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Public pensions in the U.S.: Fitting social security for the future

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Lehrstuhl für Finanzwissenschaft

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Public Pensions in the U.S.

Fitting Social Security for the Future

Diskussionsbeitrag 49

Potsdam 2005

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Public Pensions in the U.S.

Fitting Social Security for the Future

Freie wissenschaftliche Arbeit zur Erlangung des Grades eines Diplom-Volkswirts
an der Wirtschafts- und Sozialwissenschaftlichen Fakultät der Universität Potsdam

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Mit den Finanzwissenschaftlichen Diskussionsbeiträgen werden Manuskripte von den Verfassern möglichen Interessenten in einer vorläufigen Fassung zugänglich gemacht. Für Inhalt und Verteilung sind die Autoren verantwortlich. Es wird gebeten, sich mit Anregungen und Kritik direkt an sie zu wenden und etwaige Zitate aus ihrer Arbeit vorher mit ihnen abzustimmen. Alle Rechte liegen bei den Verfassern.

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Table of Contents

List of Abbreviations v

List of Figures vi

List of Tables vii

1 Introduction 1

2 The Public Old Age Insurance of the U.S. 2

2.1 Historical overview . . . 2

2.2 Technical details . . . 4

2.2.1 The income side . . . 6

2.2.2 The expenditure side . . . 8

2.2.3 Eligibility . . . 9

2.2.4 Benefit calculation . . . 10

2.3 Individual equity and social adequacy . . . 11

2.4 Conclusion . . . 13

3 The Economic Problem of Old Age 13

3.1 Introduction . . . 13

3.2 Risks and economic security . . . 14

3.3 Old age, retirement, and individual precaution . . . 14

3.4 Insurance markets, market failures, and social insurance . . . 16

3.4.1 Individual attitude towards risk . . . 17

3.4.2 Low income groups . . . 17

3.4.3 Moral hazard . . . 18

3.4.4 Adverse selection . . . 18

3.4.5 Additional reasons . . . 19

3.5 Options for public pension systems . . . 21

3.5.1 Introductory remarks . . . 21

3.5.2 Properties of unfunded systems . . . 23

3.5.3 Properties of funded systems . . . 25

3.5.4 Impact on saving . . . 26

3.5.5 Impact on the retirement decision . . . 28
3.6 Concluding remarks . . . 29

4 The Problems of Social Security **30**
4.1 The financial balance of OASDI . . . 30
4.1.1 The current state . . . 30
4.1.2 Short-run projections . . . 30
4.1.3 Long-run projections . . . 31
4.2 Causes of the long-run problems . . . 33
4.2.1 Early retirement . . . 33
4.2.2 The baby boom and the declining fertility rates . . . 35
4.2.3 Increasing life expectancies . . . 36
4.3 Rates of return . . . 40
4.4 Conclusion - The case for Social Security reform . . . 42

5 Proposed Remedies **42**
5.1 Introduction . . . 42
5.2 Full, partial, or no privatization? . . . 43
5.3 The President's Commission to Strengthen Social Security . . . 46
5.3.1 Background . . . 46
5.3.2 Three models to change Social Security . . . 47
5.3.3 Implications of the changes . . . 49
5.3.4 Discussion . . . 50
5.4 Kotlikoff's Personal Security System . . . 51
5.4.1 The model . . . 51
5.4.2 Discussion . . . 54
5.5 The Diamond-Orszag Three-Part plan . . . 54
5.5.1 Introduction . . . 54
5.5.2 Proposed adjustments . . . 55
5.5.3 Discussion . . . 57
5.6 Comparison . . . 57

6 Conclusion **59**

References **61**

List of Abbreviations

AIME	Average Indexed Monthly Earnings
DB	Defined Benefit
DC	Defined Contribution
DI	Disability Insurance
COLA	Cost of Living Adjustment
CPI-W	Consumer Price Index for Urban Wage Earners and Clerical Workers
EEA	Early Entitlement Age
NRA	Normal Retirement Age
OAI	Old Age Insurance
OASI	Old Age and Survivors Insurance
OASDI	Old Age, Survivors and Disability Insurance
OECD	Organisation for Economic Co-operation and Development
PAYGO	Pay-as-you-go
PIA	Primary Insurance Amount
SI	Survivors Insurance

List of Figures

1 Projected OASDI trust funds assets 2005-2040 in billions of constant 2004 dollars. 32

2 Total fertility rates in the U.S. 1920-2000. 35

3 Historic and projected life expectancies at birth for women and men in the U.S. 1940-2080. 37

4 Age structure of the U.S. population in 2000 and 2030. 38

5 Population 65 years and older as a percentage of the population 20-64 years old for the years 1960-2080. 39

List of Tables

1 Assets of OASDI trust funds in 2002 and 2003. 5

2 Sources and amounts of OASDI income in 2003. 6

3 Recipients and amounts of OASDI expenditure in 2003. 8

4 Options for designing pensions systems. 22

5 Labor force participation rates for men and women in the U.S. for selected years and age groups. 34

6 Inflation-adjusted rates of return under OASI. 40

1 Introduction

In the United States and in many other countries, retiring people are provided with public retirement payments to replace some of the wage income they no longer earn. Historically, the decision to retire was very often the consequence of an onset of physical inability to work, which for many elderly meant a sharp reduction in their standard of living. The availability of public retirement benefits helped to improve the situation of the non-working elderly population dramatically as it created an additional source of income and serves as a protection against the economic consequences of old age. At its implementation, the so-called Old Age, Survivors, and Disability Insurance (OASDI) program, also referred to as Social Security, was designed as a pay-as-you-go system, meaning that the currently working population finances the benefits of the currently retired population. Such system can be implemented within a relatively short time. However, it can only be sustained as long as there are enough workers relative to retirees so that financing the benefits does not pose too much burden on the worker generations. However, two main developments slowly led to the deterioration in the ratio of covered workers to retirees, a process that will accelerate in the upcoming years. As a consequence, the U.S. public pension system is likely to face mounting financial pressure that may lead to the inability to fully finance promised pensions around the middle of this century.

The first reason for this development is the presence of the baby boom generation,i.e. those born between 1946 and 1964. During the baby boom, the long-run decline of the total fertility rate was interrupted for roughly two decades. However, beginning in the middle of the 1960s, total fertility declined again and remained relatively stable at low levels since then. The consequences for the retirement system will be felt when the baby boomers begin to retire, a process that will start within the next 5 years. The retirement of the baby boomers will lead to a significant increase in the ratio of people 65 years and above to the working generations.

However, this process will only accelerate and emphasize a more profound phenomenon, the significant increase in life expectancies: not only will the number of retired people increase in absolute terms when the baby boomers retire, but retirees will also live longer and hence receive benefit payments for a longer period of time than any generation before. The increase in longevity is expected to continue and will therefore be the long-run challenge that Social Security has to deal with, even after the last baby boomer has gone.

The increasing number of retirees per worker is likely to cause the current structure of Social Security to become financially unsustainable within the next decades. Hence, a nationwide

debate has begun how the public retirement system could be prepared to meet its future challenges. This goal of this paper is to give an overview of this debate, including a description of the challenges and problems to Social Security, and a presentation of possible solutions with their likely consequences for the working and retired people in the U.S. The next section will describe the history and some technical details of OASDI. In Section 3, a theoretical discussion of the economic problem of old age will be given, followed by a presentation of the challenges and problems of Social Security in Section 4. Finally, building on the theoretical examination and the evaluation of the problems the system has to meet, three different reform proposals selected to represent the whole range of proposals will be presented and discussed.

2 The Public Old Age Insurance of the U.S.

2.1 Historical overview

When the Great Depression took its start in 1929, insurance against any form of income loss was a rare exception in the United States. Apart from small groups, mainly public employees, the vast majority of workers was not insured against risks such as old age, unemployment, or disability. In the early 1930s, with the unemployment rate skyrocketing, quickly swelling poverty wiped the hopes of the Roaring Twenties away. The severity of the economic crisis made federal action necessary, as local and state levels lacked the financial means to cope with the economic impact of the Depression. As a response, a Committee on Economic Security was set up to offer recommendations on how to secure the economic status of the American people. Most of the recommendations found its way into the Social Security Act that was signed by President Roosevelt on August 14, 1935. (Social Security Administration 1997b, p. 2)

The Social Security Act introduced two public insurance systems - one for old-age benefits and one for unemployment: "The choice of old age and unemployment as the risks to be covered by social insurance was a natural development, since the Depression had wiped out much of the lifetime savings of the aged and reduced opportunities for gainful employment" (Social Security Administration 1997b, p. 3).

The collection of Social Security taxes[1] and payment of benefits began in 1937. While payments were initially made in form of lump-sum transfers, the system was changed in 1940 to pay

[1] The compulsory payments of covered workers and their employers to Social Security, expressed as percentage of their wages, are called (payroll) taxes, although they may also be called "contributions" to the insurance provided by OASDI.

monthly benefits. In 1939, the Social Security system expanded to include survivors insurance[2], and in 1956 another component was added, the disability insurance. Since then, the formal name for the combined insurance is "Old-Age, Survivors, and Disability Insurance" (OASDI), which is often referred to as Social Security.[3] In this paper, the term Social Security will refer specifically to the old age portion OAI, unless indicated otherwise.

In the early years, only workers in commerce and industry (excluding railroad workers) under the age of 65 were covered. However, during the twenty years that followed the number of persons covered quickly expanded to include all regularly employed farm and domestic workers, and the self-employed with a few exceptions as lawyers, dentists, and other medical professions. Today, coverage is almost universal; only very few employees are not covered by OASDI, among them mainly state and local government employees. The Social Security Administration (2003, p. 10) estimates that 68 percent of those 20 years and older were permanently insured in 2003, i.e. they had already worked long enough in covered occupations to qualify for benefits at the retirement age. Another measure shows that 154.3 million employees worked at some point during 2003 in a covered employment, while there were around 39.3 million beneficiaries under OASI during the same year (Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds 2004, p. 47).

The importance of OASDI becomes much clearer by looking at the sources of incomes of retirees: in 2003, Social Security benefits accounted for at least 90 percent of their income for one third of the retired; for two thirds of the same group it made at least 50 percent of income (Social Security Administration 2003, p. 7). Hence, income from Social Security is the most important source of old age income for the majority of those 65 or older. As estimated by the Social Security Administration (2004a), average benefits of all retired workers will be around $955 per month during 2005.

Over the course of the years, the system of Social Security was changed in many important ways. For example, during the first three decades of OASDI, changes in the nominal benefit amounts to compensate for lost purchasing power due to inflation were not made regularly. Since 1972, these adjustments are included in the benefit formula and occur automatically each year, a system also known as cost-of-living-adjustment (COLA).

The last important and broad reform of OASDI was legislated in 1983. In 1981, the National

[2] In the case of death of someone covered by OASDI, certain family members may be eligible for survivors benefits.

[3] When necessary, distinctions between the Old-Age Insurance (OAI), Survivors Insurance (SI) and the Disability Insurance (DI) are made.

Commission on Social Security Reform (known as Greenspan Commission) was appointed by Congress and President Reagan to recommend changes to OASDI. At that time, the financial status of Social Security increasingly worsened and it was expected that by August 1983 the trust fund, i.e. the reserve pool of money, would be exhausted. Based upon the recommendations of the commission, several important changes were made, e.g. a gradual increase in the full retirement age from 65 to 67, acceleration of already planned increases in payroll taxation, compulsory coverage of federal employees hired on or after January 1st, 1984, and a significant increase in the size of the trust fund. (Social Security Administration 1997b)

With these changes made, Social Security was thought to be put back on a sound financial foundation. However, it turns out that this reform was not sufficient to completely restore long-run financial balance, as for example the latest annual report of the Board of Trustees of the Federal Old Age, Survivors, and Disability Insurance (2004)[4] shows.

2.2 Technical details

The Old Age, Survivors, and Disability Insurance of the United States can be characterized as a public, unfunded system that provides defined benefit plans and has compulsory participation (Modigliani and Muralidhar 2004, p. 9). It is run by a public agency, the Social Security Administration, as the only provider of these insurances, and it was established by law. The provision of benefits is called a defined benefit plan if the amount of retirement payments is determined according to some benefit formula that includes variables as years of participation, or wage in the last year or some average of years. And, as mentioned above, Social Security covers almost all employees, and employees do not have the choice whether to participate or not, making it a system with compulsory participation.

A pay-as-you-go (PAYGO) system, also called unfunded system, uses contributions of the currently working to pay the benefits of the currently retired, thus there is no accumulation of financial capital throughout the working life of a worker. Originally, the OASDI financing mechanism came very close to a pure PAYGO system. However, the adopted reform proposals of the Greenspan commission of 1983 moved Social Security towards more prefunding, i.e. it accumulates reserves. The plan was to increase tax rates by more than what was necessary to finance annual benefit amounts. Doing so enabled Social Security to accumulate significant amounts of reserves in the trust funds that serve to secure the financing of obligations for the

[4] The 2004 annual report of the Board of Trustees of the Federal Old Age, Survivors, and Disability Insurance will be referred to as Board of Trustees (2004) in the remainder of this paper.

upcoming thirty to forty years. The surpluses are paid into two separate trust funds, one for OASI and another one for DI. For simplicity, both trust funds are referred to as "the trust fund" in the remainder of this work. Asset amounts of the trust funds are given in Table 1.

Source (in billions)	OASI	DI	OASDI
Assets (end of 2002)	$1,217.5	$160.5	$1378.0
Net increase during 2003	137.8	15.0	152.8
Assets (end of 2003)	1,355.3	175.4	1,530.8

Table 1: Assets of OASDI trust funds in 2002 and 2003 (Boards of Trustees 2004, pp. 19-24).

Table 1 gives a snapshot of the increase in trust fund assets between 2002 and 2003. The sheer size of $1.53 trillion in combined trust fund assets and the net increase of $152.8 billion within a year indicate clearly its importance. The assets accumulated in the trust fund are invested into special securities of the U.S. Government that can only be obtained by the trust fund, and earn approximately a market rate of interest (Rejda 1999, p. 151). Disbursements from the trust fund can only be made to pay benefits or cover the administrative costs of Social Security.

There are some interesting issues related to the Social Security budget and the recent increase in the size of the trust fund. The Social Security budget is a part of the federal budget, albeit it is stated as an "off-budget" entry, i.e. its finances are stated separately from the rest of the federal finances (Congressional Budget Office 2002, p. 1). Nonetheless, since the Social Security budget is part of the overall federal budget, it cannot be seen separately from the rest of the budget. The current surpluses are indirectly being used to fund other government activities. Although the money is not directly diverted to pay for other federal expenses, the government needs to borrow less from the public because the trust fund reserves are invested in government securities. An open question is how this affects public saving on the federal level: did the trust fund lead to an increase in public saving, or did Social Security surpluses induce the government to spend more? According to the Congressional Budget Office (2002), the answer is uncertain; Diamond and Orszag (2004, p. 204) arrive at the same conclusion.

Another issue concerns the investment practices of the trust fund. Some authors argue that instead of exclusively investing in government securities, the trust fund could invest assets in also in private bonds and stocks to create higher returns. In fact, large-scale investments of trust fund assets in such equities were part of a proposal of the 1994-96 Advisory Council on Social Security (Gramlich 1996). However, this idea seems politically unattainable. As Cogan and

Mitchell (2003) report, a proposal to allow equity investment of the trust funds was rejected by the Senate in 1999 by 99 to 0 votes. The fear is that the government would have too much influence over the economy given the size of the trust funds. Considerations other than risk-return aspects could gain too much of importance.

2.2.1 The income side

At the present, Social Security knows three types of income: payroll taxes of covered workers, interest on the accumulated trust fund assets, and taxation of retirement benefits. These three sources created revenues of $631.8 billion in 2003, with the share of payroll taxation being by far the highest, as Table 2 shows.

