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Social Security and the Provision of Retirement Income

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Abstract

Social security is increasingly debated in terms of alleged effects of public pensions on economic efficiency. The author reviews the history and rationale for public provision of retirement income, then argues that the efficiency effects of such schemes are negligible. Social security reform in itself is not likely to generate increased savings or growth; it is essentially a zero sum game in which some participants gain at the expense of others. Arguments for reform of social security masquerade as economics, while in reality they are political arguments for changing the distribution of costs and benefits.

JEL classification: H55

Key words: Social security, retirement, pension schemes, defined benefit, defined contribution, payroll taxes, intergenerational transfers.

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1 Introduction

Everyone faces years in which the product of his or her labour is inadequate to meet even minimum consumption needs. This is necessarily true in early childhood, and may also characterise adult life if an individual suffers involuntary unemployment due to disease, disability, old age or economic recession. And everyone would like to be able to continue to consume during periods of unemployment. Adults accumulate savings or go into debt in an effort to smooth their consumption over time. This option is not available to children, who have no access to credit and little or no income of their own. Even in the case of adults, capital markets can fail, or individuals may maximise their consumption in the present rather than save for an uncertain future. It is for this reason that nonmarket institutions exist in every society to transfer resources from workers to non-workers. These institutions provide what has come to be known as social security or social insurance.

The notion that a person, even a wealthy person, might retire from work solely because of age before the actual onset of physical disability is very much a modern concept. Individuals traditionally have had to labour throughout their lives, even though the nature or pace of work might change as they age. To this day, workers trapped in poverty in poor societies are expected to work for as long as their strength permits. For these workers, security in old age means not the possibility of voluntary retirement, but rather an assurance that their access to consumption will not be blocked should they become disabled before they die. The elderly poor who have neither a pension nor savings must seek communal support when they cease to work, or join the ranks of beggars.

In Western Europe, retirement for an able-bodied person was unheard of until the sixth century, when a few of the aged who had the means began to bequeath property to religious orders in exchange for lifetime care in a monastery (Minois, 1989). Not until the 14th century did retirement become common for large numbers of able-bodied but elderly members of the wealthier strata of society. Jean le Bon established the first retirement plan for public servants in 1351 when he founded a home for aged knights as part of the chivalric Order of the Star. At about the same time, manor lords in the countryside, as well as some of the more prosperous merchants and artisans in the towns, began to secure their retirement by negotiating with individuals (frequently their own adult children) or with charitable institutions administering hospitals that functioned in part as retirement homes (Minois 1989, pp. 245-247) and Smith, 1991). In effect, the elderly began to trade their assets for the promise of lifetime care in order to avoid the risk that they might otherwise outlive their assets. This is similar to the purchase of an annuity or pension, even though the income was typically promised in grains or in kind rather than in currency.

2 Filial Provision of Retirement Income

The family is a social institution that exists in all human societies, and it was the first to provide humans with continued access to consumption in the event of unemployment; the vast majority of people in the world today continue to rely on the family as their sole source of social security. Families are important and extremely effective vehicles for transferring resources downwards, from older to younger generations. In developed Western countries, however, families are ineffective in transferring resources upwards, from the young to the old. 1/ In modern Western societies a majority of the elderly are able to retire with a high standard of living, but it is almost

always thanks to their own savings and to public pensions, not to the generosity of their adult children or grandchildren. 2/

Observers of intergenerational relations in Western societies frequently assume that the widespread failure of sons and daughters to care for their elderly parents is due to modernisation and urbanisation, or to the existence of government transfer payments, or both. In some simpler time in the past, they reason, it must have been common for adult children to care for their retired parents. Economist Paul Samuelson (1958, p. 468), for example, wrote four decades ago: "Formerly we used to support our parents in their old age. That is now out of fashion." John Caldwell (1978, 1982), a demographer, developed this view further, hypothesising that human societies in early stages of development transfer resources from the young to the old, but eventually reach a transition point where the resource flow is reversed. He reasoned that children are an economic asset for parents in traditional societies where individuals 'invest' in children because they expect to receive support in old age that will more than compensate for the cost of rearing children. In contrast, children are an economic liability in modern societies where transfers flow primarily from parents to their offspring. In support of this hypothesis, Caldwell observed that fertility rates are high in traditional societies and low in modern societies.

Hillard Kaplan (1994), an anthropologist, subjected Caldwell's hypothesis to a rigorous test. He and his associates studied three tribes of hunter-gatherers in South America: the northern Ache of eastern Paraguay, the Piro of south-eastern Peru and the Machiguenga, also of south-eastern Peru. These societies produce and consume perishable food and lack any store of wealth such as land, cattle, money or grains; investment in children is the only way members of these tribes could possibly provide for consumption needs in old age. All three tribes exhibit high rates of fertility (more than eight births per female), which is consistent with the view that parents regard their offspring as economic assets rather than liabilities.

The anthropologists carefully weighed all the foods produced and consumed by a sample of members of each tribe, converted these quantities to caloric equivalents, and recorded each subject's age, sex and height. In all three tribes children consumed four to five times more calories than they produced, so depended on parents and grandparents for the bulk of their nutritional needs. Not until they reached the age of 18, most often with children of their own, did young people begin to produce more calories than they consumed.

Strikingly, the researchers discovered that the elderly among the Ache, Piro and Machiguenga never stop working and register little or no decline in daily output as they age. Once members of the tribes become net producers, they remain so almost always for the remainder of their lives. Indeed, Kaplan reports that the elderly work harder, the more children and grandchildren they have, in order to transfer more food to them. When they become too old and frail to work, death follows quickly, frequently as a result of suicide or euthanasia. These children, like children everywhere, undoubtedly give their parents and grandparents much pleasure and happiness, but they do not transfer any resources to them. In economic terms, the children are liabilities rather than assets.

The one-way, downward flow of resources from old to young generations in the hunter-gatherer societies studied by Kaplan is extreme. Children in these tribes burden their parents as net consumers for nearly two decades, yet they provide no return at all for this investment: the elderly never become net consumers so are never supported by their adult children or grandchildren.

One can cite numerous examples in history of primitive societies in which adult children systematically neglect their elderly parents, and rid themselves of the unproductive old by means of ritual suicide or euthanasia. But one can also point in the history of Africa and Europe to primitive societies, particularly those with oral traditions, in which the elders were revered for their wisdom and knowledge. ^{3/} Although it has not been documented, one can presume that a transfer of resources upward, from the young to the old, accompanied this veneration of age, so generalisation regarding the flow of resources between generations in primitive societies is not possible.

