

Financing Retirement in the European Union

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¹ The author would like to thank Henry Aaron, Leon Bettendorf, Paul Besseling, Peter Broer, Thijs Knaap and Sijbren Cnossen for their helpful comments on an earlier draft.

Research Memorandum 0111

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Abstract

This paper explores how EU countries can address various challenges (including the aging of the population) affecting their systems of old-age income support. It presents two scenarios illustrating the most important uncertainties surrounding the major developments that affect the pension systems of the EU. To diversify these risks, EU governments should act on several fronts. In addition to the formation of human capital (especially that of children), employment (especially that of older workers) should be boosted. This calls for social insurance reform with more emphasis on individual saving schemes. Pension schemes should be more explicit about how they share demographic and other risks. Countries that currently rely heavily on public pay-as-you-go (PAYG) schemes should stimulate private pensions by gradually reducing PAYG benefits collected by high-income earners, by issuing new financial instruments, and by conducting intergenerational risk sharing through the tax system.

1. Introduction

The systems of income support in many EU countries are under stress. Pension systems financed on a pay-as-you-go (PAYG) basis are particularly vulnerable to the expected decline in the worker/retiree ratio on account of aging. Also funded schemes are affected by the aging trend. In particular, by reducing labor supply, aging makes capital less scarce compared to labor, thereby depressing asset prices and the return on capital (see e.g. Brooks (2000)). In addition, aging renders pension systems more vulnerable to risks by narrowing the contribution base compared to the outstanding pension obligations. Accordingly, pension rights can be protected in the face of shocks (such as unexpected longer longevity, inflation, or lower asset prices) only at the cost of substantial variations in contributions. By reducing the expected return and raising risks, aging thus worsens the return-risk trade-off facing pension systems. This paper puts the financing of old-age income support in EU countries in a broader context by discussing how not only aging but also other developments impact the future of old-age income support. These non-demographic trends include globalization, technological change, individualization and more heterogeneous tastes and needs. Indeed, these trends are likely to be as important as the aging of the population in determining the future of old-age income insurance.

This paper focuses on the systems of income support in old age rather than on health care, housing, and social care services provided to the elderly. It analyses EU pension systems in a broad economic perspective. In particular, it explores not only pension design but also various non-pension policies that directly impact the sustainability of pension systems. In doing so, it explores a rich menu of policy options. Indeed, a mix of policy measures involving both pension design and other policy areas is called for; no single magic solution is available that addresses all pension problems facing European countries and also carries sufficient political support.

The structure of the rest of this paper is as follows. After section 2 distinguishes three basic pension systems, section 3 explores the uncertainties facing old-age income insurance by presenting two scenarios for the future of pension systems. Section 4 investigates various policy options involving European labor markets in general, and human capital accumulation in particular. Section 5 turns to pension design, dealing with each of the three pillars of a well designed pension system in turn. Section 6 concludes.

2. Three pension systems

For the purposes of this paper, we distinguish three types of pension schemes depending on the extent of intergenerational and intragenerational distribution: Pay-as-you-go

(PAYG), defined-benefit (DB), and defined-contribution (DC) schemes.² PAYG systems pay retirement benefits out of contributions collected on the labor income of the young. In the absence of capital funding, these schemes typically imply substantial intergenerational transfers. Depending on the benefit and premium formula employed, they generally also redistribute resources within generations. These schemes are provided by the government, which can enforce the benefit promise and the associated redistribution through its tax powers.³

In contrast to PAYG schemes, DC schemes are not redistributive - neither *within* nor *across* generations. Indeed, individual retirement benefits are directly related to individual contributions. At any point in time, accumulated capital corresponds to the discounted value of future retirement benefits. These schemes can be provided by the market as either personal or occupational pension schemes.

DB schemes are a mixture of PAYG and DC schemes. These schemes are typically provided as occupational schemes by firms. Just like DC schemes, DB systems employ capital funding. However, in contrast to DC schemes, benefits are based on salary levels in the period preceding retirement rather than on the discounted value of individual lifetime contributions. In order to be able to pay these wage-linked benefits, DB schemes rely not only on the accumulation of financial assets but also on an implicit contract between the firm, its workers and retirees of different ages. If returns are low and wage increases substantial, then the firm and the younger workers transfer resources to older generations. If returns are high, in contrast, these parties benefit from lower contributions. Since these schemes benefit from intergenerational risk sharing, they can invest over a longer horizon and thus take on more risk. In this way, they are better able to exploit the equity premium than are DC schemes.