Source (in billions)	OASI	DI	OASDI
Payroll taxes	$456.1	$77.4	$533.5
Interest earnings	75.2	9.7	84.9
Taxes on benefits	12.5	0.9	13.4
Total	543.8	88.0	631.8

Table 2: Sources and amounts of OASDI revenue in 2003 (Board of Trustees 2004, pp. 19-24).

Payroll taxes

The Social Security payroll tax is a proportional tax on wage income, and it is dedicated exclusively to OASDI. Half of the amount is paid by the employer, the other by the employee, while the self-employed pay the full amount.[5] The combined tax rate started at 2 percent of gross wages in 1937, but increased significantly over time as coverage expanded, and benefits were raised. The 1983 reform of the Reagan administration included a gradual increase of the combined tax rate on gross wages dedicated to OASDI from 11.4 percent in 1984 to 12.4 percent in 1990. Subject to taxation are only earnings below the so-called maximum taxable earnings base. This limit is adjusted every year in line with the growth of average wages in order to maintain the tax base. It was equal to $87,900 in 2004, and will be $90,000 in 2005 (Social Security Administration 2004a).

[5] These taxes are part of the Federal Insurance Contribution Act (FICA). Apart from the OASDI payroll tax, FICA also includes a 1.45% employee and employer tax on all earned income. The tax collections finance the Medicare Part A (Hospital) program.

According to the Social Security Administration (2003), 6 percent of workers with taxable earnings had earnings of at least the amount of the maximum taxable earnings base. These earnings that were above the threshold represented 15 percent of all earnings in covered employment.
Concerning the partial financing of Social Security by both employer and employee, Diamond and Orszag (2004, p. 24) point out that "both economic theory and empirical evidence suggest that the employee effectively pays the full $12.40 in taxes [out of a $100 in wages], because the tax imposed on the employer reduces what he or she is willing to pay the employee by approximately the amount of the tax." From a purely theoretical point of view, the burdens borne by employers and employees depend on the elasticities of labor demand and labor supply with respect to wages, shown for example in Salanié (2003, pp. 16-18). However, as Salanié also points out, the elasticity of labor demand is likely to be significantly higher than that of labor supply. If this is the case, an increase in payroll tax rates will in relative terms depress net wages by much more than it will raise gross wages. Therefore, it seems more likely that the employee bears a much larger burden of the tax than suggested by the equal split of the combined tax rate.

Interest earnings

As mentioned above, since the reform of 1983 Social Security runs significant annual surpluses which are accumulated in the trust fund. The trust fund is not a new creation, it existed since the establishment of the program and it contained assets at all times. Rejda (1998, p. 151) gives three main reasons for its creation: first, investing the assets will yield interest income that may contribute to the payment of benefits and administrative expenses. Second, it helps to assure the payment of benefits even during temporary periods of declining revenues, e.g. recessions. And third, the existence of a trust fund may play an important role in increasing public confidence in Social Security.
Almost all of the assets are invested in special public debt obligations that can only be obtained by the trust fund and pay a market rate of return of comparable obligations. The interest on the accumulated assets in recent years began to represent an important stream of income for OASDI, which accounts for more than 10 percent of trust fund revenue today, an amount higher than the income from taxation of benefits (see Table 2).

Taxation of benefits

The third source of income for OASDI is generated through partial taxation of Social Security benefits. Until 1984, benefits had not been subject to taxation. However, with the reform of 1983, partial taxation has been introduced. For individuals with a combined income[6] from all sources between $25,000 and $34,000 (or married couples with income between $32,000 and $44,000), 50 percent of benefits are subject to taxation. If the annual income is higher, up to 85 percent of benefits may be subject to income taxation. Interesting about the taxation of benefits is the fact that the mentioned income thresholds will not change automatically. It can therefore be expected that taxation of benefits will generate higher revenue in the upcoming years both because more people will receive benefits and the automatic adjustment of benefits through COLA will result in more pensioners having income above the lower boundary. (Diamond and Orszag 2004)

2.2.2 The expenditure side

Social Security expenditures mainly consist of benefit payments, but include also two other important categories: administrative expenses and transfers to the railroad retirement program. Table 3 presents the sums for different categories of OASDI expenditures in 2003.

Source (in billions)	OASI	DI	OASDI
Benefit payments	$399.8	$70.9	$470.7
Administrative expenses	2.6	2.0	4.6
Transfers to railroad retirement progam	3.6	0.2	3.8
Total	406.0	73.1	479.1

Table 3: Recipients and amounts of OASDI expenditure in 2003 (Board of Trustees 2004, pp. 19-24).

Comparing Table 3 and Table 1 gives a relative perspective of the size of the current trust fund: it can be expressed as roughly three times the amount of current annual benefit payments of OASDI. Another interesting fact about the expenditure side of OASDI is the relatively low amount of administrative expenses, which make up roughly 1 percent of total expenditure. Looking only at OASI, the share of administrative expenses is even lower, accounting for only 0.65 percent of total expenditure or 0.57 percent of payroll tax revenue. This may be an

[6] "Combined income" is the sum of adjusted gross income, nontaxable interest, and one-half of individual Social Security benefits.

important fact when comparing alternative systems of old-age insurance.

2.2.3 Eligibility

The following explanations of eligibility and benefit calculation are based on Social Security Administration (2004c) and Rejda (1999). A person (or his/her dependants) is only eligible for retirement benefits under Social Security, if two main conditions are satisfied: the worker must have reached at least the Early Entitlement Age (EEA), and she must have earned at least 40 Social Security credits.

Credits can only be earned in an occupation with Social Security coverage, and one credit will be given for every $900 in net earnings (in 2004) up to a maximum amount of four credits per year (one per quarter). This implies that net earnings of $3,600 in 2004 will be sufficient to receive four credits, a limit that almost everyone covered under OASDI will meet. As a result, for the majority of covered workers 10 years of covered work will be satisfactory to claim benefits at the EEA. The amount of net earnings necessary to earn credits changes every year to account for earnings growth.

The EEA is the earliest age at which retirement benefits can be claimed; under current legislation it is 62 years. However, if a worker retires at the age of 62 years she will not receive the full amount of possible retirement benefits. This will only be the case for workers retiring at the so-called Normal Retirement Age (NRA)[7]. The NRA was changed with the reform of 1983 and will gradually increase from 65 years for those born 1937 and earlier to 67 years for those born 1960 and later. This change was made as a response to increases in life expectancy; in combination with higher reductions for early retirement, it will also increase the incentive to work until the NRA.

Another incentive for working longer years is the so-called delayed retirement credit, i.e. an annual increase in benefits for working beyond the normal retirement age without claiming OAI benefits. The increase will be 8 percent per additional year of working (for those born 1943 or later) up to the age of 70 years.

Apart from the direct beneficiary who earned his credits through personal payment of payroll taxes, Social Security knows some other types of beneficiaries: dependants of retired workers, and survivors. Among the dependants, eligible beneficiaries can include wives, husbands, children, and even divorced wives and husbands[8]. Eligibility is mainly determined by the age; for

[7] The Normal Retirement Age is sometimes also referred to as the Full Retirement Age (FRA).

[8] A spouse will receive 50 percent of the retired worker's benefits, if the marriage lasted for at least 10 years.

example, wives receive benefits only if they reached the retirement age; or children can only be eligible up to a certain age, which usually is 17.

It is possible to receive benefits and earn an additional income through working. However, if somebody receives benefits before reaching the NRA and the additional annual earnings are above the earnings limit[9], the benefit amount is reduced by $1 for each $2 in earnings that are above the earnings limit. This deduction reduces to $1 for each $3 in earnings during the year in which the beneficiary reaches the NRA, and in the year following completion of the NRA, benefits will not at all be reduced by additional earnings. This system is the so-called earnings test of Social Security.

2.2.4 Benefit calculation

The determination of the monthly benefits a retired worker will receive is relatively complicated and a detailed description would go beyond the purpose of this paper. However, a brief overview of the mechanism will be given to show that the absolute amounts of taxes collected through payroll taxation during the working career are not relevant to compute the monthly benefits someone will receive during retirement.

Basis for the computation of monthly benefit amounts are the *average indexed monthly earnings* (AIME) and the *primary insurance amount* (PIA). The average indexed monthly earnings summarize up to 35 years of earnings of a worker.[10] To obtain the AIME, the earnings a worker received during his working life are converted ("indexed") using the national average wage indexing series. This method of conversion lets workers benefit from real wage growth during their working career. In the next step, those 35 years with the highest indexed earnings are summed up and divided by the number of months in 35 years.[11] The resulting number is represents the AIME.

The primary insurance amount is based on that number and is determined as the sum of three percentages of portions of AIME. For 2004 these percentages and portions were:

(a) 90 percent of the first $612 of AIME,

(b) 32 percent of AIME over $612 and through $3,689,

This applies as well to divorced but un-remarried spouses.

[9] The annual earnings limit changes each year. In 2003 it was $11,520 for beneficiaries under the NRA and $30,720 for those reaching the NRA in 2003.

[10] If there are more than 35 years of covered employment, only the 35 years with the highest earnings are used.

[11] Benefits from covered employment of less than 35 years are calculated by using the actual number of months in covered employment.

(c) 15 percent of AIME over $3,689.

The two bend points that determine the portions ($612 and $3,689 in 2004) change every year along with the national average wage index, while the percentages themselves remain constant. In a last step, the monthly benefit amount is calculated depending on the age at retirement. If a person retires exactly at the normal retirement age, the monthly benefit amount will be exactly equal to PIA, but it will be lower (higher) if a person retires earlier (later). For example, someone born before 1938 who retires at age 62 would receive 80 percent of PIA, while retirement at age 70 would result in 132.5 percent of PIA (Social Security Administration 2004b). It is worth emphasizing that the determination of the monthly benefit amount is done using wage indexation at both the determination of AIME and the bend points in the PIA formula.

It should be noted that the PIA has an upper limit, which may not be obvious by looking just at the way it is calculated. Since there is an upper limit for taxable earnings, earnings that are above that limit are not relevant for the calculation of AIME and PIA, which results in an upper limit for benefits. In 2004, the maximum possible amount of Social Security benefits was $1,825 per month.

As already mentioned, since 1972 the change in nominal retirement benefits occurs automatically through a system called COLA. This adjustment is based on the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) and it aims at holding the real value of the monthly benefit amount constant. The exact computation uses the change in the average third-quarter CPI-W between two years and is applied beginning with the December benefits. The cost of living adjustment increases the primary insurance amount (but not the bend points) and thus indirectly the monthly benefit amount. As a result, wage indexation is used to determine the initial monthly benefit amount, while from then on the monthly benefit is indexed to prices as reflected by the CPI-W. An issue in this context is that the Consumer Price Index CPI, and also the CPI-W, may actually overstate the true increase in the cost of living (Stiglitz 2000, p. 375). If this is the case, the real value of a person's monthly benefit will increase over time, which is not intended by the cost of living adjustment.

2.3 Individual equity and social adequacy

The determination of the monthly benefit amount indicates that benefits for low-income earners replace a higher percentage of their last (or averaged) wage income than benefits for higher income groups, i.e. the replacement rate is higher for low income earners. This happens despite

the fact that the payroll tax is the same for all income groups. Therefore, Social Security obviously has a strong redistributional component that aims at supporting low-wage earners during their retirement period. The Board of Trustees (2004, p. 186) projects that in 2004 the replacement rates at the normal retirement age for low, medium, and high income[12] earners will be around 57.4, 42.5, and 35.7 percent, respectively.

This example highlights an important tension to be solved within Social Security, the tension between individual equity and social adequacy. According to Rejda (1999), social adequacy refers to the achievement of a certain standard of living through the benefit payments to all former contributors. Individual equity on the other hand requires a direct link between contributions and benefits.

By looking at the computation of the monthly benefit amount, it seems that Social Security emphasizes the social adequacy character stronger. The same conclusion can be drawn by realizing that the first generation of retirees received benefits despite having contributed little or nothing. Consequently, the system redistributes income by undercharging some groups while overcharging others (Rejda 1999, p. 21).

Other redistributional components can be found by comparing rates of return for different demographic groups within a birth cohort. Leimer (1999) reports several differences in the rates of return on contributions to Social Security found in the literature: women tend to achieve better rates of return than men, which can mainly be explained by their relative higher life expectancy. The spouse benefit is the main reason why married couples have higher rates of return than unmarried couples or singles that never married. Additionally, life expectancy for singles is lower, leading to another negative impact on their rates of return. Finally, he also reports lower rates of return for whites than for non-whites, which he attributes to lower earnings for non-whites and the progressivity in benefit calculation.

Redistribution under Social Security also occurs from the poor to the rich. It is well documented that rich people have longer life expectancies than poor people (Kotlikoff 1995, p. 27); therefore, richer individuals will receive their benefits for a longer period of time. Kotlikoff (1995) even argues that this introduces a regressivity into Social Security that may completely offset the progressivity of the benefit formula.

[12] The income definitions are set as a percentage of the average wage indexing series used by the Social Security Administration. They also take account of the earnings patterns experienced on average by workers of these groups between 1991 and 2000. (Board of Trustees 2004, p. 185)

2.4 Conclusion

In summary, the importance of the current system for the elderly can hardly be overstated. Its coverage is extensive and includes almost any worker in the U.S., which in turn implies that the majority of those 62 years and older will have the right to claim benefits under Social Security. The system includes a strong redistributional component by replacing a higher share of wage income for those who had low earnings. Other important features are the payment of inflation protected annuities for the whole retirement period, and the determination of the initial monthly benefit amount based on growth in real wages.

3 The Economic Problem of Old Age

3.1 Introduction

It has already been mentioned that among the reasons for establishing the U.S. Social Security system as a public system was the fact that life-time savings for many elderly were virtually wiped out as a result of the stock market crash and the Great Depression. Not surprisingly, policymakers saw it as an important goal to support the many elderly that suddenly found themselves in poverty. Another reason was to give elderly workers the possibility to retire and thus to relieve the labor markets of workers during those times of high unemployment. The establishment of a public system was seen as the only way to quickly achieve these goals given the conditions during the Great Depression, especially because it could be implemented relatively quickly and paid for by the working population.

However, publicly run retirement systems with varying coverage can be found in all member countries of OECD (see for example Kalisch and Aman 1998), some of them were established decades before the Great Depression or the U.S. Social Security legislation took place. In this context it seems worth looking at the reasons of this dominance. The next subsections will explain in greater detail the economic problem of old age, different forms of protection, the dominance of public pension systems, properties of funded and unfunded systems, and the impact these systems may have on labor force participation and national saving. However, before turning to the general problems associated with old age, some introductory remarks on risks and economic security will be given.

3.2 Risks and economic security

Starting at the very beginning of the economic problem, any individual is confronted with the problem of scarcity, resulting from having unlimited wants and needs while being constrained by limited resources. Given the constraints, an individual tries to satisfy her needs and wants in the best possible way. If the individual is relatively certain to be able to satisfy present and future basic needs and wants, she is experiencing a sense of well-being because of economic security (Rejda 1999). This sense of well-being can thus be viewed as a desirable state.

However, individuals may not at all times be able to achieve the state of economic security. It is in the nature of the world that future events are uncertain, and it is therefore possible to move from economic security to a state of economic insecurity. There are various reasons for this to occur, e.g. diseases, disability, death of the primary income earner, unemployment, pregnancy, or old age. The results of any of these events can be loss of income, additional expenses, insufficient income, and/or uncertainty of income, which in turn may result in economic insecurity. (Rejda 1999)

According to Knight (1921), future events are usually distinguished according to what is known about their probability distribution. Uncertain events are those for which nothing is known about the probability distribution, while in the case of risky events information about the probability is available. The above mentioned possible causes of economic insecurity can be considered risks, while the category of uncertainty includes events as wars, natural disasters, inflation, recessions, i.e. events of a more general nature beyond an individual's influence.