The history of European civilisation, beginning with the ancient Greeks and Romans and continuing in the Christian era, records, for the most part, the failure of adult children to accept responsibility for care of elderly parents. There are exceptions to this generalisation, but they most often reflect strategic behaviour induced by the desire of a son or daughter to inherit a parent's estate (Minois, 1989; Pelling, 1991; Thomson, 1991 and Smith, 1991).

The elderly in Western societies stoically accept their fate, and do not wish to be a burden for their children. In much of Asia, in contrast, there is a strong sense of filial obligation and much transfer of resources from adult children to their elderly parents, even when the latter are poor and have no estate to bequeath (Lee, Parish and Willis, 1994; Cain, 1991 and Hashimoto, 1996). Nonetheless, it is not known whether the rate of return for parents who invest in children is positive in any society in Asia. As Lee, Parish and Willis (1994) note, for children to be economic assets rather than liabilities, support received by elderly parents must be at least sufficient to repay the investment made when the children were young, plus any return that the parents would have received had they invested the funds in a different fashion.

In sum, in many primitive societies the resources of a typical family do not flow upwards from young to old, while in others they do. Similarly, even though resources in European families flow almost exclusively downwards from parents to children today as they did in the past, there is a substantial upward flow from young generations to the old in most families in Asia. One must conclude that the available evidence fails to support Caldwell's hypothesis: the intergenerational flow of resources within families depends on social norms, not on a society's level of economic development.

One constant is that parents everywhere are generous in the care of their young, so governments intervene much less in the transfer of resources to children than they do in the transfer of resources to retired adults. In most countries, transfers from adult taxpayers to children are limited to public education along with the meals and health care that may accompany school attendance. In addition, governments provide an indirect subsidy to children by allowing parents an income tax exemption for each dependent child. Developed countries, with the notable exception of the United States, augment this subsidy with a cash allowance for each child, but this represents at best a small fraction of the costs of rearing a child.

3 Government Provision of Retirement Income

Policymakers are motivated by two distinct concerns in their desire to provide pensions to elderly citizens. First, they want to eliminate or at least to reduce the incidence of absolute poverty among the elderly by assuring all residents a minimum income once they become disabled or attain a specified age. Second, they want to insure that workers, in retirement, are

able to maintain the standard of living to which they have been accustomed during their working life. 4/

The first goal calls for the provision of modest pensions of uniform size financed on a pay-as-you-go basis from general taxes. Few have any quarrel with this role for government. There is, however, disagreement over whether such pensions ought to be given to everyone on a universal basis, or whether they ought to be means-tested, which would target the needy and reduce the fiscal costs of the programme. Opponents of means-testing worry that this would stigmatise social security as 'welfare', with the result that many of the truly needy might not apply for benefits. At the same time, those facing a means-test have an incentive to spend all their savings, and pass all their assets on to their children, in order to become eligible for a government pension. 5/

The second goal calls either for mandatory contributions to a retirement fund or for payroll taxes to finance, on a pay-as-you-go basis, pensions related to each participant's wage history. Invariably earnings above a maximum (associated with a maximum pension) are subject neither to mandatory saving nor to payroll taxes, so social security affects low-income workers proportionally more than it affects high-income workers. Sometimes the two goals are met with a single programme of social security that includes a guaranteed minimum pension. Unless all pensions are funded from general taxation, as is the case in Denmark, this is not very satisfactory, for it imposes on low-income workers a disproportionate share of the cost of assisting those who have had only a limited attachment to the work force.

Not everyone agrees that maintenance of the standard of living of retirees well above the poverty line is a necessary or even a proper function of government in a market economy. Of course it is satisfying that workers be able to retire in dignity, but presumably this is a goal of workers themselves, who can put aside savings for their own retirement without compulsion from the state. As Alan Blinder (1988, p. 17) so aptly explains, most governments would also like citizens to own their own homes; they may provide some incentives to encourage this, but they leave the decision for the most part to individual choice and certainly do not compel home ownership.

Why, then, do governments require each worker, in retirement, to have a pension related to his or her past wages? Economists have struggled with this question for years, and have come up with a number of possible explanations. The most intellectually satisfying of these is market failure caused by adverse selection in the annuities market. Adverse selection is a term from the insurance industry that refers to asymmetric information, that is, to the fact that an individual knows more about himself than the insurer does. If the insurer offers annuities (private pensions) at a price based on average life expectancies, only those who expect to live long lives will purchase the policies. This will force the insurer to increase the price, causing some potential purchasers to drop out of the market. This may continue until the price is literally too high for anyone, so everyone can be made better off if they are forced to participate in a pension plan.

Adverse selection is undoubtedly a factor explaining compulsory pension plans, but adverse selection also affects life insurance without serious consequences, so it cannot be that important. Blinder (1988, p. 21) doubts that adverse selection helps much in explaining why governments actually establish social security programmes. He suggests that it does, however, make economists feel better in recommending government involvement. Another justification is uncertainty regarding the effect of future inflation on retirement savings, but this is an argument for public provision of indexed bonds, not for compulsory contributions to social security.

The true reason for public provision of pensions above a minimum, subsistence level, is governments' desire to protect citizens from their own improvidence. Workers, policymakers assume, are myopic, so consume too much of their current income and save too little for the future. Without compulsion, few will save enough for retirement. Economists, whose models are based on free choice by rational consumers, are understandably reluctant to embrace this argument for social security. Nonetheless, there are other instances where governments restrict consumer choice in order to enhance the welfare of individuals. Addictive drugs, for example, are prohibited or taxed heavily. Social security, then, protects workers from the temptation to consume too much in the present just as drug control protects them from other types of temptation.

3.1 Pay-as-you-go Pensions

Governments finance income-related pensions predominately through payroll taxes on a pay-as-you-go basis. With this type of financing, today's workers support today's retirees so there is no need to build up a pension fund. Indeed, this is the great attraction of such schemes: full pensions can be given to a first generation of workers who retire before the plan matures, even though they did not contribute to social security in the early years of their working lives. Moreover, if the demographics and economics are right, these early pensions can be provided at little or no cost to succeeding generations of workers. Pay-as-you-go pensions under these circumstances can be justified as enlightened self-interest with no need for emotional appeals to "solidarity" between generations or altruism of young workers toward their elders.