The difference between risk and uncertainty has important consequences for attempts to reduce the likelihood of a negative event or the consequences in case it occurs. Individuals can take sufficient steps to protect themselves against risky events, e.g. through pooling of risks (insurance) or measures to reduce the probability of negative events (e.g. healthy lifestyle). In the case of uncertainty, individual actions are not necessarily sufficient to protect against negative economic consequences, for example because insurance is not available, or the nature of the event makes it impossible to reduce the likelihood through actions on the individual level (Petersen 1989).

3.3 Old age, retirement, and individual precaution

An precise definition of old age turns out to be relatively difficult. On an individual level, old age clearly cannot be defined a priori in terms of a specific age after which "old age" begins. It

rather refers to events that occur with a higher probability to individuals of a higher age, while there may be a high variation within a birth cohort when a certain member is affected. In a very narrow sense, old age can be understood as an event whose occurence makes it impossible for the individual to earn a wage income. Such a narrow definition would capture, for example, the decline in physical and/or mental abilities, or the increased likelihood of diseases an individual may experience as a result of aging. It may, however, turn out to be practically difficult to define clear borders to other risks such as sickness or disability, as they may not at all times occur independently.

A broader definition of old age would use reaching a specific age as the occurence of the "old age" event. Such a definition would naturally include individuals who are still able and willing to earn a wage income. While the onset of old age in the narrow sense differs across individuals and can at best be defined on an average basis, lawmakers can and did define ages for eligibility for collecting retirement benefits. However, retirement as an act by itself, i.e. the withdrawal from the labor force, is usually not bound to a specific age. In absence of mandatory retirement and medical reasons that may force retirement, it is finally up to the individual to decide on the timing of retirement, which may even extend over a period of time, beginning with reduced labor force participation.

It has been mentioned above that old age is one of the risks that may cause economic insecurity. This follows primarily from the important role wage income plays for most people to satisfy basic needs and wants. Old age may reduce or end an individual's ability to work and earn wage income, mainly due to a decline in physical and/or mental conditions. Hence, loss of income or insufficient income represent the foremost reasons for economic insecurity in old age. Additionally, one can also observe other reasons for economic insecurity, as additional expenses that are related to old age, e.g. for care-takers. This raises the question how individuals can protect themselves against economic insecurity in old age. (Rejda 1999)

The most obvious way of protection would be to accumulate savings during the working life. Savings plus the interest earned could be used during the retirement period to create an income stream which could at least partially substitute the loss of wage income. However, there are many reasons why economic insecurity may not be prevented. First of all, life expectancy is a random variable. Hence, it may be possible that saving for old age is unnecessary because of death before old age. Another possibility is that accumulated savings may be insufficient to maintain the individual living standard for the whole retirement period. Reasons for this may be

an incorrect judgment about the personal life expectancy (risk of longevity) or low wage income during the work life, making sufficient saving impossible (earnings risk). Another complicating factor is that individuals may have a strong preference for current consumption over future consumption, and therefore they may not save enough.

It may also be possible to reduce economic insecurity through intrafamily transfers. One could, for example, imagine an unwritten contract between parents and children: parents get support during old age in return for raising and protecting their children during childhood. However, there are reasons why this may work insufficiently: people may not have children, be it voluntary or involuntary, and second, children may not feel obliged to support their parents during old age. Again, the risk of economic insecurity in old age cannot be excluded.

Another possibility to reduce the resulting economic insecurity associated with old age would be to pool risks over a group of people. Pooling of risks has two beneficial results: it improves predictions of future losses by application of the statistical law of large numbers, and it spreads the costs of harmful events over the entire group (Rejda 1999, p. 30). It is therefore a main feature of insurances of any type, which can be defined as "pooling of risks of fortuitous losses by transfer of such risks to insurers who agree to indemnify the insured for such losses, to provide other pecuniary benefits on their occurrence, or to render services connected with the risks." (Commission on Insurance Terminology of the American Risk and Insurance Association 1965, p. 1)

An important feature of risk pooling is that the risk moves from the insured to the insurance company, which will reimburse the insured in case of the event giving rise to the claim. In return it receives insurance premiums from the insured. The premiums to be paid for a specific insurance are in the simplest case calculated on basis of the probability of the risk and the sum insured, i.e. the amount of money to be paid in the event giving rise to the claim. Insurances can therefore be seen as a tool of reducing economic insecurity that makes use of the market mechanism. In the next section it will be discussed whether insurance markets are an applicable solution to the old age problem.

3.4 Insurance markets, market failures, and social insurance

In general, insurance contracts can be thought of as a specific good offered on insurance markets, where demand and supply will determine the individuals covered, the scope of coverage, as well as the premiums. The emphasis of such private insurances is on individual equity, which

refers to a strong relation between individual premiums, the probability of the risk, and the insured amount. Customers are free to decide whether to purchase insurance or not, or which among different degrees of coverage to choose according to their preferences and ability to pay premiums (Rejda 1999).

However, private insurance seems to have its limits, and there exist various reasons that may - in an extreme case - even lead to market failure. The following list of examples draws from Petersen (1989, pp. 54-58). Although these reasons affect private insurance in general, in the following paragraphs the examples will be put in the context of the old age problem, if possible.

3.4.1 Individual attitude towards risk

The first argument concerns the fact that individuals may differ in their attitudes towards risk, i.e. individuals can be either risk-taking or risk-averse. While for risk-takers already an actuarial fair insurance premium would be above what he or she is willing to pay, the opposite would be the case for a risk-averse person. Apart from differing attitudes towards risk, in case of the old age problem it is also possible to observe different degrees of time preference among individuals. If today's consumption is much more highly valued than future consumption, individuals may again not be willing to pay actuarial fair premiums. Accounting for the fact that real world insurance premiums add shares for administrative costs and profit margins to the actuarial component, a significant number of persons may choose not to insure. Additionally, insurance companies may also tend to be risk-averse, which results in attempts to separate good from bad risks and charging them different premiums. This category by itself does not constitute market failure, because policies would still be supplied and demanded. However, from a social point of view it may not be desirable to have large numbers of individuals without protection, e.g. because it may not be socially acceptable to have poverty among the elderly or because it may present additional costs to the public through forms of public assistance. (Petersen 1989)

3.4.2 Low income groups

Another case that may make it impossible for individuals to acquire insurance arises if even the lowest insurance premium would still be above what a person is able to pay. This is clearly the case when a person has an income close to or even below the socially defined poverty level and payment of the insurance premium would move him or her below that level. Again, insurance will not take place. (Petersen 1989)

3.4.3 Moral hazard

Moral hazard is the phenomenon that an individual may change her behavior once covered by an insurance. Being covered by insurance may reduce incentives for individual attempts to reduce the probability of risky events, i.e. insurance may increase the likelihood of the risks covered. The result of moral hazard is that it increases the costs to the insurance, which in turn could lead to increasing premiums. However, since the increased costs are spread over the entire group of insured, the increase a single person will face may be of little importance compared to the claim received, and thus would not represent a sufficient disincentive. The case of moral hazard in terms of old age insurance arises if the insurance event is defined by reaching a certain age rather than not being able to work. In this case, even someone who is still willing and able to work may have a strong retirement incentive that rises with the replacement achieved through insurance payments (see Stiglitz 2000, p. 362). In other words: insurance against the economic problems of old age may make retirement possible in the first place.

3.4.4 Adverse selection

Adverse selection, on the other hand, is the possibility that asymmetric information may cause bad risks to be disproportionately more represented among the insured because of an inability on part of the insurance company to separate good from bad risks. In their seminal paper, Rothschild and Stiglitz (1976) present a model in which asymmetric information in insurance markets leads to market failure. Although their model uses the market for health insurance, it can be equally applied to the market for retirement insurances paying annuities. In their model, utility maximizing individuals are either good or bad risks, while the profit maximizing insurance company does not possess information about the risk an individual represents. Their conclusion is that a pooling equilibrium, in which both types pay the same premium, is not possible. Additionally, there is the possbility that a separating equilibrium in which both types of risks pay different premiums may also not exist. Consequently, there may be market failure in insurance markets because of asymmetric information.

For the specific case of old age insurance and annuities, adverse selection is cited as the main reason why private insurance companies offer annuities, if at all, only with a significant mark-up. The idea is that those purchasing annuities are likely to be the ones with higher than average life expectancies. Insurance companies may therefore be forced to raise the price of annuities to cover their cost, which in turn would make such contracts unattractive for individuals who

expect to have normal or low life expectancies. Hence, there could be room for welfare improvement, e.g. by introducing mandatory participation and requiring insurers to offer contracts to any customer.

3.4.5 Additional reasons

Finally, further problems are worth mentioning. So far it has been assumed that insurance companies exist and will do so, but there is in fact no guarantee that an insurance company will not go bankrupt, including the possibility of complete or partial loss of accumulated claims. However, there exist ways to reduce that risk, e.g. through requiring the company to invest in less risky assets or to accumulate extra reserves to cover potential losses. (Petersen 1989)
Other reasons for possible market failure, specifically addressing private old age insurance, are given by Diamond (1977). These reasons include the absence of real investment security, real annuities, and the risks associated with the length of the working life. The absence of real investment security refers to the fact that any investment, no matter into what type of assets, will involve risks, ranging from the risk that the actual return will be less than the expected return to the complete loss of the investment amount. These risks are particularly important for small investors whose funds are not sizeable enough to obtain an optimally diversified portfolio. The second reasons refers to the absence of private inflation protected annuities. As Stiglitz (2000, p. 359) points out, "the closest private policies have come to indexed benefits are annuities whose benefits are linked with the performance of the stock market." Stiglitz (2000) notes that, apart from the adverse selection problem, this may be because unlike the government, insurance companies cannot engage in risk sharing over generations, and they cannot simply increase revenues to meet their obligations. However, Blinder (1988, p. 22) argues that protection against inflation could also be achieved by purchasing indexed bonds.
Finally, the risks involved with varying lengths of working life arise because of moral hazard and adverse selection. Diamond (1977) considers them to be particularly important. It refers to the possible need of early retirement, which may shorten the time available for an individual to accumulate sufficient funds to finance retirement. However, insurance against this risk is likely to face serious moral hazard and adverse selection problems, as the insurance companies may not be able to perfectly monitor an individuals condition, especially if the ability to earn wage income declines gradually. Additionally, an individual's wish to retire early may also result from large increase in disutility from work (Diamond 1977).

A reason not mentioned so far is that from a society's point of view there may be preferences towards having a minimum level of economic security, derived from prevailing moral and ethical convictions. With the emphasis on individual equity, it may not be possible to achieve minimum economic security in a system of private old age insurance as long as there are people who are not covered, especially because of relative poverty, or who receive payments from their insurance contract that will not be sufficient to resolve economic insecurity (Rejda 1999, p. 28). In awareness of the problems associated with private insurance, it is worth to evaluate whether public involvement could resolve some of these issues. There exist many different ways how public interaction could achieve economic security, ranging from regulation of private insurance markets to a public insurance monopoly (Petersen 1989).

Compulsory private insurance could be one possible way to circumvent many of the problems associated with private insurance. In such case any individual would be forced to choose an old age insurance, which could solve the adverse selection problem. As it will be discussed later, this is indeed part of many of the proposals to reform Social Security. The current system of OASDI also relies on compulsory participation, albeit insurance has to be taken from a public monopoly.

The major shortcoming of compulsory private insurance is that low income groups may be hurt disproportionately through significant reductions in their current disposable income. This is the result of the principle of individual equity, i.e. private insurance does not include redistributional components. It is this lack of redistribution that is often used as a justification for implementing old age insurance in the form of a public monopoly with compulsory participation. A reasonable question in this context would be whether this redistributional component needs to be included in the pension system. Alternatively, society could support low income groups through the taxation system, e.g. as done through the earned income tax credit of the federal income tax. Diamond (1977) notes here that he views redistribution through the income tax system as not ideal, and that there is room for additional redistribution.

Probably more important is the fact that only the government is able to enact intergenerational redistribution. The main beneficiaries of this type of redistribution were of course the first retirees. A justification for such redistribution could be that those first retirees where the ones affected worst by the Depression. No private insurance company could engage in such form of intergenerational redistribution and risk-sharing. (Diamond 1977)

A public monopoly may add other advantages. Often mentioned are low transaction costs of

public old age insurance monopolies (e.g. Stiglitz 2000), since public retirement systems have comparatively lower marketing costs, e.g. because there is hardly need for advertising and salespeople. Additionally, the administration of insured's data, benefit payments, and premium collection can be centralized, which represents another cost advantage over competing private insurance companies. (Diamond 1996)

Kalisch and Aman (1998) also cite a so-called reward rationale for public retirement systems. According to this rationale, the retired generation should be rewarded for having contributed to the development of the country. This reward should come from the "collective resources of the community." (Kalisch and Aman 1998, p. 6).

A paternalistic argument is given by many authors, including Stiglitz (2000), Diamond (1977), and Kalisch and Aman (1998). This argument rests on the possibility that people may not save sufficient amounts during their working years. The existence of a compulsory savings scheme in form of a public retirement system could present a solution by forcing people to save more than they otherwise would, and also raise the awareness of the need for saving for retirement. The main reason why people may not save enough include strong preferences for current over future consumption, wrong judgments about the amount of savings needed, or unsuccessful investment choice.

All these reasons are commonly used to justify why retirement systems should be public systems. The most convincing ones can probably be derived from the need or preference for income redistribution. In a historic perspective, a convincing argument seems to be the need to quickly implement the retirement system, and to use intergenerational redistribution for its financing.

3.5 Options for public pension systems

3.5.1 Introductory remarks

Discussions about design or reform of pension systems often appear confusing because of the variety of terms in use. Therefore it seems important to clarify some of these terms.

The first distinction concerns the determination of the pension benefit to be received. This can be done either through defined benefit (DB) or defined contribution (DC) systems. In the first case, the (real or nominal) annuity, i.e. the benefit, is specified and usually calculated according to the last salary or an averaged salary over a certain number of years before retirement. A defined contribution plan, on the other hand, specifies an amount that has to be paid as a contribution to the retirement plan. The funds accumulated through the contributions will be invested in

financial assets that pay a rate of return, be it through interest, dividends, or the change in market value. The benefits will be paid out of the total assets in the account upon retirement. Since the return on the assets is uncertain, the amount of benefits will become uncertain as well. Before the benefit payments start, the beneficiary can usually decide on whether to draw from the funds until all of it is used up or whether to convert them into a nominal annuity.

Diamond (2001) compares some risk characteristics of DC and DB plans. He argues that DC plans expose the individual usually more to the earnings risk, the asset return risk, and the risk of longevity. Under DB plans these risks are usually spread more widely over all participants, specifically future retirees, depending on how much the benefit formula incorporates increasing life expectancies.

Another important distinction concerns the organization of the pension system. It was mentioned earlier, that the two ideal-typical options are the funded and the unfunded (PAYGO) system. The main difference is that in a funded system a stock of financial capital is built up, which together with the return to investment of these assets is used to finance benefits. An unfunded system is usually balanced such that revenue within a year is sufficient to pay benefits of the same year.

Using the distinctions described above, four combinations of designing pension system can be derived as shown in Table 4.

	unfunded	funded
defined benefit (DB)	traditional PAYGO	traditional occupational or employer plan
defined contribution (DC)	notional accounts	Individual (or personal) accounts, e.g. Pillar 2 of World Bank (1994)

Table 4: Options for designing pension systems (taken from Willmore 1998, p. 2).

As indicated in Table 4, unfunded, defined benefit schemes are the common form of public pension systems in most countries. The U.S. Social Security system is also organized in a PAYGO-DB fashion. However, the last big reform of 1983 modified the PAYGO character. Since revenue from payroll taxation exceeds expenses significantly for the last years, the trust funds could be built up significantly, which would move current Social Security a bit away from pure PAYGO-DB towards a partially funded DB system. Nevertheless, it is far from being characterized as fully funded.

3.5.2 Properties of unfunded systems

But why is there such a predominance of unfunded systems? The reason is that PAYGO systems can be implemented rather easily and quickly, because there is no time needed to accumulate funds to provide benefits from. Instead, a tax is imposed on the currently employed which finances the benefits of the retired population, a process that can be legislated within a rather short period of time.

The important role of PAYGO systems makes it worthwhile to look at their properties in more detail. The basic idea has already been described: currently employed are taxed to finance benefits of the retired. The main properties of PAYGO systems can be shown in a simple framework, as given for example in Petersen (1989) or Sinn (2000). The parameters used are the number of employees E_t, their (average) wage w_t, the number of retirees R_t, the (average) amount of benefits b_t, and the tax rate τ. While benefits are allowed to change, the tax rate is assumed to be fixed. Further, any generation lives for two periods, working in the first, retiring in the second. Population and wages grow at rates n and p, respectively. For a pure PAYGO system to be balanced at time t, the following condition must hold:

$$E_t w_t \tau = R_t b_t \tag{1}$$

The return on contributions for generation t can be calculated by comparing b_{t+1} and $w_t\tau$. Using the growth rates given, wages at $t+1$ will be $w_{t+1} = w_t\,(1+p)$, and employment is at $E_{t+1} = (1+n)\,E_t$. Assuming all workers of generation t retire at time $t+1$, the retired population can be expressed as $R_{t+1} = E_t$. Thus, the return b_{t+1} on contributions $w_t\tau$ can be written as

$$\frac{b_{t+1} - w_t\tau}{w_t\tau} = \frac{\left(E_{t+1}w_{t+1}\tau\right)/R_{t+1}}{w_t\tau} - 1 = (1+n)\,(1+p) - 1 \tag{2}$$

If both n and p are numbers close to zero, the rate of return can be approximated by $n+p$, a result first derived by Aaron (1966). This is the rate of return in a stylized mature PAYGO system.

Let $t = 1$ be the time at which the PAYGO system is implemented. It is obvious that the rate of return for R_1 is infinity, because this generation never paid contributions. This transfer payment is also known as unfunded liability, or legacy costs. For all other generations, the return will be equal to the rate implied by equation (2). In the model given, the total unfunded liability from the first generation of retirees will not remain at its initial level of $E_1 w_1 \tau$. It will grow at a rate

equal to the return on contributions. If before retirement but after work life of some generation q the PAYGO system would be discontinued, the total of promised payments to generation $E_q = R_{q+1}$ would be equal to

$$R_{q+1}b_{q+1} = E_{q+1}w_{q+1}\tau = E_1 w_1 \tau \left(1+n\right)^q \left(1+p\right)^q \tag{3}$$

which is exactly $\left[\left(1+n\right)\left(1+p\right)\right]^q$ times the size of the original liability.

This simple model can already show that if there is the wish or need to reform or discontinue an existing PAYGO system, any delay will lead to additional increases of the financial burden. Additionally, if the growth of the population or real wages slows, so will the long-term rate of return in a PAYGO system. This of course assumes that any adjustment takes place on the benefit side. The public liability to the generation of retirees is also referred to as "implicit government debt". It is being serviced by the contributions of the currently employed, which in turn creates a new future liability (Sinn 2000).

The impact of demographic changes can be seen by rearranging equation (1):

$$\frac{E_t}{R_t}\tau = \frac{b_t}{w_t} \tag{4}$$

This way the relation between the replacement rate and the old age dependency ratio becomes more obvious[13]. The replacement rate b_t/w_t tells how much of the last (or averaged wage) is replaced by retirement benefits. The old age dependency ratio R_t/E_t gives the number of retirees per contributing worker. If due to demographic changes, e.g. a decreasing birth rate or increasing longevity, the dependency ratio becomes larger (or equally, its inverse becomes smaller), the replacement rate must fall too, given no change in payroll taxation (Petersen 1989, p. 138). In other words: given an increasing dependency ratio, fixing the replacement rate requires the payroll tax to increase. On the other hand, maintaining the payroll tax rate requires a decrease in the replacement rate. The main problem of today's public retirement PAYGO systems is indeed an increasing dependency ratio. As Sinn (1998) points out, a PAYGO system can only function over time if each working generation pays for the old and its own children, i.e. child-bearing is a necessary condition. Even if policymakers are aware of a change in the old age dependency ratio, it may be politically and economically impossible to increase the payroll tax to the amount necessary to keep the replacement rate constant. And it may be equally hard

[13] The term E_t/R_t in equation (4) is actually the inverse of the dependency ratio R_t/E_t.

to reduce the replacement rate. Therefore, in the long run funded systems may present a more favorable option than unfunded systems, a topic to be explored in the next seetion.

3.5.3 Properties of funded systems

A comparison of PAYGO and funded systems is given in World Bank (1994, pp. 297-302). The first topic discussed concerns the contribution rate necessary in both systems to achieve a target replacement rate. For the PAYGO system, this relation was given by equation (4). This will clearly be different for funded systems, where workers accumulate savings over their working life and additionally receive returns on their savings. Hence, for the comparison it is assumed that workers contribute a certain fraction c of their wage. Wages are increasing at the constant rate g over time, and savings earn a constant real interest rate r. A worker's accumulated savings after n years of working can then be expressed as

$$\left\{\left[cw_t\left(1+r\right)+cw_t\left(1+g\right)\right]\left(1+r\right)+...+cw_t\left(1+g\right)^{n-1}\right\}\left(1+r\right) \tag{5}$$

or

$$cw_t\sum_{i=1}^{n}\left(1+r\right)^i\left(1+g\right)^{n-i} \tag{6}$$

Unlike in the case of an unfunded system, it is now assumed that workers draw from their accumulated savings for a number of m years of retirement, while allowing benefits to grow at the pace of wages, thus maintaining the replacement rate b. In order to receive benefits for m years, the discounted value of benefits at the start of retirement should at least equal the accumulated savings. Using interest rate r as discount factor, the discounted value of benefits can be expressed as

$$bw_t\left[\left(1+g\right)^n+\frac{\left(1+g\right)^{n+1}}{1+r}+...+\frac{\left(1+g\right)^{n+m-1}}{\left(1+r\right)^{m-1}}\right] \tag{7}$$

or

$$bw_t\left(1+g\right)^n\sum_{j=0}^{m-1}\frac{\left(1+g\right)^j}{\left(1+r\right)^j} \tag{8}$$

The further analysis is made easier by simplifying expressions (6) and (8) using the assumption that wage growth g be equal to the interest r. Setting both simplified equations equal to one

another,

$$cw_t (1+g)^n n = bw_t (1+g)^n m \tag{9}$$

makes it possible to solve for the equilibrium contribution rate c.

$$c = b\frac{m}{n} \tag{10}$$

where m/n is the so-called passivity ratio, i.e. the ratio of years spent in retirement to years of working. However, the contribution rate must be higher than bm/n, if the interest rate is less than wage growth. The opposite is true if wage growth is less than the interest rate.
Recall that the contribution rate for an unfunded system as shown in equation (4) can be written as

$$\tau = b\frac{R}{E}$$

where R/E is the dependency ratio. Hence, one can draw the following conclusions (World Bank 1994, p. 299): both systems have the same contribution rate, if the dependency ratio equals the passivity ratio and interest rates equal wage growth. Assuming no transaction costs and labor market distortions, pay-as-you-go systems seem to do better if wage growth plus population growth are higher than the interest rate, and vice versa. Finally, World Bank (1994) concludes that due to demographic changes it is more likely that the same replacement rate requires a lower contribution rate under a fully funded system. However, as Orszag and Stiglitz (2001) point out, comparing two idealized versions of retirement systems can only be the first step. The next step must involve the comparison of the already implemented system to the second system, treating the latter as-if implemented, and thus paying attention to possible political economy constraints. Additionally, it is important to keep in mind that moving from an unfunded to a funded system involves high transition costs, as the implicit debt, i.e. the retirement claims of the currently retired and the ones close to retirement, must be paid off during transition.

3.5.4 Impact on saving

A second topic associated with compulsory retirement systems concerns the impact the system's design may have on national, public, and private saving. Starting from theoretical grounds, the implementation of an unfunded system should result in a reduction of national saving. The reason is that the first generation of retirees receives an unplanned gain, which is being paid off

by the working generation. The working generation can substitute their own private saving for retirement with the claim for public benefits. Hence, private households should save less, while the public sector is unaffected by the system, as it only organizes the intergenerational transfer. Consequently, national saving will decrease, with a resulting negative impact on capital stock and future growth rates of output.

This, however straightforward the theoretical conclusion may seem, is hard to prove empirically. In World Bank (1994, p. 307) several explanations for this difficulty are presented, e.g. there may be not sufficient saving among young workers before implementing the PAYGO system, leading to less than one-to-one crowding out of private saving by pensions. The same may be true for private intergenerational transfers. Additionally, people may still be saving for retirement if they are skeptical about the system's ability to pay promised benefits. The mentioned explanation can contribute to a reduction of the negative impact that implementing an unfunded system may have on national saving.

In a funded system the outcome is different. Instead of paying for the benefits of the retired, the working generation will pay their contributions into their own, individual accounts. This by itself will only increase private saving, if the required contribution rate is higher than the savings rate before implementation of the retirement system (World Bank 1994).

Feldstein (1974) investigates the impact of Social Security on private saving and finds that it is likely to be negative. In his empirical investigation for the U.S. Feldstein can show that Social Security wealth presents a complete substitute for a significant part of saving for low to middle income families. Hence, according to this study, one should expect household saving to increase as a result of cuts in public pensions.

Several studies tried to estimate the degree of substitutability between pension wealth and household saving, but the evidence so far is neither obvious nor convincing. A major problem for these types of studies is to estimate the public pension wealth; another is the fact that variability in household's savings behavior can have a many different causes that are not only related to changes in public pensions.

For example, Attanasio and Brugiavini (2003) conduct an empirical investigation on changes in private saving as a response to reforms of the public pension system. They specifically investigate the 1992 pension reform in Italy and find that privately accumulated wealth and pension wealth are substitutes, though the degree of substitutability depends on how expected future earnings are approximated and at what point in the life-cycle the household was affected

by the reform.

3.5.5 Impact on the retirement decision

In the discussion about insurance theory it has already been mentioned that individuals may have an incentive to change the way they behave once they are covered by insurance. This phenomenon is known as moral hazard. In the case of old age insurance, the moral hazard problem would occur if people that are actually still able to work would decide not to. Such decision is possible because old age as an insurance event is usually defined in terms of reaching a specific age. Hence, a worker has the possibility to retire even if he or she is actually still able to work. This incentive is bigger, the larger the share of wage income that is being replaced by the retirement benefits (Stiglitz 2000, p. 362).

The described effect is present in both funded and unfunded systems. How the individual retirement decisions affect the system as a whole depends on its specific design. In a funded system it may be easier to send clear incentives, because benefits will be paid out of the accumulated funds. Thus, early retirement may turn out to be more costly than later retirement. In unfunded systems, a shift towards early retirement can contribute to an increasing dependency ratio and therefore make adjustments of contributions or benefits necessary. Nonetheless, it is also possible to give disincentives for early retirement, as for example a reduction in retirement benefits. The problem is that it may be very difficult to determine the actuarially fair amount by which benefits should be reduced.

Retirement is clearly a phenomenon that goes beyond what can be described in its complexity by relying entirely on economic theory. However, using methods of economists can deliver answers how budget constraints and prices, i.e. the value of income and leisure, may influence the retirement decision.

Modeling the retirement decision turns out to be difficult, as many different factors come into play. The simplest framework to analyze the retirement decison would be the static income-leisure model, and a sizeable branch of literature has used this method. Other frameworks put more emphasis on the dynamic nature of the retirement decision by using life-cycle models. Early work with these models often lead to the conclusion that Social Security has no effect on the retirement decision as private saving was replaced one-by-one with public benefits, provided that lifetime wealth was not increased by public pensions. However, these models were usually based restrictive assumptions as perfect capital markets, actuarial fairness, and certain lifetimes.

Crawford and Lilien (1981) showed that giving up either one of the assumptions while leaving the other two in place creates ambiguous effects on the retirement decision, indicating that it may be impossible to derive clear effects from theoretical work. For example, if actuarial fairness is given up, e.g. because the system redistributes incomes, especially low-income earners have a strong incentive to retire early, i.e. at the earliest possible retirement age, while high income earners may retire later. The authors support this argument using Social Security data, which indicates that the median income before retirement was higher for those retiring later.

Another work of this branch of the literature is Mitchell and Fields (1984), who show in a dynamic framework the trade-off situation an individual has to solve. Working additional years results in an earnings stream from work and, by assumption, in an increase in pensions. However, total lifetime is limited, which creates the trade-off situation. The retirement age thus depends on how the weights an individual assigns to retirement (leisure) time and lifetime income. Further, according to their model, an increase in public pensions will merely create an income effect. Provided that leisure is a normal good the individual will then advance retirement to an earlier age.

To conclude, the theoretical literature does not offer unambiguous results; while some groups of workers have an incentive to retire earlier than they would without Social Security; other workers are affected in exactly the opposite way. It does not seem possible to determine which effect is more important for the retirement decision on purely theoretical grounds.

Turning to the empirical literature, Diamond and Gruber (1997) report mixed results. So far, empirical studies could not show convincing evidence of the impact of Social Security in either direction. Further, if studies find a reduction of the retirement age, only about a third of the decline can be attributed to Social Security, indicating that other reasons might play an important role. Additionally, many investigations only include the impact of estimated pension wealth, but ignore the role of the Social Security tax. The importance of taxation results from its role in reducing consumption possibilities of the working. This may induce earlier retirement because these workers have a higher wealth in retirement than they otherwise would.

3.6 Concluding remarks

In this section, various theoretical aspects associated with the economic problem of old age have been discussed. Old age has been show to be a risk of economic insecurity that could be dealt with by different tools. One of them would be the creation of private old-age insurance,

which would make use of markets and prices to achieve this goal. Due to possible market failure in insurance markets, mainly attributed to asymmetric information of the market participants, private insurance markets may develop only rudimentarily. Additionally, redistributional and paternalistic argument are usually cited to justify the need of compulsory public insurance systems. Most of these systems in the real world are unfunded. However, as these PAYGO systems mature or come under pressure due to demographic changes, the option of funded system seems to become more attractive and has recently been endorsed by the World Bank (1994) as a goal of social security reform. The next section describes these problems and challenges for the U.S. Social Security system.

4 The Problems of Social Security

4.1 The financial balance of OASDI

4.1.1 The current state

Section 2 already gave an overview of the system's current financial status, which will only briefly be recaptured at this point. In 2003, OASDI had an income of $631.8 billion and expenditures of $479.1 billion, which resulted in a net increase in assets of $152.8 billion; hence, it is running a significant surplus, a picture that looks similar to the balance of recent years.
However, the problems with OASDI, or more specifically its old age portion OAI, do not lay in the current state: using projections about the further development of life expectancy, birth rate, migration, wage and economic growth, inflation etc. makes evident that the existing surplus will turn into a deficit in the not so far future. The Social Security Administration is required to make forecasts for the short run of 10 years and for the long run of 75 years. Concerning long-range outlooks, it is impossible to make precise predictions for such a period of time. A way to make predictions more acceptable is to use different sets of assumptions to obtain certain time paths for the system's financial situation. These sets of assumptions are grouped into optimistic, pessimistic, and intermediate points of view, where the first two rather serve as a frame within which the likely development will take place.