The arithmetic of pay-as-you-go is relatively simple. Suppose that R is the number of retirees receiving an average pension of p . Pensions are financed by a tax on covered wages at the proportional rate t (percentage rate $100t$). Typically there is a wage ceiling above which no taxes are collected, and a maximum pension is associated with it. If L workers participate in the plan, and their average covered wage is w , then twL flows into the social security system. Balancing the social security budget requires that expenditures equal revenue: 6/

$$pR = twL$$

Rearrangement of terms yields a formula for the required rate of payroll tax:

$$t = \frac{p/w}{L/R} = \frac{\text{replacement ratio}}{\text{support ratio}}$$

The numerator of this formula (p/w) is simply the average replacement ratio, i.e. the proportion of the average covered wage that is replaced by the average pension. Note, however, that this refers to replacement of current wages, not the historical wages received by retirees. The denominator (L/R) is the support ratio, i.e. the number of contributing workers per pensioner, which is the reciprocal of the dependency ratio (R/L). This dependency ratio is often approximated by an elderly or old-age dependency ratio, which is measured as the ratio of the population of pensionable age (usually 65 and over) to the population of working age (usually 15 to 64) and can be easily calculated from census data. The correlation between the elderly dependency ratio and the social security dependency ratio is far from exact, since labour force

participation rates, average retirement ages, and the proportion of workers covered by social security all vary over time and across countries.

Using the basic formula for the social security tax rate, it is a simple matter to plug in values for an observed support ratio (L/R) and the desired replacement ratio (p/w) to calculate the required rate of payroll tax. With a support ratio of 4 workers per retiree, for example, workers would have to contribute 15% of their salaries to the social security scheme in order to provide retirees with pensions equal, on average, to 60% of the average covered wage. If the ratio of workers to retirees were to fall to 3, the payroll tax would have to increase to 20% in order to maintain the same replacement ratio. Were the support ratio to fall to 2, the tax rate would have to be set at 30% of covered wages. Workers in many countries today face such increases in social security taxes, for support ratios fall when birth rates decline and populations age, and when workers are encouraged to retire at earlier and earlier ages.

These calculations overstate the likely increase in payroll taxes as a result of declining support ratios because they assume that the replacement ratio remains fixed. In fact, the ratio of average pensions to average covered wages is likely to fall when the support ratio falls. Retirees do not contribute to social security, so the replacement of wages net of social security contributions increases from approximately 70% ($100 \cdot .6 / .85$) to more than 85% as payroll taxes increase from 15% to 30%. Workers are not likely to support an increase in the relative affluence of retirees precisely when their own take-home pay is being squeezed. Germany in 1992 and Japan in 1994 for this reason switched from gross wages to net wages as the basis for calculation of retirement pensions (Schmähl, 1993; Takayama, 1996).

The calculations also overestimate the required tax rate (t) in many cases because they implicitly assume that pensions are indexed by wages. In the real world, pensions received by retirees are most often indexed (formally or informally) to consumer prices rather than wages. Even if initial pensions are based on real wages, their subsequent indexing to prices combined with rising real wages will produce a lower ratio of current pensions to current wages, hence a lower rate of payroll tax than that predicted by the basic formula.

A more fundamental question is whether we ought to regard a worker's contribution to social security as a tax, which finances transfer payments to current retirees, or as saving, which is returned to the worker during his or her retirement. The distinction is important. If social security is a tax, then it is a very regressive one. Unlike income tax, there are no personal deductions for social security tax, and wages that exceed a ceiling are not taxed at all. Nor is investment income taxed for the purposes of social security. Consequently, the burden of the social security tax on the wealthy is very light.

But payments to social security are not taxes like an income or sales tax, for they give the worker a claim on pension income during his or her own retirement. In this sense, social security contributions are deferred wages or savings. In exchange for accepting reduced consumption possibilities while working, an individual gains a right to increased consumption during retirement.

What type of return does the worker receive on these savings? Initially, a very high return indeed, for the first recipients of pay-as-you-go pensions typically receive full benefits despite the fact that they begin to contribute only toward the end of their working life. The first participants receive a windfall gain because of the 'Ponzi' or chain-letter aspect of pay-as-you-go pensions. 7/ The returns become lower for each successive cohort of retirees, until the plan matures. Full maturity occurs only after the average number of years in an average working life

have passed, which can be four decades or more. An increase in the replacement ratio or a decrease in the number of years of contributions required for a full pension can set off a new round of abnormally high returns, which subside only when the new plan matures. Current generations thus have an incentive not only to initiate pay-as-you-go pensions, but also to set them at generous levels. 8/

What is the return on social security contributions in a mature pension plan? This depends on what is happening to the support ratio (L/R) and to real wages (w). If these two parameters are constant, then the average participant in a mature plan will receive in benefits exactly the amount of his or her contributions. In other words, the real return on contributions will be zero and the nominal return will equal the rate of price inflation. If either or both of these parameters are falling, negative returns are possible, and if either or both are rising, real returns can be positive. In many developed countries today, low birth rates are causing the support ratio to fall, which gives rise to the possibility of low or even negative returns on contributions for today's generation of workers. Generous provision of early retirement, in the guise of disability pensions, has the same negative effect on returns for those who continue to work until the normal age of retirement.

Paul Samuelson (1958) demonstrated long ago that with a constant real wage and a population that grows from below, i.e. one that increases in size because of increased births, not because people are living longer, the return on contributions in a mature pay-as-you-go pension plan is equal to the rate of growth of the population. The support ratio (L/R) increases constantly in such a society, with the result that the same payroll tax (t) finances an average pension that is a larger and larger fraction (p/w) of the real wage. Henry Aaron (1966) expanded Samuelson's model to demonstrate more generally that the real return on contributions for the average participant in a mature pay-as-you-go plan is equal to the sum of the rate of growth of the population plus the rate of growth of productivity (real wages). Again, this assumes no change in life expectancy or retirement age.

Since life expectancy changes only slowly, and wages tend to be a constant share of national income, the Samuelson-Aaron result implies that the real return on social security contributions in a mature, pay-as-you-go system will be approximately equal to the rate of growth of GDP. To measure the tax component (if any) of social security contributions in a mature plan, we need only compare the growth of GDP over long periods with the return that participants could obtain by investing instead in stocks and bonds. Table 1 reports, for eight developed countries, the growth of real GDP and real returns earned by private pension funds in the 25 year period ending in 1990. On balance, the average real rate of return on pension assets was roughly equal to real GDP growth over this period: GDP growth exceeded investment returns in Australia, Canada, Japan and the United States, whereas investment returns were higher than GDP growth in Denmark, Germany, the Netherlands and the United Kingdom.

Managers of pension funds in the United Kingdom earned a particularly high rate of return in this period because they invested a large proportion of their assets in equity rather than bonds. In each of the eight countries, equity investments provided a much higher return than bonds over this period. (See table 2.) This equity premium came at the cost of increased risk, for in each case the standard deviation (volatility) of real returns is greater for equity than for bonds. In the case of the United States, however, the difference in standard deviation is a trivial 0.1 percent whereas the equity premium is 5.2 percent. In other countries as well, with hindsight, the equity premium was so large as to warrant concentration of investment in stocks rather than bonds. The size of the equity premium and its persistence has long puzzled economists, who expect all assets, adjusted for risk and liquidity, to earn the same rate of return in the long run. 9/

Rates of return on pension assets are quite different in sub-periods of this 25 year span. (See table 1 once again.) In each of the eight countries, real returns on investment were depressed or negative in the 1970s, then rose sharply in the 1980s, precisely when growth of real GDP slowed. According to the Samuelson-Aaron rule, young contributors to social security have been taxed since the early 1980s, for they would have been better off investing their payroll taxes in a private pension fund. Since investment for retirement is investment for the long-term, this assumes that real returns will continue to exceed the growth of GDP far into the future. Proponents of funded pensions routinely make this assumption. Feldstein (1997), for example, predicts that real GDP in the United States (or at least the wage component of GDP) will grow at 1.5% per annum or less, and projects real investment returns of 5.4% (9% if the proportional amount of taxes paid by companies in which pension funds invest are given as a subsidy to the tax-free pension funds). In a country that expects such a wide and prolonged divergence between growth rates and real investment returns, a pay-as-you-go system imposes a tax burden on workers once the system matures. This will not be true in all countries nor at all times, but it is a factor that policymakers are advised to take into account when designing a pension system.

It is sometimes thought to be self-evident that pay-as-you-go pensions have adverse effects on saving. But economic theory cannot predict the effect on national saving of the introduction of unfunded pensions. Early participants in such plans enjoy a windfall gain, for they receive disproportionate benefits compared to what they contribute in taxes. This is known as the social security wealth effect, which causes current consumption to rise, so is unambiguously negative for savings. There are two additional effects, however, each of which is positive. First, access to a pension might induce workers to retire earlier than they otherwise would, and, unless the pensions are exceedingly generous, individuals will want to build up savings over fewer working years in order to supplement their social security income during retirement. This causes workers to increase their rate of saving. Second, individuals save not only for retirement but also to leave an inheritance for their children. Parents, realising that future generations bear the burden of their retirement benefits, may save more in order to leave larger bequests, thus offsetting the impact of social security taxes on their children's incomes. Robert J. Barro (1974, 1978) argues that this bequest effect offsets completely the negative impact of social security wealth on national saving.

In sum, the net effect of pay-as-you-go pensions on savings can be positive or negative and is very much an empirical question. Econometric evidence unfortunately is inconclusive. Several studies, beginning with Feldstein's seminal paper (1974), find large, negative effects, whereas others find small effects, no effects and even positive effects on saving. This lack of agreement reflects problems of data and model specification, in particular the measurement of social security wealth, as well as differences in the econometric techniques that are used. 10/

3.2 The Burden of Payroll Taxes

In the design and reform of pension systems, much debate goes into the question of who ought to be responsible for payroll contributions to social security: the employer, the employee, or both. Many educated, informed people, including those who draft national laws, those who draw up international conventions, and no small number of professional economists, believe that contributions to social security paid by employers increase business costs, while those paid

directly by workers do not. Horst Siebert (1997) articulates this view with exceptional clarity in a recent paper on European labour markets:

"The implicit taxation of demand for labour in the form of contributions to social security is relatively heavy in some European countries. Whereas employers bear a smaller share relative to employees in the Netherlands (7.9 vs. 33.5 percent) and an equal share in Germany (21.05 vs. 21.05 percent), other countries require a much higher contribution from firms, such as France (33.5 vs. 18.6 percent) and Italy (46.1 vs. 10.0 percent). Spain also has high employer's contributions. We should expect that demand for labour is more severely affected in these countries" (p. 48).

Siebert's data refer to the sum of contributions to all forms of social security, including unemployment compensation and health care as well as old-age pensions and survivors' benefits. His argument has some validity for the short run, before wages have a chance to adjust, but it cannot be true for the long run, for two reasons.

First, demand for labour depends not on payroll taxes alone, but rather on the total cost to the employer of hiring workers: cash wages plus payroll taxes and non-monetary benefits (child care, transportation, paid holidays, subsidised lunches and the like). To the extent that workers value the social security benefits they receive because of their employment, such as health care, unemployment insurance and a guaranteed old-age pension, they presumably are willing to accept less take-home pay. It is entirely possible for employers to provide social security and other benefits to workers in exchange for lower cash wages, leaving total labour costs unchanged (Lee, 1996).

Second, even if workers do not regard all contributions made to social security on their behalf as deferred wages, the incidence of a payroll tax depends only on the supply of and demand for labour, not on who is legally obligated to pay the tax. It is analogous to a retail sales tax, the incidence of which is the same regardless of whether the seller or the buyer pays the tax. 11/ A pure payroll tax (with no benefits attached) is a tax on transactions between workers and their employers, just as a sales tax is a tax on transactions between buyers and sellers. Payroll taxes, regardless of whether they are paid by the worker or by his employer, introduce a wedge between what an employer must pay for labour and what a worker receives. They can cause the wage rate to fall or labour costs to rise or some of each, depending on the relative elasticities of labour supply and labour demand. If the absolute value of the two wage elasticities are equal, the burden of the tax will fall equally on the worker and his employer. If labour supply is less elastic than labour demand, more of the tax will be shifted to labour.

For an individual industry, the supply of labour may be quite elastic, for workers can move to other industries if their wages are cut. But social security taxes are imposed on an entire economy, not a single industry, and workers rarely have the option of moving to another country. In some countries, imposition of payroll taxes may induce workers and their employers to move to the informal sector, where no taxes are paid. This is common in developing countries. In countries without a large informal sector, labour is supplied inelastically to the whole economy: overall labour supply responds very little to changes in wage rates. 12/ For this reason most of the payroll tax, employer and employee component alike, is shifted eventually onto labour in the form of lower wages.