4.1.2 Short-run projections

A fairly high degree of accuracy can be placed on forecasts for the upcoming 10 years, since there is relatively less uncertainty concerning changes in birth rates, migration etc. for such

short time period. An indicator used to assess the state of the system is the *trust fund ratio*, which is the ratio of assets of the system at the beginning of the year to the projected payments in the same year. As long as this ratio is greater or equal to 100, the system can finance the payment of full benefits for the current and at least some of the following years, which leaves a short-term time window for necessary legal adjustments.

Using the trust fund ratio as an indicator and intermediate assumptions as reference shows that in the short-run the ratio is far above 100 percent. Looking only at the Old Age and Survivors Insurance shows that their trust fund ratio increases until 2015, when it reaches a maximum of 500 percent (Board of Trustees 2004).

The good performance of OASI in the short-run mainly results from the fact that the burden of the retiring baby boom generation will increase after more than ten years. Although the first baby boomers will reach the early entitlement age of 62 years in 2008, it will take some time for the full burden to develop. The delay is caused by the fact that the whole baby boom generation spans over 20 years, while the short-run outlook captures only the birth years 1946 to 1952 reaching age 62. Additionally, the normal retirement age for these birth years is age 66. Because benefits will be lower for those retiring early, it is more likely to see a significant part of the first baby boomers starting to retire around 2012. The combined effects are likely to push the onset of decreasing OASDI surpluses outside the ten year short-range focus.

4.1.3 Long-run projections

More important for the discussion about the problems of OASDI are the long-run forecasts. Figure 1 shows the projections for the combined OASDI trust funds from 2005 to 2040.[14] Using the intermediate set of assumptions, the system shows the following picture: it will have less income than payments (excluding interest income) by 2018, i.e. the trust fund will start shrinking in the following years. Including interest income, OASDI will show a clear deficit around 2028, and by 2042 trust funds will be completely exhausted. Hence, by the time the last members of the baby boom generation are eligible for full benefits (2031), the current system will only be able to pay full benefits by using up accumulated assets.

At this point it should be noted that due to the high degree of uncertainty associated with long-run forecasts, the results of such projections differ from across institutions and over time. For example, the Congressional Budget Office (2004b) projects that trust fund exhaustion will occur

[14] Years after 2040 are not depicted because trust fund exhaustion is assumed in 2042 and projections are made in 5 year steps.

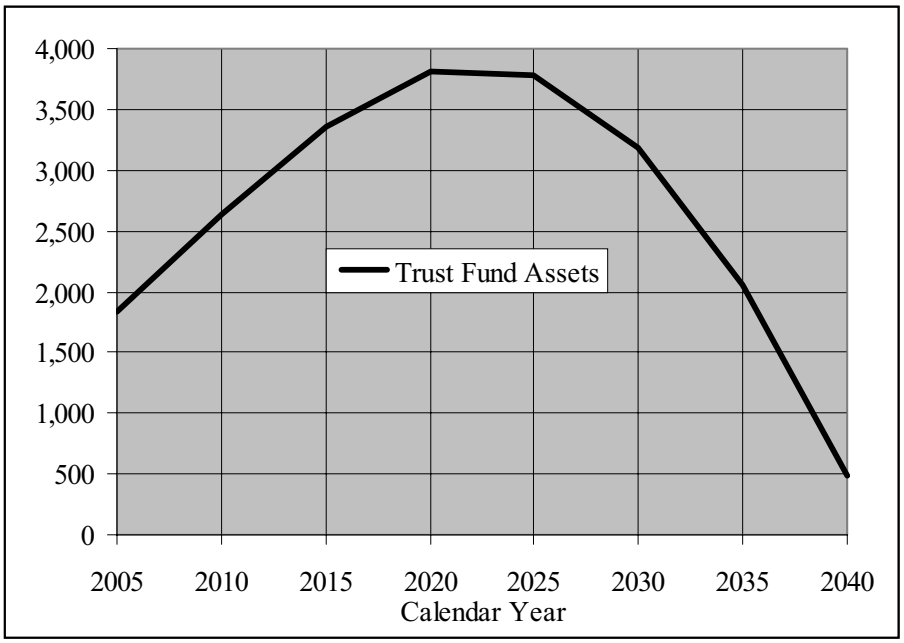

Figure 1: Projected OASDI trust funds assets 2005-2040 in billions of constant 2004 dollars, using the intermediate set of assumptions (Board of Trustees 2004).

2052, i.e. ten years later than projected by the Board of Trustees (2004). And Board of Trustees (1998) projected that trust fund exhaustion would occur 2032, i.e. ten years earlier than its current projection. Consequently, if it seems hard to evaluate the timing of trust fund exhaustion, there will be also considerable uncertainty about the minimum measures necessary for restoring long-run balance. Nevertheless, studies project that around the middle of the 21st century trust funds will likely be exhausted.

It is often mistakenly argued that by the time of trust fund exhaustion Social Security will be "bankrupt". This view is wrong because it implies that the system will at some point in time not be able to pay any benefits at all. Even if the trust funds are exhausted and no changes to the current system are made, OASDI will still receive a steady flow of income from covered employees that contribute to the system. Relying solely on that revenue to pay benefits would of course not allow the payment of the full amount of promised benefits. However, revenue would be sufficient to pay 73 percent of projected expenditures in 2042 and 68 percent of it in 2078 (Board of Trustees 2004, p. 8).[15]

The 2004 annual OASDI Trustees Report contains different measures for the present discounted value of the imbalance over the seventy-five-years period. The present discounted value in 2004

[15] Related projections about revenues as a share of expenditures by the Congressional Budget Office (2004b) are: 81 percent in 2053 and 71 percent in 2100.

dollars is equal to $3.7 trillion (Board of Trustees 2004, p. 57). Expressed as a percentage of the taxable payroll it amounts to 1.89 percent. This number can be interpreted as the immediate and permanent tax increase necessary to balance OASDI over the next 75 years.

However, looking only at a seventy-five year range does not account for possible shortfalls in the years beyond that range. The 2004 OASDI Trustees report also contains information about the theoretical infinite horizon case, assuming current Social Security law. The calculated present discounted value of the imbalance over the infinite horizon is $10.4 trillion in 2004 dollars, or 3.5 percent of taxable payroll (Board of Trustees 2004, pp. 59-60). Thus, to restore financial balance over the infinite horizon, resources roughly equal to today's value of U.S. GDP are necessary, a number that expresses the relative magnitude of the (very) long-run imbalance of Social Security.

Having looked at the long-run projections for OASDI, the next section will explain the causes discussed in the literature that may contribute to the worsening financial situation of the system in the future.

4.2 Causes of the long-run problems

4.2.1 Early retirement

In the literature on Social Security reform, one potential cause of financial pressure to Social Security mentioned could be the negative long-run trend in labor force participation among older men. As Table 5 shows, labor force participation rates among men in the age groups 55 to 64 as well as 65 and above dropped remarkably between 1950 and 1998. Fullerton (1999) projects that labor force participation rates for men will at best show a very small increase. For women the picture looks differently: the increase over time visible in Table 5 can be viewed as a catching up process that tends to reduce the gap between the rates for men and women. Women's labor force participation was in general at very low levels in the 1950s. Since then participation rates have risen for women of most age groups. However, the projections indicate that the low rates among women 65 years and older are expected to remain unchanged.

It has already been argued above that a theoretical explanation for the declining labor force participation rates of the elderly may be delivered by the assumption that leisure is a normal good. The argument is that higher pension income would induce individuals to choose more leisure because such pension increase creates an income effect. In fact, since the 1950s real retirement benefits have been rising, making the argument plausible. Empirical studies of the

Age groups by gender	1950	1970	1998	2015*	2025*
Men 55-64	86.9	83.0	68.1	69.1	67.7
Men 65 and older	45.8	26.8	16.5	19.8	19.1
Women 55-64	27.0	43.0	51.2	60.8	58.8
Women 65 and older	9.7	9.7	8.6	10.3	9.9

* indicates projections.

Table 5: Labor force participation rates for men and women in the U.S. for selected years and age groups (Fullerton 1999, p. 4).

likelihood to retire at specific ages have been able to show a significant relationship between the level of benefits and the timing of retirement. However, the economic impact of changes in the level of benefits on the likelihood to retire at a certain age as implied by such studies seems to be very small (Samwick 1998, p. 208).

The influence of early retirement on Social Security's finances seems to be a problem, but one of secondary importance. If workers retire before the early retirement age, they will not make contributions, but they will not be able to receive benefits either. Additionally, retirement before the normal retirement age will result in a reduction of benefits. This reduction will even be higher for birth cohorts born after 1937 (Social Security Administration 2004b). The benefit reduction is supposed to be actuarially fair, i.e. the public pension wealth[16] of a person should not change depending on which retirement age is chosen. Whether it really is actuarially fair remains controversial, as Diamond and Gruber (1997) report. Their own findings also draw a mixed picture: incentives vary for different groups, e.g. according to marital status, position in the earnings distribution, number of years of contributing to the system etc. Nevertheless, the fact that the reduction in benefits because of early retirement will become more pronounced for retirees born after 1937 will certainly help to counterbalance any further increase in the share of early retirees. Disincentives for delaying retirement because of actuarially unfair system design may be more of an issue in other countries; for example, Börsch-Supan (2000) reports strong disincentives in the German public retirement system.

[16] Public pension wealth is defined as the sum of the present discounted values of all future benefit payments for the whole expected length of the retirement period.

4.2.2 The baby boom and the declining fertility rates

More important pressures to the system's finances may come from demographic developments. One statistic used to describe such developments is the total fertility rate. To construct this number, the age-specific birth rates for a given year are calculated. An age-specific birth rate is defined as the number of births to mothers of a certain age, divided by the total female population with the same age. The total fertility rate will then be calculated as the sum of these age-specific birth rates for a given year, usually including women between 14 and 49 years of age. After a long decline in the total fertility rate, beginning at least in the last decade of the 19th century, the trend was interrupted sharply after the Second World War. As depicted in Figure 2,

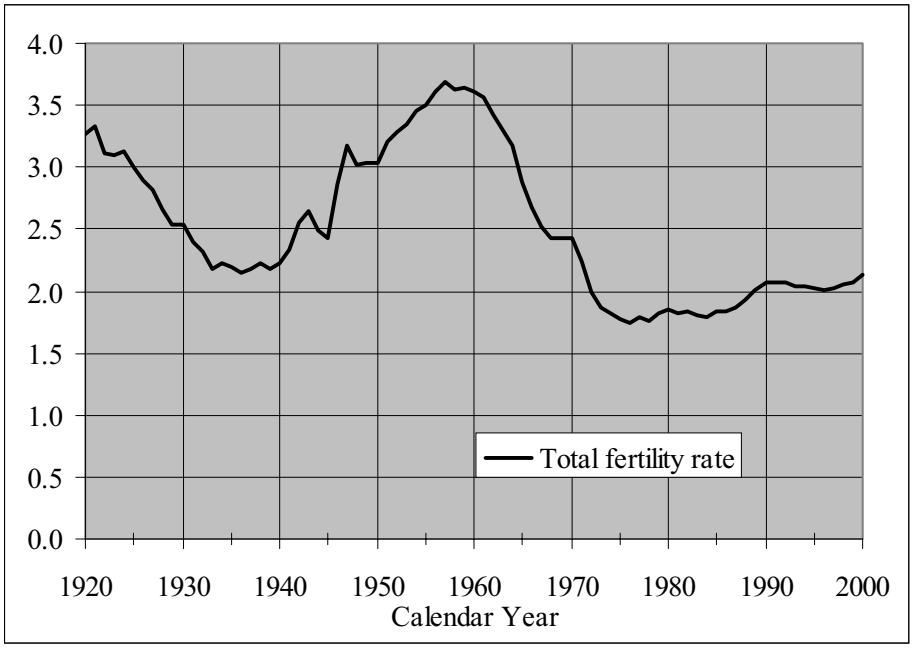

Figure 2: Total fertility rates in the U.S. 1920-2000; the intermediate set of SSA assumptions is used for projections after 1997 (Social Security Administration 1997a).

during the 18 years between 1946 and 1964 (the baby boom generation), the total fertility rate went up to a peak of almost 3.7 births per woman in 1957. Beginning in 1965, the total fertility rate dropped below 3 live births and reached a low of 1.74 in the mid-1970s. In the1980s it mostly remained at these levels, but eventually increased slightly in the late 1980s, remaining around the replacement level of 2.1 until today (Social Security Administration 1997a).

For its long-run forecast, the Social Security Administration uses total fertility rates of 2.2, 1.95, and 1.7 children per woman for the low cost, intermediate cost, and high cost assumptions, respectively (Board of Trustees 2004, p. 72). The intermediate assumption of 1.95 children

per woman indicates that the Social Security Administration estimates the total fertility rate to decrease slightly, but to remain relatively close to the replacement level.

The pure existence of the baby boom generation had and has significant implications for Social Security. The participation of baby boomers in the labor force created a flow of revenues that would be smaller had the total fertility rate remained at its pre-war level. This may have made some of the real benefit increases during the late 1960s and early 1970s possible in the first place. However, by raising real benefits, the unfunded liability was increased simultaneously. Because the significant revenue gains from the baby boomers have not been completely accumulated, but have been spent to finance real benefit increases, the smaller cohorts born later will have to finance these higher benefits for the retiring baby boomers. Building up the trust funds is thus one measure to spread some of the burden of the retiring baby boomers over more generations. Had this increase in the trust funds started earlier, the retirement of the baby boomers would be a smaller financial burden. As a consequence, some authors, for example Viard (2002), argue that the retirement of the baby boomers should rather be seen as the end of temporary gains of the PAYGO structure, not as a separate problem. Nevertheless, the existence of the baby boom generation and the not necessarily sufficient preparation for its retirement aggravate a problem that stems from an even more profound demographic change, the significant increase in life expectancy.

4.2.3 Increasing life expectancies

The increasing longevity is for Social Security's future the statistic that has the most important implications. As Figure 3 shows, life expectancy at birth for females in the U.S. increased from 65.7 in 1940 to 79.4 in 2000, while it rose for men from 61.4 to 74 years over the same time period. It is commonly expected that this trend will continue in the future, although its pace might slow down. The Social Security Administration (Board of Trustees 2004) expects that life expectancy at birth will rise to 81.6 years for men and 85.3 years for women by 2080, using the intermediate set of assumptions. Long-run forecasts of the life expectancy at birth are an important tool for obtaining a good picture about the demographic risks to OASDI, or fiscal policy in general. Studies attempting to forecast increases in life expectancy are various, and many different techniques are offered. One way used by the Social Security Administration was to approximate the impact of progress in medical methods on mortality by interviewing medical experts about their expectations. Many other studies rely on time series analysis to forecast the

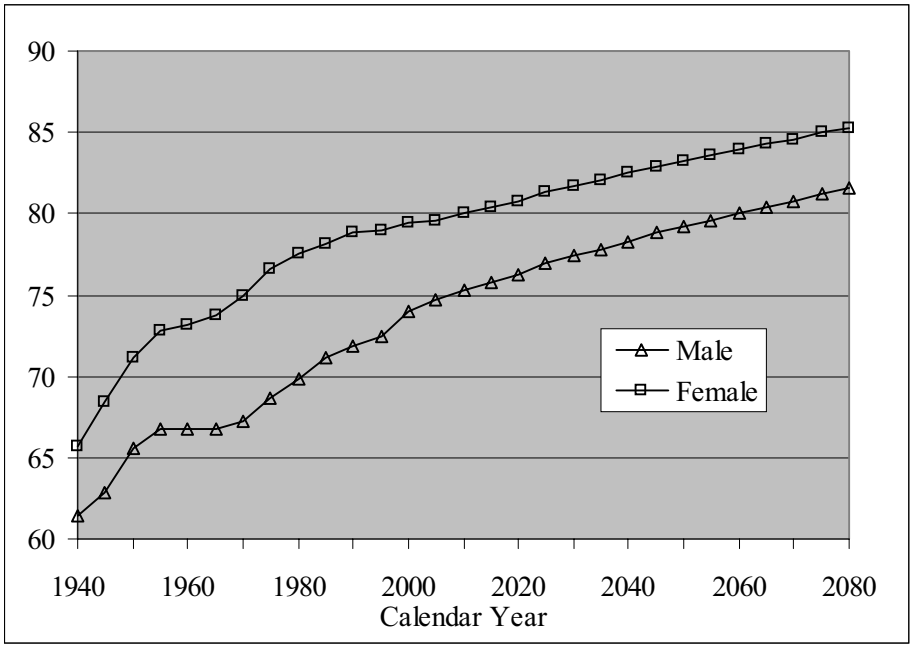

Figure 3: Historic and projected life expectancies at birth for women and men in the U.S. 1940-2080. Projections made for the years 2005 and after are based on the intermediate set of assumptions (Board of Trustees 2004).

development of mortality. In a seminal paper, Lee and Carter (1992) develop a technique for forecasting life expectancy at birth based on time series analysis of U.S. mortality data from 1900 to 1989. Among their predictions is an increase in the average life expectancy at birth to 86 years by 2065, with a 95% confidence band of plus 3.9 and minus 5.6 years. This prediction is significantly larger than even the 85.3 years for women that the Social Security Administration expects for 2080 under the intermediate set of assumptions. Apart from the discussion about its degree, the pure fact of increasing life expectancies itself contributes significantly to the rising absolute number of elderly.