An important exception to this reasoning is workers earning a minimum wage, which is inflexible unless authorities allow inflation to erode its real value. Payroll taxes added to

minimum wages cannot be shifted to workers, so labour costs rise and excess labour supply (unemployment) can result. This is equally true for wages that are inflexible for other reasons. Siebert (1997, pp. 50-53), for example, argues that the reservation wage, i.e. the wage below which a worker will not accept employment, has increased sharply in the European Union, primarily because of increased generosity of unemployment benefits. 13/

On the demand side, firms that face increased labour costs have the option of closing plants and moving production to countries with lower labour costs, so their demand for labour can be quite elastic. This, precisely, underpins the thesis that payroll taxes increase labour costs and cause unemployment. 14/ If payroll taxes increase the labour costs of employers, and capital is mobile, we ought to observe high rates of unemployment in countries with high rates of taxes. There is no evidence that this is the case. Stephen Nickell (1997, pp. 69-70), in a cross-section study of 20 developed economies, finds no apparent relationship between payroll tax rates and unemployment rates. Denmark, for example, uniquely has no payroll taxes, yet suffers a rate of unemployment that is on par with the average for the rest of Europe.

Payroll taxes may also increase labour costs if labour markets are dominated by powerful trade unions and monopolistically competitive firms. Alesina and Perotti (1997) suggest that this may be true in the developed economies of Europe and North America. They analyse data of 14 countries for the period 1965-1990, ostensibly to test the following hypothesis:

"The basic idea of the paper is simple. An increase in labour taxation used to finance re-distribution to pensioners and/or unemployed workers induces the labour unions to increase wage pressure, which in turn induces higher labour costs and a loss of competitiveness. As a consequence, the demand for exports and employment fall" (p. 922).

But Alesina and Perotti make no attempt to measure the effect of payroll taxes on exports or employment. They focus instead on competitiveness, defined as unit labour costs of production in the manufacturing sector. For only three of the 14 countries (Germany, the Netherlands and Belgium) do they find tax rates to have a measurable, positive effect on competitiveness. For the other eleven countries, they find no statistically significant relationship between changes in unit labour costs and changes in payroll taxes. They interpret this as evidence that payroll taxes are shifted to the employer only when trade unions are moderately centralised, as is true in Germany, the Netherlands and Belgium, rather than extremely centralised, as in the Nordic countries, or decentralised, as in the United States or the United Kingdom.

3.3 Funded Pensions

The alternative to pay-as-you-go is a funded system, which might be expected to have a positive effect on saving. When pensions are administered by governments, however, funding may well be more apparent than real. Even when accounts are kept 'off budget', policymakers typically regard social security contributions as a part of general revenue: they promptly spend it or use the income to reduce taxes, which causes the public debt to increase. It's a simple matter for a government or central bank to finance new debt by selling bonds to the social security fund, the assets of which typically consist solely of government bonds. The government has to service its debt, so it remains committed to future transfer payments; the apparent funding amounts to little more than creative accounting, a roundabout method of pay-as-you-go financing. 15/

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

Because governments are prone to spend the revenues they collect, those who favour the funding of pensions also advocate their privatisation. Enthusiasts such as Feldstein (1997) sometimes give the impression that increasing the assets of private pension funds must increase national saving, but this is simply not true. Private funds may increase saving, but they may also have no effect at all, and they might even decrease saving. If contributions to private pension funds are voluntary and taxed in the same manner as other saving, they will have no effect whatsoever on total saving; saving in pension funds will simply displace other forms of saving. If contributions to pension funds are sheltered from taxes, or are taxed only lightly, their effect on saving may well be negative. Suppose, for example, that an individual wants to accumulate a target amount of savings to provide retirement income. Savings grow faster within a tax shelter than outside it, so a person can save less and still attain his or her savings target. 16/

Saving will increase during a transition from pay-as-you-go to private, funded pensions, but only if fiscal policy is tight. Suppose that a government operating a pay-as-you-go pension plan that is balanced (payroll taxes = expenditures) suddenly ceases to collect social security contributions from workers and their employers, and requires instead that they deposit the same amount of money each month into private pension funds. Unless there is some change in fiscal policy, this policy will have no impact at all on national saving. The government will have to borrow money to pay pensions to existing retirees who have earned entitlements, and this public dissaving offsets exactly the increased private saving captured by pension funds. In fact, the net effect on national saving might well be negative if contributors believe that they are better off with a private pension fund, so reduce other saving. 17/

For national saving to increase, someone's consumption must fall. The government can finance its pensions with taxes, for example, thus causing the general public to reduce consumption; or it can pay lower pensions, thereby causing retirees to reduce their consumption. But governments can achieve this same result with tighter fiscal policy or conventional public pension reform, with no need to privatise social security! The desire to increase national savings is a poor reason to privatise social security unless, of course, tight fiscal policy is somehow more acceptable when it is implemented along with privatised and funded pensions. 18/

It is often alleged that during the transition from pay-as-you-go to funded pensions, the current generation of workers must 'pay twice', once for the pensions of current retirees and once for their own pensions. This is strictly true only if the government retains the payroll tax, which will diminish gradually over time as pensioners benefiting from the 'old' system die off. It is more helpful to regard a switch from pay-as-you-go to a funded system as the transformation of implicit debt into explicit debt. This is clearest when recognition bonds are issued to participants

on the basis of their past contributions to the 'old' system. A second decision, such as the retention of payroll taxes, increase in general taxes, or reduction of pension benefits, is required to reduce the size of this debt. Unless fiscal policy is tightened, the cost of transition can be pushed onto future generations. 19/

In sum, the effect of private pensions on saving, like the effect of public pensions (funded or unfunded) on saving, is an empirical issue that theory alone cannot resolve. Table 3 brings some evidence to bear on this question. It reports for eight developed economies the sum of private pension assets as a percentage of GDP in 1970, the same statistics for 17 countries in 1994, and their respective rates of gross domestic saving in each of those years. There is little apparent relation between the pension assets and saving, and what relationship there is, is negative. The United Kingdom and the United States register extremely low rates of saving in each year, yet residents of those countries have large amounts of savings deposited in private pension funds. Japan has a saving rate higher than any of the other 16 countries, even though its residents have almost no savings in private pension funds. In each of the eight countries for which data are available for the two years, pension assets as a proportion of GDP increased, often markedly; in contrast, the rate of saving fell. On balance, there is no evidence to support the thesis that privatisation of social security in itself increases national saving.

4. Defined Benefit versus Defined Contribution Plans

In the discussion of the effect of social security on employment and national saving, we begged the question of whether the plans are defined benefit or defined contribution. This choice is far more important than the decision between funding and pay-as-you-go or even between public and private provision of pensions. 20/ A defined benefit plan grants pensions on the basis of each individual's history of covered earnings, irrespective of the payments that he or she may have made into the system. A defined contribution plan, in contrast, credits each participant with actual payments made into the system, much like an individual savings account.

Presumably the improvident behaviour which justified mandatory participation in social security in the first instance is still present at retirement, so workers ought to receive a pension rather than a lump sum settlement. In addition, although death is certain, its timing is not, so a retiree without a pension faces the risk of outliving his or her savings. With defined benefits, the size of the pension by definition is part of the contract between a worker and the pension scheme. With defined contributions, the worker's accumulated savings have to be transformed into monthly annuity payments. This is difficult given the fact that the market for annuities is extremely inefficient even in countries with highly developed capital markets. 21/ Annuities ought to be indexed to prices to insure that retirement income is not eroded by inflation, but private annuities are rarely indexed. Regarding administration of the plans, public pensions are given higher marks than private pensions, for costs everywhere are significantly lower for public than for private plans. 22/

Defined benefit is sometimes assumed to be synonymous with public, pay-as-you-go schemes and defined contribution to be synonymous with private, funded pensions, but this is not strictly true. Many, indeed most, private pension plans are defined benefit and some public schemes such as provident funds are defined contribution. A defined benefit plan may be funded or unfunded, but its degree of funding is inherently uncertain, as calculations of the present value of future liabilities depend on assumptions as to life expectancy of participants and the rate of

return on assets of the plan. Defined contribution plans are always fully funded, but there is no compelling reason for this to be true. Indeed, some reformers of public pensions (Boskin, Kotlikoff and Shoven, 1988) advocate the introduction of defined contribution as a way to link benefits to contributions while retaining the pay-as-you-go nature of existing plans.

Portability of pensions, or rather the lack of portability, is very much a problem with defined benefit plans in the private sector. Employees often have no right to a pension of any size until they have participated in a company's plan for many years, and early leavers are penalised heavily. Defined contribution plans, in contrast, are similar to savings accounts, so are very portable between employers. Portability is never a problem with public pension schemes: regardless of whether they are defined benefit or defined contribution, they accompany the contributor from job to job, and even from job to unemployment.

The defined benefit/defined contribution choice is central to design of pension policies because defined benefit invariably redistributes wealth within a single generation or cohort whereas defined contribution generally does not. 23/ There is no technical reason for this distributional dichotomy to exist, but it does exist, regardless of whether pensions are public or private. Absent redistribution of wealth within cohorts, each participant of the same age earns the average return from the system, which may be the Samuelson-Aaron return on pay-as-you-go contributions or a more conventional return on the assets of a pension fund. When pension rules redistribute wealth, some participants earn a return that is higher than average, at the expense of others of the same age who earn a lower return on their contributions to the pension plan.

Any redistribution of income produced by a defined benefit plan can, in principle, be achieved in a defined contribution plan. Moreover, a defined benefit plan can be implemented with rules that do not benefit one group of participants at the expense of others. Consider, for example, a cohort of workers born in the same year who contribute the same portion of their salaries to the same pension plan for precisely the same number of years before retiring. Suppose that most of the workers have a flat earnings profile while a select few receive promotions, so have covered wages that increase steadily throughout their working lives. A typical defined benefit plan (public or private) replaces a fixed percentage of the average covered wages received by a worker in the last few years before retirement. This rule means that workers who are promoted enjoy a greater return on contributions than workers who are not promoted. In a typical defined contribution plan, in contrast, all contributions earn the same rate of return. But the redistributive element of the defined benefit plan could be largely eliminated by calculating average wages for all years of work rather than only the last few years. 24/ And a defined contribution plan can redistribute income in this same fashion, if desired, by shifting credits from the accounts of workers who are not promoted to the accounts of workers who are.

The previous example illustrates nicely why redistribution of wealth is prevalent in defined benefit plans, yet largely absent from defined contribution plans. The concept of 'fairness' depends on how outcomes are framed. With individual accounts, fairness means that the return on contributions for each participant ought to be the same, even though replacement of final earnings will be less for those who receive more promotions. With defined benefits, it seems fair to base each participant's pension on final earnings, even though this is unfair from the standpoint of an 'equal rate of return' rule. By moving from defined benefit to defined contribution, reformers hope to reduce the amount of redistribution of wealth that occurs within pension systems. In other words, they expect all participants to earn much the same rate of return on their contributions. They most likely are right, except that the poor, who have

relatively short life expectancies, will earn a lower return than the wealthy unless some adjustment is made when they purchase annuities.

There are many additional examples of redistribution of wealth in defined benefit plans. The variety and extent of redistribution varies widely from country to country. One common rule is replacement of a larger proportion of the earnings of workers with low incomes than those with high incomes. In large measure, this merely compensates the poor for their lower life expectancies. To the extent that such a rule actually increases the rate of return on contributions by the poor, it provides an opportunity to redistribute wealth based on the criterion of lifetime income. The income tax is also a tool to redistribute income, but, in the absence of extensive income averaging, only from the transitory rich to the transitory poor. Another common rule is replacement of the same proportion of earnings of a woman as a man with equal earnings. This redistributes wealth from men to women because women live longer, on average, than men. Sometimes this redistribution is made even stronger by allowing women to retire at an earlier age than men, with full pensions. This seems unfair in terms of the implied differences in rates of return on contributions; on the other hand, women require more social security wealth precisely because they live longer.

Defined benefit plans also provide a myriad of 'free' benefits to participants. Credits are given to workers for years they were unemployed, in the military, in school, or rearing children. This increases the size of the pension, hence the return on contributions, for recipients of such credits, at the expense of other participants in the system. Defined benefits are almost always larger for a person with a nonworking spouse, compared to a person who does not marry, or one married to a person who also works. Couples with a single income thus profit from the system at the expense of dual-income couples or singles, and the effect, intended or not, is to subsidise the traditional family. In addition, defined benefit plans provide generous survivors' benefits at no charge, whereas in defined contribution plans the survivors receive only the contributions made by the participant, plus their accumulated return. Life insurance is sometimes mandatory in a defined contribution system, as is the case in Chile, but it is never provided for free. Not everyone has a spouse or children, so provision of free survivors' benefits also redistributes wealth from single persons to those with families.

It is important to remember that these benefits are free for participants but not for society. When they are included in a defined benefit package, they are financed in effect by regressive payroll taxes. Governments may want to provide retirement income to those who have had little or no attachment to the formal labour market. But do they also want to finance a programme of this nature by taking away a larger portion of the income of a poor person than that of a wealthy individual?