Figure 4 shows the effects of the increasing life expectancy and the baby boomers on the age structure of the U.S. population. In 2000, members of the baby boom generation were between 36 and 54 years old. The bulge in the age structure is obvious. Moving 30 years in the future using the forecasts of the U.S. Census Bureau (2004b), the baby boomers cause a significant expansion of the elderly population compared to 2000. In Figure 4 this can be seen by the area enclosed by the two demographic lines and the ages of 65 to 85 years. The increasing life expectancy causes the demographic pyramid to become thinner at higher ages in 2030 than in 2000. Additionally, the number of individuals 100 years and above increases much compared to 2000, especially for women. This can be seen at the small spike at age 100, which more

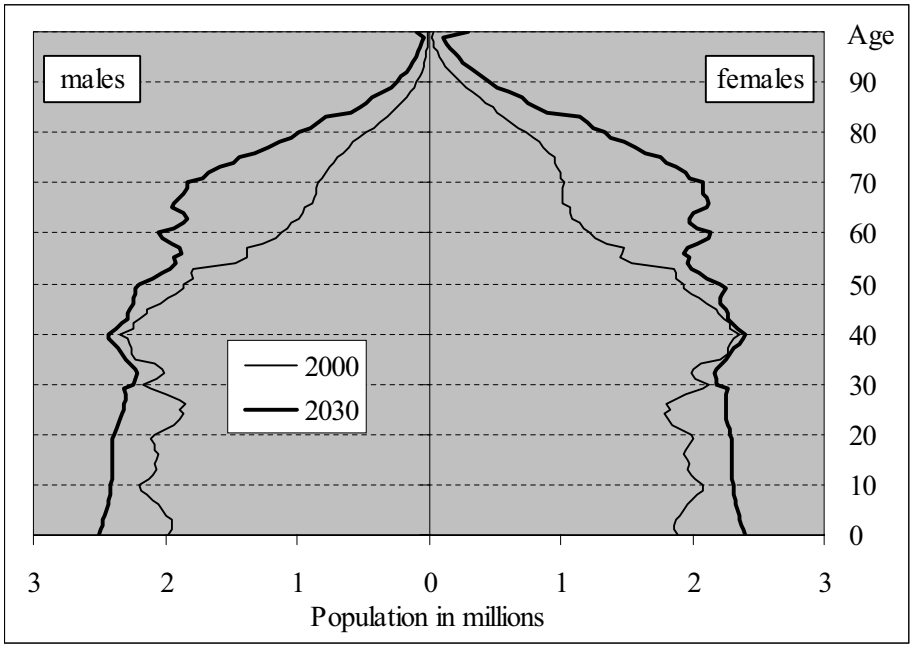

Figure 4: Age structure of the U.S. population in 2000 and 2030 (U.S. Census Bureau 2004b).

correctly depicts all those 100 years and above.

The consequences of this development for the age dependency ratio can be inferred from Figure 5. According to the intermediate set of assumptions, the ratio of those 65 years or older to those 20 to 64 years old will sharply increase from 22 percent in 2000 to about 35 percent in 2030, and it will continue to rise afterwards to levels of around 43 percent in 2080. Although the graph does not present the precise definition of the retiree to workers dependency ratio, the trend is approximately the same. Again, were the baby boomers the only cause of the change in the dependency ratio, one would expect a decrease in the ratio after 2050, when most of the baby boomers will have died. However, the baby boomers just accelerate a trend that is caused by the combination of increasing longevity and birth rates around the replacement level. Even in absence of a baby boom, had total fertility rate been around the replacement level since the Second World War, one could observe an increase in the old age dependency ratio caused by the increasing life expectancies.

What does the increase in longevity imply for Social Security? The most direct result is that for a given average retirement age people will collect their pensions for a longer time. Thus, expenses per retiree increase with life expectancy. A second result is related to the old age dependency ratio: because people live longer, the total number of retirees will increase over time. Lee and Skinner (1999, p. 126) calculated the increase in the average retirement age

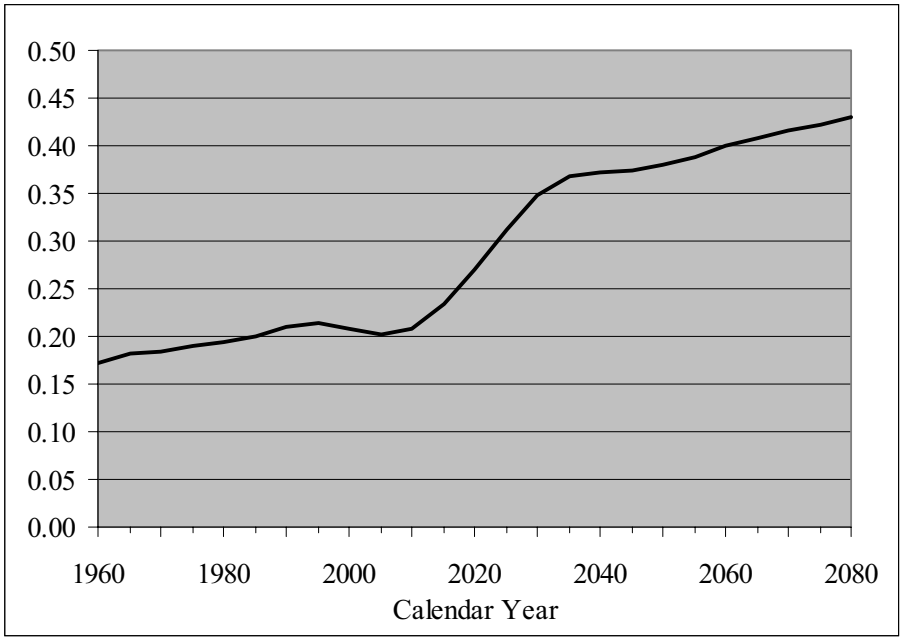

Figure 5: Population 65 years and older as a percentage of the population 20-64 years old for the years 1960-2080 based on the intermediate set of assumptions (Board of Trustees 2004).

necessary to achieve the current level of the ratio of covered workers to retirees by the year 2070. The result was an impressive increase from 63 years to 72 years, given the intermediate set of assumptions used by the Social Security Administration. Returning to Figure 5, currently there are around five individuals between 20 and 64 years of age for one individual 65 years and above. By 2060, a time when most of the baby boomers will have died, there will be less than 2.5 individuals between 20 and 64 for one person 65 years of age and above. This indicates both the existence of a more fundamental problem than the retirement of the baby boomers and the significant increase in the financial burden of supporting the retired that has to be carried by the working generations. This leads to the conclusion that the real problem that Social Security has to face is the increase in life expectancies that coupled with birth rates around the replacement level will lead to increasing numbers of retirees per covered worker.

Although the increases in life expectancy are a steady phenomenon for a long time, major changes to Social Security that account for it are rather an exception. Under the current incentive structure, working beyond the age of 70 years does not increase benefits at all, i.e. working beyond 70 years reduces an individual's Social Security wealth (see footnote 15). So far, the one important adjustment made to account for increasing life expectancies was the gradual increase of the full retirement age from 65 years to 67 years, without any change in the early retirement age. The extent of future changes in the retirement ages is difficult to evaluate;

however, it seems extremely unlikely that changes could be made that would keep the old age dependency ratio at or close to its current level. This implies that major adjustments must be made elsewhere.

4.3 Rates of return

An argument that is often used by proponents of privatization is the supposedly higher rate of return to contributions in a funded system. It has been shown above that individuals could be better off under a funded system, if the interest rate on their contributions was higher than the sum of wage and population growth, which determine the rate of return in a mature unfunded system. In the above discussion about the possible reasons for the long-run imbalance it has been shown that fertility rates were below or close to the replacement level since the mid-1960s. To the extent that low fertility rates reduce population growth, this may indeed have negative consequences for the rates of return under a PAYGO system.

Table 6 presents rates of return under Social Security for different birth cohorts. The birth cohort 1875 was among the first to receive benefits from Social Security, while their contributions to the system were relatively insignificant, explaining the comparatively high rate of return. For later generations, the rates of returns clearly show significant decreases. On the other hand, the

Birth cohort	Rate of return	Birth cohort	Rate of return
1875	36.5	1950	2.2
1900	11.9	1975	1.9
1925	4.8	2000	1.7

Table 6: Inflation-adjusted rates of return under OASI present law for selected birth cohorts (Leimer 1994).

average annual real rate of return on the stocks in the S&P 500 index between 1950 and 1999 amounts to 9.7 percent (U.S. Census Bureau 2001, p. 732).[17] Comparing this average rate of return to the relatively low rates of return to Social Security for birth cohorts 1950 and later one can understand the motivation of shifting to a funded system. Although the relatively low rate of return under Social Security is usually not cited as a reason for the upcoming financial difficulties, reform proposals promoting fully or partially funded systems emphasize the relatively

[17] However, real average annual rates of return before taxes drop to 8.3 percent for the 1950-2003 period (U.S. Census Bureau 2001, 2004a). The difference in the two values makes clear that long-range average rates of return depend heavily on the start and end points chosen.

higher rate real rate of return compared to a mature PAYGO system as another argument for a transformation.

However, it needs to be pointed out that the pure comparison of rates of return is fallacious: investment in equities involves exposure to significant risk due to the volatility in equity markets, while the returns to Social Security contributions are without risk in that aspect. On the other hand, Social Security carries risks of political nature, since benefits and payroll taxes are set by law, which can be changed if considered necessary. Even more, moving to a fully funded system as proposed for example by Feldstein (1997) is essentially a switch from a defined benefits to a defined contributions system, which places a much higher earnings and investment risk on the individual. Additionally, if the defined contributions plan is coupled with nominal annuities, leaving it vulnerable to inflation risk, the individual may be exposed to completely different types of risks, which in turn implies that a pure comparison of just the pre-tax rates of return falls too short. Apart from that, the administration of individual accounts can become expensive, especially if account holders make frequent trades. The charges and fees for account administration and transactions may reduce returns on asset holdings.

Additionally, taking account of the transition costs caused mainly by the unfunded liability gives a provocative result: because the unfunded liability has to be served, a different source of revenue must be used after Social Security is privatized. This means that either taxes have to be raised or new ones introduced, or the government would have to borrow from the public. Geanakoplos, Mitchell, and Zeldes (1998a) present an example of financing the liability through a capital gains tax. They can show that doing so would essentially wipe out any differences in the rates of return to contributions.

It should be noted that the discussion about rates of return assumes that Social Security is a public retirement-savings program. If Social Security was viewed as a pure old-age insurance program, a discussion about rates of return would not be appropriate. Premiums for an insurance are normally calculated to cover the expected payout plus some administrative costs and profit. Delivering a rate of return on the premium is not purpose of an insurance. Nevertheless, the importance that rates of return play in the public discussion indicates that the insurance character of Social Security has less significance today then at its implementation almost 70 years ago, at least for the proponents of a funded system of individual accounts. How and whether the social insurance components of the current system are supposed to be incorporated in such a funded system as well as comparing winners and losers of this transformation may give an idea of less

publicly pronounced motivations for such a change.

4.4 Conclusion - The case for Social Security reform

The reasons explained above indicate serious problems with the current system and made apparent that a re-evaluation of the system is likely to be needed, although it seems to be exaggerated to talk about a crisis of Social Security. However, the Board of Trustees (2004) projects that under current law the revenue from payroll taxation will be less than the expenditure for scheduled benefits beginning in 2018. Only the existence of the OASDI trust funds allows the full payment of benefits until 2042, the year in which trust funds will be exhausted. The main reason for the imbalance that Social Security has to face in the longer run is the continuation of a trend towards higher longevity in combination with low birth rates. The existence of the baby boom generation is not the main cause that imbalances Social Security, it rather accelerates and aggravates temporarily the emergence of a more profound permanent change in demographics, the phenomenon of increasing longevity. Further delaying necessary reforms will only increase the burden to be paid by future generations; therefore, the reform process should begin in a timely manner. The last section of this paper will examine three proposals that represent different stylized ways to redesign or change the current system.

5 Proposed Remedies

5.1 Introduction

The preceding chapter outlined reasons and arguments why Social Security should be adjusted or reformed. While there is a considerable amount of agreement about the characteristics and problems of current Social Security law, there is little unanimity about how to redesign the system. Many proposals call for adjustments on the revenue and expenditure sides of the current system to achieve financial balance over the long run, i.e. for at least the next 75 years. Opposing to this idea are proposals of fundamentally changing the unfunded system and replacing it with a funded system over the long run. This final section will explore some recent proposals. The selection of proposals to be evaluated was based on the premise of finding examples that are representative for the full spectrum, ranging from complete transformation into a fully funded system to ways of adjusting the current system as to balance it financially over the long run.
First, some background information on the debate between proponents and opponents of mov-

ing to a funded system will be given. Building on that information, the single proposals will be explained and discussed, beginning with the three models proposed by the President's Commission to Strengthen Social Security. These models are essentially examples of a two-tier system: preserving Social Security as the basic pension system, but adding a voluntary funded personal accounts system. Such a change is usually referred to as partial privatization of Social Security. Following that proposal, the Personal Security System developed by Boston College professor Laurence J. Kotlikoff will be discussed as an interesting way of completely transforming Social Security into a fully funded system. Finally, the last proposal to be presented was developed by economists Peter A. Diamond and Peter R. Orszag, who propose adjustments to the current system to keep it solvent over the long run. This proposal would not change the pay-as-you-go nature of Social Security.

5.2 Full, partial, or no privatization?

The comparison of mature unfunded and funded systems made clear that the latter may yield higher returns if the average interest rate is greater than the sum of real wage and population growth. However, since one of the systems is already in place, policymakers must consider the costs associated with the transition from a mature PAYGO system to a fully or partially funded system.

To better understand the differences between the single proposals, a definition of the fundamental terms is necessary. Specifically the widely used term "Privatization" can take on various different meanings. In this treatment of reform proposals, privatization refers to the creation of a system of personal (or individual) accounts to which an individual makes mandatory contributions.[18] Personal accounts will result in a transformation towards a funded system. Privatization can be partial or fully: a fully privatized system completely replaces the existing PAYGO Social Security, while a partially privatized system adds a second, funded tier to Social Security. Although funding the system through personal accounts does not necessarily imply a defined contributions plan, most authors seem to have this combination in mind, since the amount of accumulated reserves will in the end determine a major share of the annuity amount to be received. The creation of a funded system using personal accounts would further reduce the insurance character of Social Security and move it towards a mandatory retirement savings program.