In shifting from a defined benefit to a defined contribution system, it is equally important to remember that large numbers of citizens will suddenly their benefits reduced or even eliminated. A nonworking wife who is widowed while her husband is young, for example, is likely to find the proceeds of a defined contribution scheme to be inadequate. Governments must either 'top up' these pensions out of general revenue, or require that workers with families purchase life insurance. This is an important cost of the transition to defined contributions, a cost that is often ignored by proponents of privatisation.

5 Conclusion

There exists widespread consensus that, at least in modern societies, government ought to be involved in assuring adequate retirement income for the elderly. There is less consensus as to the form this involvement might best take. Some analysts call for a radical replacement of public, pay-as-you-go pension schemes with private, fully-funded plans in which government involvement would be limited to mandating contributions to such plans and guaranteeing participants some minimum pension. Others call for reform rather than replacement of existing public plans, and urge the extension of coverage to more workers in those countries where participation is not yet universal.

This debate is often couched in terms of private versus public provision of pensions, or funded versus unfunded pension schemes. Public, unfunded pensions, it is argued, redistribute income from the young to older generations because the wealth effect of a pay-as-you-go pension scheme causes consumption to increase.^{25/} Consequently, the argument goes, saving and capital formation is lower than it would be in the absence of unfunded pensions. Future generations are worse off to the extent that they inherit a smaller stock of capital, and thus a less productive economy. But other forces cause the introduction of unfunded pensions to increase the rate of saving, namely the bequest motive and the desire to save for early retirement. Empirically, there is no clear evidence that choice of a pension regime has much effect at all, positive or negative, on saving and capital formation.

In any case, privatisation of pension plans is not necessary if the goal is to decrease consumption and increase saving in order to promote economic growth. Fiscal retrenchment will suffice. Governments need only increase taxes (including social security taxes) while maintaining expenditure constant, or direct more of their expenditure to physical and human capital formation.

Those who favour privatisation of social security also advocate a shift to a defined contribution plan. This would have important implications for the intragenerational distribution of wealth. With a defined contribution system, each participant gets back exactly his or her contributions, plus any return on the accumulated assets. With defined benefit plans, on the other hand, the link between benefits received and payments made into the fund can be weak. When 'free' benefits are given to some participants at the expense of others, contributions to social security come to resemble a personal tax more than personal saving. In this regard, it should be noted that social security is a very regressive payroll tax. For social security taxes, there is no personal deduction, so low-income workers pay taxes at a flat rate; moreover, wages above some ceiling are exempt from tax, so at this point the average tax rate falls as wages rise.^{26/}

Advocates of privatisation are on solid ground when they oppose the use of social security taxes as an instrument to redistribute wealth within a single generation. It is true that existing defined benefit plans give some participants a greater return than others on their contributions. But this can be corrected by reforming public pensions, rather than privatising them. If benefits are linked tightly to contributions, then the return on contributions will be the same for all participants, regardless of whether the system is funded or unfunded, private or public. Where desired, non-contributory benefits can be financed out of general taxes, which in all cases are less regressive than social security taxes.

Suppose, for example, that government wants to provide each elderly citizen with a small pension, or guarantee a minimum pension for all citizens, which is equivalent to a means-tested

universal pension. It is politically difficult, if not impossible, to tax private pension funds to finance such a universal pension. It should be, but usually is not, equally difficult to appropriate social security contributions for the same purpose. Or, suppose that government would like pension payments to last not only for the lifetime of the retiree, but also for the lifetime of a dependent spouse. With defined contributions, a participant that chooses this option receives a lower pension compared to one payable only for the duration of his or her lifetime. This is actuarially fair, for pensions are paid for more years in the case of two lives than in the case of a single life. With defined benefits, monthly payments for joint lives ought to be reduced as well, otherwise single retirees and dual-income couples are financing, via a regressive payroll tax, overly generous pensions for single-income couples.

Ultimately all pension systems, be they defined benefit or defined contribution, require workers to reduce present consumption in exchange for a claim on future consumption. Numerous government policies affect, now and in the future, the distribution of output between investment and consumption, the distribution of consumption between retirees and workers, and the distribution of consumption within each of these two broad groups. Empirical studies suggest that choice of a pension regime in itself has little impact on savings, investment or growth, but it can change markedly the distribution of income and wealth. Pension reform for this reason is more a political than an economic issue. Governments everywhere would like, within the constraints of resources available to them, to assure an adequate standard of living for all retirees. In designing pension plans to achieve this goal, policymakers must examine carefully the distribution of costs and benefits, for they cannot rely on efficiency gains to pay for needed reforms. Social security reform to a very large extent is a zero sum game in which some participants gain but others lose.

Endnotes

1. See, for example, Lee and Miller (1994) for detailed calculations of intergenerational flows based on data from the 1987 Consumer Expenditure Survey of the United States. These researchers show not only that gross flows are overwhelmingly downward, but, more surprisingly, that upward transfers diminish steadily as couples age and their children become more established.
2. Nor are adult children generous in donating their time to care for elderly parents, according to survey data reported in Kotlikoff and Morris (1989) and in Sloan and Zhang (1993).
3. For a fascinating review of this literature, see chapter 1 of Minois (1989, pp. 8-24).
4. The World Bank (1994) in a widely cited report refers to these as the two mandatory pillars of income security systems. A third pillar is voluntary and consists of personal savings for retirement.
5. For a discussion of these issues, see Kingson and Schulz (1997) and Binstock, Philips, Steurle and Brutless (1996).
6. In the real world this budget is not always in balance. If social security revenues exceed expenditures, as is currently the case in the United States, the system is said to be partially funded. More often, governments finance a portion of their social security expenditures with revenue from general taxes. Denmark uniquely finances all pay-as-you-go pensions with income rather than payroll taxes.
7. Charles Ponzi, an Italian immigrant to the United States, swindled investors in 1919 and 1920 by paying returns to early investors with money invested by others, thereby making his fraudulent scheme appear profitable. Had Mr. Ponzi not absconded with the cash, when the scheme folded the average investor would have received back in dividends precisely the amount of his or her investment, i.e. the average rate of return would have been zero. Nonetheless, early participants would have gained at the expense of late entrants.
8. The fact that current workers benefit from voting themselves high pensions, the cost of which is borne by future workers, is often invoked as an argument against pay-as-you-go financing of public pensions. Altruism toward the next generation, or (more egotistically) fear of a 'tax revolt' in the future dampens this pressure for excessively generous pensions. See Disney (1996, chapter 10, pp. 283-306).
9. Some students of finance view a large equity premium as evidence of a mistake by investors, while others regard it as evidence of extreme risk aversion. Perhaps purchasers of stock have just experienced an extraordinarily long run of good luck. The Economist argued that their luck was about to change in "Lovely while it lasts", the lead editorial of its 9 August 1997 issue. See Siegel and Thaler (1997) for a non-technical explanation of why the equity premium is a puzzle and Kocherlakota (1996) for a survey of the literature.
10. For surveys and summaries of empirical studies, see Atkinson (1987), Magnussen (1996) and appendix II of Mackenzie, Gerson and Cuevas (1997, pp. 21-27).
11. For details, see any standard textbook, such as Varian (1996, pp. 291-293).

12. Estimates of aggregate wage elasticities of labour supply vary widely, but tend to be very low, in the range of 0.04 to 0.20. See Killingsworth (1983, pp. 125-129) and Pencavel (1986).
13. See also Phelps (1997), especially pp. 96-99.
14. E. Philip Davis (1997, p. 21), for example, argues that European Monetary Union will bring greater capital mobility, which "will arguably tend to put countries imposing high taxes on labour for social security purposes under greater pressure to adapt their systems and reduce the burden on industry and commerce, as high taxes would otherwise lead firms to relocate their activities where such taxes are lower."
15. The social security fund could purchase government bonds from the general public, freeing savings for other investments. The absence of a positive effect of funding on savings is due not to the fact that the fund purchases government bonds, but rather to the fact that the government increases its deficit by the amount of the social security contributions.
16. In this example the income effect more than offsets the substitution effect of an increase in the after-tax rate of interest. For a diagrammatic explanation of this and other effects of pensions on saving, see Blinder (1983, pp. 32-43).
17. A negative impact on saving was evident for nine years following privatisation of the provision of pensions in Chile, yet national saving increased markedly because of tight fiscal policy. See Holzmann (1997, pp. 149-178).
18. For two exceptionally clear expositions of this point, see Mariger (1997) and Mackenzie, Gerson and Cuevas (1997).
19. Burdens cannot be shifted onto future generations in models of the new classical school, but in that case the implicit debt of the 'old' system has already been paid, since the generations that received windfall gains from social security increased the size of its bequest (Barro, 1974).
20. Peter Diamond stresses this point in his many writings on the subject. See, for example, Diamond (1995).
21. Blake (1997, pp. 66-67) reports that in the United Kingdom "the market for immediate annuities is fairly thin (i.e. uncompetitive) in the sense that the annuity rates offered tend to be poor value for money." He adds that "the market for deferred annuities is very thin" and they "are offered only on the worst possible terms". A deferred annuity is a pension that is to commence some time in the future.
22. Pension plans in the Netherlands reflect typical public/private cost differences. Administrative costs for state pensions amount to 1% of contributions, compared to 7% for company pensions and 24% for individual pensions (Davis, 1997, footnote 44, p. 29).
23. An important exception for defined-contribution plans is the sale of annuities with unisex factors, which transfers wealth to women since they live longer than men on average.

24. To account for inflation and changing productivity, past nominal wages should be multiplied by a wage index.

25. Note that only early participants enjoy a windfall gain, so only their consumption would be affected by the choice of pay-as-you-go over a funded scheme.

26. This cannot be avoided by requiring the employer rather than the employee to pay the tax, for payroll taxes are ultimately borne by the worker.

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Table 1. Actual returns on private pension funds in selected developed economies, 1966-1990.

(Percent per annum, period averages)

<u>growth</u>	<u>Real pension-fund returns</u>				<u>Real GDP</u>
	1966-70	1971-80	1981-90	1966-90	1966-90
Australia	...	-4.2	7.5	1.6	3.7
Canada	-3.3	-1.1	7.0	1.6	3.9
Denmark	-1.9	-0.3	8.0	3.6	2.4
Germany	5.0	3.3	7.0	5.1	2.8 a/
Japan	0.1	-0.9	10.8	4.0	5.7 a/
Netherlands	1.7	0.3	8.4	4.0	3.3
United Kingdom	4.2	1.1	11.3	5.8	2.3
United States	-5.4	-1.4	9.7	2.2	2.8
Simple average	0.1	-0.4	8.6	3.5	3.4

a/ GNP.

Note: Nominal returns were deflated by the consumer price index.

Source: Pension-fund returns from Davis (1995, table 6.17, page 150). GDP growth calculated using endpoints from IMF, International Financial Statistics, 1995 Yearbook, except Germany which is from the 1994 Yearbook.

Table 2. Real returns on private pension-fund investments in domestic equities and bonds, selected developed economies, 1966-1990.

(mean and standard deviation for annual data)

	<u>Equities</u>	<u>Bonds</u>	<u>Equity Premium</u>
	Mean (s.d.)	Mean (s.d.)	Mean
Australia	8.1 (20.8)	-2.7 (14.7)	10.8
Canada	4.5 (16.5)	0.0 (12.1)	4.5
Denmark	7.0 (27.5)	3.4 (16.1)	3.6
Germany	9.5 (20.3)	2.7 (14.9)	6.8
Japan	10.9 (19.4)	0.2 (12.8)	10.7
Netherlands	7.9 (28.2)	1.0 (13.1)	6.9
United Kingdom	8.1 (20.3)	-0.5 (13.0)	8.6
United States	4.7 (14.4)	-0.5 (14.3)	5.2

Note: Pension funds in each country also invested in loans, mortgages, property, foreign bonds and foreign equity.

Source: Davis (1995, table 6.1, p. 133).

Table 3. Private pension-fund assets and gross domestic saving in selected developed economies, 1970 and 1994.

(Percentage of GDP)

<u>saving</u>	<u>Private pension assets a/</u>		<u>Gross domestic</u>	
	1970	1994	1970	1994
Australia	10	41	27	20
Austria	...	1	31	26
Belgium	...	3	26	23
Canada	13	34 b/	23	19
Denmark	5	18	23	21
France	...	4	27	20
Finland	...	10	29	22
Germany	2 c/	6 c/	30	27
Ireland	...	42	18	28
Italy	...	2	27	20
Japan	0	6	40	31
Luxembourg	...	3	39	27 d/
Netherlands	29	82	26	25
Portugal	...	8	20	13
Spain	...	2	26	20
United Kingdom	17	68	20	14
United States	17	67	18	15

a/ Excludes pension reserves held by insurance companies.

b/ 1992.

c/ Data for Germany exclude assets held as reserves by sponsoring firms, which amounted to nine percent of GDP at the end of 1994.

d/ 1992.

Source: Pension fund data are from Davis (1995, table 32, p. 55) and Davis (1997, table 2.2, p. 36). Gross domestic saving are from IMF, International Financial Statistics, 1996 Yearbook.