[18] An example of another meaning of privatization is to allow the Social Security trust funds assets to be invested into equities, i.e. private bonds and/or stocks, instead of investing exclusively in Treasury securities.

One of the most prominent proponents of completely privatizing Social Security, Martin Feldstein, gives several reasons why moving to a funded system is desirable. First, he points at the low implicit rate of return of Social Security, which he estimated to be around 2.6 percent between 1960 and 1995 (Feldstein 1996). Comparing this to higher rates of real pretax return on nonfinancial corporate capital leads him to the conclusion that the payroll tax for Social Security turns out to be a real tax compared to a funded system where an individual makes contributions to her own account. Thus, the current system creates a significant deadweight loss and distorts labor supply.

Another reason why Feldstein favors privatization is that he believes national saving to be reduced through the current public pension system (Feldstein 1974, 1996). This is again related to the low rate of return in the unfunded PAYGO system; therefore, each year the capital stock grows by much less than what would be the case if a fully funded system was in place. Feldstein (1996) estimated that loss for 1995 to be around $470 billion, a number that represents the difference in the return to the Social Security wealth of $7 trillion dollars in 1995. Shifting to a funded system therefore seems to be a way to increase national saving and the capital stock, resulting in potentially higher GDP growth rates.

In addition, such shift would allow a reduction of the current payroll tax to a level of 2 percent over the long run; given the high rates of return on equities persist. This result is shown in Feldstein and Samwick (1998), where the authors simulated the transition of the U.S. Social Security system to a fully funded system. To pay for the transition of the system, the authors argue that an initial increase of the payroll tax to 14.4 would be sufficient with tax rates falling slowly and becoming less than today's 12.4 percent within 20 years after the transition began (see also Feldstein 1998, p. 32).

Murphy and Welch (1998) add that privatization would reduce the political risk OASDI is exposed to, since lawmakers can change benefit levels and tax rates, which in a fully funded system is not the case. On the other hand, as they note, political risk would be substituted by economic risk.

Modigliani and Muralidhar (2004, p. 114) state that based on their simulations, fully funding Social Security could have been undertaken if a part of the budget surpluses of the late 1990s were used for that purpose. They show that doing so could have lead to a reduction in the combined payroll tax to 6.2 percent by 2050. However, as they note, because of using the surpluses to finance the most recent tax cuts, fully funding is less of an option than partial

funding.

Full and even partial privatization has prominent opponents. Krugman (2004) emphasizes the negative impact that the diversion of revenue has in the short run, while the effects of lower benefits on the expenditure side will only slowly emerge. Diamond and Orszag (2004) also oppose any type of privatization. They give many different reasons why individual accounts could turn out to be negative for the society.

Their first argument is that OASDI entitlements are almost completely risk-free. Wealth in individual accounts, on the contrary, would depend on the development of the underlying assets, which could vary significantly. This point is also illustrated by Orszag and Stiglitz (2001), who show that assuming higher returns under a fully funded system is not a necessity. Naturally, bad investment decisions on part of the workers cannot be excluded.

A second argument is related to the redistributive nature of OASDI, i.e. the goals of narrowing inequalities in income and reducing poverty. How this could be instituted in a system of individual accounts is hard to imagine. In addition, OASDI does not just provide old age benefits, it also pays disability benefits. If OASDI was completely replaced by individual accounts, those payments would have to come from the individually accumulated funds, leading in turn to generally lower payments for the remainder of that worker's life.

And it is also possible argue that instead of creating a new system of individual accounts, use should made of the existing system of firm sponsored and tax favored retirement accounts, the so-called 401(k) plans and IRAs (Individual Retirement Accounts). Diamond and Orszag (2004, p. 138) report a relatively low participation in these plans, being around 50 percent of households. Out of the participating households, only 4 percent were constrained by the annual contribution limit of $2000 in 1995.

Finally, the administrative costs of individual accounts are likely to be higher than those of current Social Security (Diamond and Orszag 2004). Without making predictions about the amount, it is important to realize that due to the effect of compound interest already small differences in annual administrative costs can accumulate to significant differences in account balances at the retirement age. It seems therefore important to pay special attention to the cost of a system of individual accounts. A closely related issue is also, how costs would differ depending on whether a public institution or private firms administer the accounts. Diamond (1998) argues that a system that receives a small part of the payroll tax is likely to have lower costs if accounts were centralized at a public institution, mainly because of economies of scale

effects.

5.3 The President's Commission to Strengthen Social Security

5.3.1 Background

With the reelection of George W. Bush as President of the United States on November 2nd 2004, it appears naturally to consider the stand of his administration on Social Security reform. The pressure for adjustments increases as the retirement of the baby boomers approaches, and the reform debate played an important role in the election campaigns of both candidates. Therefore, it is widely expected that the next four years will bring significant changes to Social Security. Although in his first term no major legislation concerning Social Security took place, President Bush laid foundations for such changes in his second term by creating the "President's Commission to Strengthen Social Security" in May 2001. The task of that commission was to evaluate ways how Social Security can be changed to protect the economic security of the elderly in the future. The commission, which worked for 7 months during 2001, consisted of 16 members, 8 from each political party, among them two well-known economists, Olivia Mitchell and Estelle James. The final report of the commission was released on December 21, 2001. It includes three different models that follow principles given by President Bush (President's Commission to Strengthen Social Security 2001, p. 13):

" • Modernization must not change Social Security benefits for retirees or near-retirees.
- The entire Social Security surplus must be dedicated to Social Security only.
- Social Security payroll taxes must not be increased.
- Government must not invest Social Security funds in the stock market.
- Modernization must preserve Social Security's disability and survivors components.
- Modernization must include individually controlled, voluntary personal retirement accounts, which will augment the Social Security safety net."

Specifically the last principle shows the direction Social Security is supposed to take. All three models thus include some form of personal accounts in which covered employees can divert part of their payroll taxes to accumulate wealth, which would be converted into an annuity upon retirement. Hence, even before the development of specific models, the guideline was to move the system towards a two-tier system by reducing the role of traditional Social Security

to providing a basic pension level (Tier 1) and adding a prefunded voluntary component (Tier 2). Complete replacement of Social Security by a funded system was not asked for by President Bush (Cogan and Mitchell 2003, p. 155).

As Cogan and Mitchell (2003) also note, the commission considered it important to reduce the political risk involved with traditional Social Security. Under current law, there is no ownership of benefits, i.e. Congress is free to change the benefit formula in any way, and it did so in the past. Therefore, Cogan and Mitchell (2003, p. 156) summarize for the future prospects: "Commissioners felt that the political risk of achieving a given level of retirement income is substantial, since the system faces even larger shortfalls as a result of the program's financing problems." The introduction of a two-tier system can thus serve as means of risk-diversification.

5.3.2 Three models to change Social Security

The following description of the three models is based on the final report of the President's Commission to Strengthen Social Security (2001).

Model 1 would leave Social Security largely unchanged. Keeping the existing payroll taxes and benefit calculation in place, it only diverts from current law by creating voluntary personal accounts. Covered workers can choose to pay 2 percentage points of the payroll tax into these accounts. For those that choose to divert payroll, traditional Social Security benefits will be lower. However, having the diverted part of the payroll tax accumulated in a personal account, a worker will be better off if the real return on the accumulated assets is at least 3.5 percent[19]. The introduction of such model has a serious shortcoming: Social Security would face a reduction in income, because of the smaller share of taxes flowing into the system. The financial balance would therefore not be improved; instead, other sources of revenue would have to be used to secure the payment of benefits in the future. The total transition cost is expected to total $1.1 trillion in present value, i.e. in 2002 dollars.

In Model 2, the attempt is made to balance Social Security over the long run. Again, voluntary personal accounts are proposed, into which workers could divert 4 percentage points of the payroll tax, constrained by a limit of $1000 annually[20]. Receiving lower benefits from Social Security will be compensated if the real interest rate on the personal accounts is 2 percent or more. This rate is lower than in Model 1 because of an implicit subsidization of personal ac-

[19] This number indicates the assumed average annual real rate of return on the special Treasury securities that the trust funds hold, i.e. it is the rate of return an individual would receive if the 2 percentage points of payroll were not diverted but left in Social Security.

[20] This limit will be growing in line with annual wage growth.

counts in Model 2. Another innovation will be the introduction of a minimum level of benefits by 2018, set at 120 percent of the poverty line for those having worked for minimum wages for at least 30 years. This feature does not exist under current law. Its implementation aims at improving the position of low-wage earners during retirement. It emphasizes the social insurance character of Social Security, and is supposed to enhance the system's progressivity.

The main change of traditional Social Security made under Model 2 would be a switch to price instead of wage indexation of initial benefits beginning in 2009. Currently, wage indexing is being used to calculate the AIME and the bend points for the determination of PIA (see part 2.2.4). After payments begin, real benefits are kept constant by linking nominal benefits to the CPI-W. Wage indexation, however, increases the real purchasing power of initial benefits if wages grow faster than prices. Thus, price indexing the calculation of initial benefits can reduce the pressure on the expenditure side significantly. However, it would mean a departure from letting retirees benefit from real wage growth in the economy.

It is estimated that the implementation of Model 2 will lead to an accumulation of $12.3 trillion (in 2002 dollars) in personal accounts after 75 years. Again, during 2025 and 2054 other sources of revenue are needed to keep Social Security in financial balance, assuming that 67 percent of workers participate. The higher the participation is, the more and longer general revenue will be needed to finance traditional Social Security. The total cost of transition is estimated to be around $900 billion in present value.

Finally, Model 3 resembles the other two by introducing voluntary personal accounts into which 2.5 percentage points of the payroll tax, up to $1000 annually, are paid into. Participating workers will also have to contribute an additional 1 percent of their wages taxable under Social Security. For low-wage earners the negative effect of this contribution will be reduced through refundable tax credits. If the real interest rate earned on the personal accounts will be 2 percent, workers that opted for personal accounts will be better off. Also, a minimum pension benefit is introduced starting 2018, which will pay 100 percent (111 percent) of the poverty level for those having worked for at least 30 years (40 years) at minimum wages. This minimum pension will be indexed to wage growth. The cost of Model 3 would be around $400 billion in present value.

Under Model 3, benefits of the traditional system will effectively be cut through adjustments for increasing life expectancy, stronger decreases in benefits for early retirement, and reducing the third bend point of the benefit calculation from 15 to 10 percent. The combined impact

of these measures will increase replacement rates for workers who choose personal accounts. Nevertheless, between 2034 and 2063 other sources of revenues must be used to pay promised benefits.

5.3.3 Implications of the changes

The focus here will be on Model 2, since it involves the most changes to the traditional system, i.e. it incorporates changes also made in the other two models. The Congressional Budget Office (2004a) prepared a detailed long-run analysis of Model 2. The assumptions made were 100 percent participation in the plan, implementation in 2006, and price indexing benefits beginning in 2011. By implementing Model 2, the diversion of part of the payroll taxes to personal account will reduce revenue of Social Security. This reduction will not be matched by the positive effect of reduced benefits before 2033. Nevertheless, trust fund exhaustion is assumed for 2035, and for years between 2036 and 2050, the Congressional Budget Office (2004a, p. 11) projects that general revenue needs to be used to finance scheduled benefit payments. Hence, the impact of Model 2 on the federal budget will be negative from 2006 to 2050.

Cogan and Mitchell (2003) mention what needs to be done to make the second tier a success. Specifically, personal accounts need to find a balance between costs and investment choices, and they must be especially attractive for low-wage earners to maintain the progressivity of the system. Model 2 incorporates this through the relative amount of foregone traditional Social Security benefits when choosing to divert payroll taxes into personal accounts. High income earners will lose a larger share than low income earners (Cogan and Mitchell 2003, p. 161).

The administration of the personal accounts would initially be centralized by a public authority that will select fund managers from the private sector for investment of the assets. The selection will be done in a competitive process. This setup aims at finding a good balance between cost saving through economies of scale and competition among firms that could lead to a reduction in management fees. In a later phase, the personal accounts could be moved from the centralized system to a licensed private investment firms or managers (Cogan and Mitchell 2003, p. 162).

Investment options should be limited, and the options available should be widely diversified portfolios. The choices could include investment in either U.S. treasury securities, the U.S. bond market index, the S&P 500 index, the Wilshire 4500 index or some international stock indices. Workers should only be allowed to change their investment choice once a year to emphasize the long-term character of these savings. Access to the assets of the account will be

possible only by reaching the retirement age. Upon retirement worker could choose between receiving annuities and making periodic withdrawals. The option of a lump-sum payment is also available, provided that a minimum amount of assets is accumulated. The maximum lump sum will be equal to the excess of assets over that minimum amount (Cogan and Mitchell 2003, p. 164).

5.3.4 Discussion

All of the models included the addition of voluntary individual accounts to the existing Social Security system. However, all three models rely on financing from sources outside the system, i.e. general revenue. Such additional financing from outside the Social Security budget can take on significant amounts. A recent article in the New York Times (Stevenson 2004) points at the difficulties that the current administration may face by trying to implement an individual accounts system: how to fund the implementation of personal accounts? Taxes are unlikely to be raised given that tax cuts are a priority on the current administration's agenda, including making the so-far temporary tax cuts permanent. Further, cutting benefits is also not seriously considered. As consequence, borrowing basically remains as the only option. However, borrowing large sums in times of big budget deficits is likely to cause crowding out effects on private borrowing and investment.

Diamond and Orszag (2002) criticize the flaws of all three models. The first model will not be able to restore long-term solvency and can thus not be considered a solution to the financial problems. Their criticism of the other two models centers on the reduction in replacement rates, the fact that the individual will be exposed to the investment risk, and finally the necessity to devote resources from general revenue to finance Social Security over substantial periods of time.

Another point not explicitly discussed is how accumulated funds will be paid out upon retirement. Specifically, the question left unanswered is whether they will be converted into a real annuity or not.

The participation rate is another problematic part. The higher the participation, the longer will general revenue be needed to finance the revenue shortfall to traditional Social Security. How many workers will finally choose to participate is impossible to estimate. Numbers at the upper end would be desirable, but would require more general revenue in the short-run and for a longer time period. On the other hand, numbers at the lower end would most likely not change much

about the financial pressures to traditional Social Security.

Further, as Diamond and Orszag (2004) point out, the introduction of a voluntary system raises new issues. Making the accounts voluntary adds a new decision process to the system that requires financial advise and record keeping. Also, will individuals be able to change their decision once it has been made, and if so, how often? If there is a systematic way in which people decide to participate that may influence the revenue side of the traditional system: for example, if low income earners tend to remain completely in the old system, high income earners could reduce their costs of redistribution under Social Security by participating in the personal accounts system. This would contribute to a worsening of the traditional system's finances.

To summarize, neither of the three reform models of the President's commission does appear as a compellingly convincing way to solve the challenges and problems that Social Security has to face. While the creation of personal accounts by itself can be a useful tool to create additional retirement savings, its specification as a voluntary system raises new, not yet answered questions of system design. The most serious shortcoming of the proposed models is the heavy reliance on general revenue to finance the transition process. Attempts to financially balance traditional Social Security are few, but they rely mostly on reductions on the benefit side. Since President Bush ruled out tax increases, the only remaining way of financing the transition is significant public borrowing. Doing so would have a negative impact on national saving and it could put upward pressure on interest rates. Additionally, from a social insurance point of view, Social Security would be weakened, even though a minimum pension is thought of in some proposals. This is mainly because of the proposed benefit cuts and the fact that richer individuals are likely to benefit more from the creation of personal accounts, because for them the impact of compound interest will be more pronounced. In short, the proposals have serious shortcoming that are likely to outweigh its benefits.

5.4 Kotlikoff's Personal Security System

5.4.1 The model

Building on the prior work on Social Security reform of Kotlikoff (1995), the so-called "Personal Security System" (PSS) proposal is presented to a broader audience by Kotlikoff and Burns (2004). Its proposals are derived mainly from simulation results of the Auerbach-Kotlikoff Dynamic Fiscal Policy model (AK-model) using U.S. data. In essence, the PSS will completely

replace the old-age portion of Social Security with a funded system, while disability and survivors insurance would remain as they are under current law.

Like under the proposals of the President's commission, a system of personal accounts will be set up. However, workers will contribute the whole payroll tax into these accounts. The PSS is therefore a much more radical transformation of Social Security. Beginning with the implementation of the new system, workers will stop contributing to the old Social Security. Claims to the traditional system will still be paid, but no new ones will be created. This means in effect that workers will be treated as if they had not contributed to Social Security anymore from the time the new system was started. The problem of the unfunded liability that immediately emerges when switching from pay-as-you-go to funding is addressed by the introduction of a new federal retail sales tax of roughly 12 percent. Over time this tax will be reduced to levels around 3 percent, but it is not supposed to be eliminated. (Kotlikoff and Burns 2004)

For unemployed or disabled workers the government will pay contributions to their PSS accounts using returns from the retail sales tax. Additionally, the plan requires the government to make matching contributions to any PSS account on a progressive basis to maintain the progressivity of Social Security. The matching contributions are explained by Kotlikoff et al. (1998): the government would pay a certain amount annually as a contribution to an individual's PSS account. The amount paid would be set at 5 percent of labor income for the poorest and become a smaller percentage the higher labor income is.

The assets accumulated in the PSS accounts will be invested in a "single market-weighted global index fund of stocks, bonds, and real estate" (Kotlikoff and Burns 2004, p. 156). Furthermore, the sum of accumulated contributions, i.e. the principal, will be guaranteed by the government, implying that workers are protected from an overall negative real rate of return.

Contributions to the PSS will be tax free, but the full federal income tax rules will be applied to the resulting income stream. This is supposed to increase the progressivity of the PSS system, because benefits are only partially taxed under current law.

Finally, workers' accumulated funds will be transformed into real annuities. When a worker reaches age 57, the Social Security Administration would begin to sell part of the assets over the following ten years on a daily basis. By doing so, the negative impact of a temporary bear market could be avoided, and the asset return risk could be reduced. The income resulting from selling the assets is supposed to be invested into long-term inflation-indexed government bonds. Starting at age 62, participants will receive an annuity based on the income stemming from the

so-far sale of accumulated assets. The pension will increase every year until age 67, when all the balances will be converted into an annuity. All members of an age cohort will be offered annuities for prices which are based on that cohort's life expectancy. The annuities will thus include returns from the investment in the bonds as well as from the mortality rate in the cohort. The last part of the proposal states that the account balances can be bequeathed up to the amount not yet transformed into an annuity. Consequently, when someone dies after the age of 67, there will not be any account balances left to be bequeathed. On the other hand, death before the age of 57 makes it possible that the spouse or some other heir may inherit the whole account balances. (Kotlikoff and Burns 2004)

The proposal described above incorporates quite distinct features that need to be discussed in more detail, namely the consumption tax and investment in only one security.

Kotlikoff (1995, p. 19) presents arguments why he chooses a consumption tax to finance the unfunded liability. He argues that increasing income taxes may distort labor supply and intertemporal consumption decisions, which could easily mean lower economic efficiency. Another way would be to use debt financing of the transition costs for an initial time period, and raising income taxes later, but to lower levels as in the case without debt financing. This would result in crowding-out effects in the short-run that could hurt the initial generation but leave later generations better off. However, it is hard to determine to optimal number of years for debt financing to find the right balance for a fair intergenerational sharing of the transition costs.

Further, consumption taxation can put a higher share of the burden of the transition on older individuals, because their marginal propensitiy to consume is higher (Kotlikoff 1995, p. 20). He also addresses the regressive character of sales taxes: according to his reasoning, elderly living exclusively from Social Security would not be affected by the new sales taxes. The cost-of-living-adjustment automatically undertaken every year will insure that higher prices because of higher sales taxes will be compensated. For rich people the higher sales tax would work like a wealth tax, because the bundle of goods purchased by richer individuals is different from that of low income earners.

The requirement of investing in only one security is supported by Kotlikoff and Burns (2004) with several arguments. First, it will result in the fact that individuals that made the same contributions to the system will receive the same return. Second, it will reduce the administration costs of the personal accounts significantly, because there is only a single equity in which to invest, and the account management will be centralized at one institution. To comply with risk

diversification, a global index fund of stocks is used, presumably the most diversified asset available.

5.4.2 Discussion

Kotlikoff's model is an interesting example of how to completely privatize the old age part of Social Security. Its positive aspects are the speed of the transformation process, its attempts to minimize the administrative costs of individual accounts as well as the way he tries to manage the risks involved with investing accumulated savings for retirement.
He further includes social insurance components to protect disabled, survivors, widows and widowers, and low income earners. Particularly important is the system of matching contributions that would even protect the unemployed from not being able to contribute to their retirement accounts.
To finance the rapid transition towards his funded PSS, Kotlikoff proposes the introduction of a federal retail sales tax of around 12 percent. This seems to be the important shortcoming that makes it rather unlikely that any administration will introduce such a system. Another questionable point is the plan to invest the accumulated assets into an international global index fund. Usually, proponents of privatization of Social Security hope to raise national saving. However, if assets are invested in foreign stocks, bonds, and real estate, significant outflows of capital would take place, leaving the positive impact on national saving questionable.
In short, the model that Kotlikoff presents is surely an interesting and fast way for transitioning towards a completely funded system. However, it seems highly unrealistic that a new federal retail sales tax would be legislated, given the current aversion to increasing even existing taxes.

5.5 The Diamond-Orszag Three-Part plan

5.5.1 Introduction

The last proposal was developed by Peter Diamond from MIT and Peter Orszag from the Brookings Institution, and was presented in Diamond and Orszag (2004). Their plan involves the least structural changes to Social Security. No personal accounts system will be introduced as a second tier or replacement of the traditional system. Rather, they try to adjust many different parameters of the current system to bolster revenues and reduce the impact of increasing expenditures in the future that will begin with the retirement of the baby boomers. An important part of the Diamond and Orszag plan is to strengthen the social insurance character of Social Secu-

rity; something they feel would be neglected under proposals of partial or full privatization. In the following subsection, the single adjustments that could be made to balance Social Security over the long run are introduced.

5.5.2 Proposed adjustments

The three-part plan of Diamond and Orszag (2004) first proposes changes in taxation. Their argument is based on the stylized fact that income inequality increased over the last decades. This led to an increase of the share of income which is not subject to payroll taxation simply because it is above the taxable maximum. Therefore, the authors argue that individuals with earnings above the taxable maximum should carry a larger share of the burden. Upon introduction of the upper limit for earnings subject to OASDI taxation in 1983 it meant that 10 percent of total payroll income was not subject to the tax. However, since 1983 the share of untaxed income on total payroll income rose to 15 percent. Consequently, if the income distribution did not change, Social Security would have more revenue than it actually has. Restoring the original balance would thus generate excess revenue that could be used to balance Social Security. Diamond and Orszag mention that already a return to a 13 percent level, even if achieved over a phase-in period of almost 60 years, would create significant revenue for Social Security. This could result in a reduction of the projected long-run deficit by one-eighth, even though a higher earnings limit implies higher benefits for those workers being affected (Diamond and Orszag 2004, p. 86).

As already mentioned, one of the main reasons for the Social Security system to run out of funds is the increasing life expectancy. This in turn increases the average time span that benefits will be paid to retirees, thus creating higher expenditures to the system.

An individual could respond to the phenomenon of increasing longevity in three possible ways: increase saving before retirement, decrease consumption during retirement (lower benefits), and working additional years. Under Social Security, as Diamond (1996) points out, an improving life expectancy can be accounted for by increasing the normal retirement age, without a change in the early retirement age. Doing so would essentially cause a cut in benefit, since retirement before the NRA means lower benefits.

However, the authors consider a balanced approach that brings in elements of the aforementioned available individual responses without changes in the retirement ages. The Social Security Administration could calculate each year the increase in expenditures due to improving

life expectancies. Half of these costs will be financed through reductions in the PIA, thus on the benefit side, the other half could be financed through very small increases in the payroll tax rate. The result of this measure would be a reduction of the seventy-five year imbalance by a third.

The rationale for not changing the EEA and NRA is that the authors expect the variability of the date of death to increase as mortality declines. Hence, those with a lower life expectancy would need the option of early retirement. Additionally, the worker's ability, her interest in working, and the availability of occupational opportunities for the elderly should also be considered when proposing reforms. Another critical issue is the uncertainty about how the labor market for older workers will develop, whether it will be attractive enough for the elderly to work additional years.

An important part of the three-part plan is how a fair distribution of the so-called legacy costs, i.e. the unfunded liability, could be achieved. As mentioned before, these costs result from the relative generosity of the pension system for the early generations who paid much less than what they received in benefits. A current estimate puts the legacy cost for actuarially fair system around 3 percentage points of the 12.4 percent payroll tax (Geanakoplos, Mitchell, and Zeldes 1998b, p. 13). Diamond and Orszag believe that the whole society should share this burden fairly; hence, they propose (1) universal coverage of OASDI, (2) subjecting earnings above the taxable maximum to a legacy tax, and (3) adding a universal legacy charge which applies to future workers and beneficiaries.

Concerning current Social Security coverage, the system does not include some four million state and local government employees. The argument of Diamond and Orszag is that a fair sharing of the burden would mean that those employees be included in Social Security coverage. Their plan recommends beginning universal coverage of newly hired state and local employees by 2008.

Additionally, a legacy tax should be imposed on earnings above the earnings limit such that high earners bear a fair burden of the legacy costs. Initially, this tax would be set at 3 percent, but it would slowly increase over time. This "legacy tax" alone would reduce the long-run deficit by almost another third.

Finally, a universal legacy charge on both taxes and benefits is proposed that would apply to all workers beginning in 2023. This date has been chosen because it marks the end of the phasing-in period of the increase in the normal retirement age. It is planned that each year benefits will

decline by 0.31 percent and payroll taxes will increase by 0.26 percentage points.

The authors estimate that the combination of these three measures will reduce the seventy-five year deficit of OASDI by 1.71 percent of payroll, which represents 89 percent of current estimates of this deficit.

Strengthening the social insurance character of Social Security is an important part of the Diamond-Orszag proposal. The adjustments described as necessary to balance Social Security will hurt specific groups of the society more than others, among them low income earners, widows/widowers, disabled workers, and survivors. Hence, increasing the benefits for these groups is included as an important part of the author's proposal.

5.5.3 Discussion

Diamond and Orszag present a way of preserving Social Security. The main goals the authors have in mind are: restoration of the long run financial balance and the character as a social insurance.

The means to achieve the first aim are combined measures of small tax increases, benefit cuts, expansion of coverage and the tax base. The current retirement ages will remain unchanged, which is part of protecting those with low life expectancies from having no or few years of retirement. Given the current aversion to tax increases, it seems again rather unlikely that a proposal like this would be seriously considered, no matter how small the increases will actually turn out to be.

Nonetheless, Diamond and Orszag show that there are ways to solve the financial imbalances within the existing institutional framework of Social Security. Where other proposals emphasize the character of individual equity, the authors hold up social adequacy and try to strengthen the social insurance character of Social Security. Because no radical changes of the system are made that could leave weaker groups worse off, and the measures to restore financial balance are manifold to avoid drastic adjustments, their approach seems to be the most convincing and well-balanced one.

5.6 Comparison

Using the descriptions and discussions of the three ways to redesign Social Security given above, a brief summarizing comparison shall conclude this section. The selected models represent different ways to change the current system: transitioning to partial funding, to fully

funding, or simply adjusting the current system by making changes on the revenue and expenditure side.

The models of the President's commission are based on the creation of personal accounts with voluntary participation. Contributions to these accounts would not be made additionally to the current payroll tax, but would rely on diverting part of this tax into the accounts. Balancing Social Security is supposed to take place mainly through reductions in benefits. The redistributional aspects of Social Security would rather be weakened, and the transition would require large amounts of money that are likely to be raised by borrowing from financial markets.

The Kotlikoff proposal of fully privatizing Social Security would divert the complete payroll tax into personal accounts without any phase-in period. The claims to the traditional system would be paid off using general revenue of a new federal retail sales tax that would start at 12 percent but would be reduced in the following. The system has some strong redistributional components that are supposed to resemble those of traditional Social Security. Nevertheless, its implementation is rather doubtful because of the need for a new tax.

Finally, the Diamond and Orszag plan would try to preserve the existing system. Some adjustments on the benefits and expenditure sides are made, namely also through the introduction of a new tax and some cuts in benefits due to changes in life expectancy. The redistributional aspects would be strengthened by improving protection for financially weaker individuals.

To summarize, fully privatizing Social Security does not seem to be an option, given its immense costs. The high budget deficits of the current administration and the sentiment against tax increases leave fully funding only as a theoretical option. Concerning the introduction of voluntary personal accounts, the proposals presented in this text fail to financially balance traditional Social Security and raise the need to rely on general revenue to finance the benefits. Once more, transition costs will have to be financed, and it is likely that this will be done through increased public borrowing which may have negative economic consequences. Given the fact that the future prospects for public health care programs in the U.S. are even worse, the need for additional public borrowing should rather be reduced than expanded.

The plan of Diamond and Orszag appears as the most convincing way to strengthen Social Security. Instead of having to face the massive transition costs, their plan tries to share this debt over generations by using a small legacy charge.

6 Conclusion

This paper gave an overview of the history and possible future of the United States Social Security system. The importance of the system for the income protection of the elderly is hard to exaggerate, with two thirds of the elderly relying mostly on public pensions as source of income after retirement. During its history, Social Security has been remarkably successful in improving the economic well-being of the elderly in the United States, specifically for those with lower incomes. It is an important tool of social policy in the United States, and one of its main features is the emphasis of social adequacy, which implies that the redistribution of income is a goal within the system.

However, the increase in life expectancies coupled with low birth rates and the retirement of the baby boom generation will cause significant financial pressure on the system in upcoming years. This pressure is likely to culminate in an inability of the system to finance promised pension claims from its own resources around the middle of this century. It has been pointed out that the baby boom generation is not the real problem; it only accelerates the impact of a combination of increasing life expectancies and low fertility rates. The current system with its PAYGO structure is particularly vulnerable to the result of this change, the increasing number of retirees to workers. Therefore, an intense debate is led whether the structure of the system should be fundamentally changed or whether it should be readjusted.

The theoretical discussion about public pension systems showed that a funded system may be preferable to an unfunded system. However, the transition from the existing unfunded system to a funded system is very costly. Further, the proposals of privatizing Social Security so far fail in preserving the social insurance character of the current system. As a consequence, economic protection of low income earners during their retirement could be weakened. Additionally, privatization of Social Security would significantly alter the risks that individuals have to face. Currently, political risk of tax increases and benefit cuts has to be faced, but a privatized system would exchange this for the economic risks of volatile asset returns and low lifetime wage income.

It is the social insurance character of Social Security that made it a success, and it is this feature that should make it worth to adjust the current system rather than fundamentally altering its structure with the possibility that the economically weaker members of the society will be worse off. The Diamond-Orszag plan presents a balanced way to preserving the current system and fitting it for the future. In its history, Social Security had to respond at many time to

changes in the society and economic conditions, and if the political will were there, relatively small adjustments could be sufficient to restore the long-run balance. Neither of the models of the President's commission seems to be a good response to the future challenges to Social Security. If implemented, they are likely to worsen the financial situation of the current system in the short-run while relying heavily on borrowing for many years to finance to transition. It is therefore likely that partial privatization would cause a bigger burden to society than the relatively small adjustments proposed by Diamond and Orszag (2004).

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