² Bovenberg and Van der Linden (1997) discuss the strengths and weaknesses of these three pension schemes in detail. In addition to the three pension schemes explored here, other types of pension systems can be distinguished. To illustrate, public, non-funded schemes, which involve some degree of intergenerational redistribution, may refrain from intragenerational redistribution by relying on so-called notional accounts.

³ PAYG schemes can be seen as part of an implicit social contract between generations. The older generations raise the younger generations, thereby conferring human capital to the young. The elderly provide the young also with public capital goods, such as a clean environment, public infrastructure, and most importantly, knowledge and ideas. In return for this service, the younger generations later on transfer part of the return on these assets to the older generations as PAYG pension benefits. The market cannot enforce this implicit contract since it should be concluded before birth.

Firms can perform the redistributive activities associated with the benefit promise in DB schemes only in less-than-perfectly-competitive product and labor markets.⁴ Indeed, employers may employ DB schemes as an instrument to alleviate labor-market imperfections associated with asymmetric information and lack of commitment. In particular, long vesting periods and the link between retirement benefits and the final wage motivate workers not to shirk and serve to bind them to the firm. This reduces costs associated with monitoring, training, hiring, and firing.

3. Two scenarios

An important reason for adopting a mix of pension systems is to diversify risks; workers should not put all their eggs into one basket to avoid excessive exposure to the substantial political-, capital market-, and human capital risks.⁵ By increasing the vulnerability of pension systems to risks (see the introduction), aging makes diversification even more important. Each country should determine its own mix of pension systems depending on its political preferences (e.g. for inter- and intragenerational risksharing) and the functioning of capital and labor markets. The selected mix should depend also on expectations regarding future developments (e.g. regarding future returns on financial and human capital).

This section presents two scenarios that illustrate the major uncertainties over a long time horizon. The scenarios show how the considerable uncertainty about various developments affects each of the three pension systems introduced in section 2. These scenarios reveal also which trends are relevant when a country considers the future of its own pension system.

The two scenarios are called the *market* scenario and the *intergenerational solidarity* scenario, respectively.⁶ In the market scenario, markets are competitive and dynamic, capital and labor mobility are high, the population is heterogeneous, the income distribution within generations is less equal, and formal market relationships are dominant. In the intergenerational solidarity scenario, in contrast, implicit contracts, government intervention, and various non-market institutions play an important role in alleviating various imperfections in labor and capital markets. Indeed, markets are much

⁴ Also government regulations may help occupational schemes to perform risk sharing and prevent adverse selection by making collective labor agreements compulsory for particular sectors.

⁵ In this connection, Merton (1983) argues that a mix of funded and unfunded pension systems is optimal. In the absence of tradable human capital, the unfunded component provides the elderly with a claim on human capital.

⁶ The description of these scenarios draws heavily on Bovenberg and Van der Linden (1997). This latter study also provides a numerical illustration of these two scenarios, focusing on the uncertainty surrounding the elements of the Aaron condition (see Box 1).

Box 1 Aging and the Aaron condition

The Aaron condition (see Aaron (1966)) reveals how the rate of return and the growth rates of labor productivity and the labor force affect the relative merits of PAYG versus funded schemes. The long-run return to PAYG schemes depends on the growth rate of labor income determining the growth of the contribution base. The return on funded schemes, in contrast, depends on the rate of return on financial assets. Hence, in the long run, funding can offer a higher return if the rate of return on financial capital exceeds the growth rate of labor income (i.e. the sum of the growth rate of labor productivity and the growth rate of employment). However, PAYG schemes are always more favorable to the first generation because they can offer pension benefits without having to build up assets.

The Aaron condition can be interpreted as an arbitrage condition involving the relative returns on human and financial capital. PAYG schemes rely on the human capital of the younger generations. Therefore, PAYG schemes are particularly attractive compared to funded schemes if a high growth rate of wages implies a high return on human capital while financial markets offer only low returns. The table below compares the average growth rate of wages with the average real return on capital in recent times. In contrast to the real interest on government bonds, the return on shares substantially exceeded the growth rate of wages during this period.

The aging of the population reduces the attractiveness of PAYG by decreasing the growth rate of employment. However, aging is also likely to make labor scarcer relative to physical capital. This may raise wage growth and depress the rate of return on capital. Accordingly, the overall effect of aging on the Aaron condition is ambiguous.

Table: Real wage growth contrasted with real returns on capital, selected OECD countries, 1971 – 1990

	Real wage growth	Real average annual return on equities	Real average annual return on government bonds
Canada	1.1	5.0	1.1
Denmark	2.5	9.4	4.5
France	4.0	9.6	1.3
Germany	3.6	9.3	2.6
Japan	3.0	11.2	0.0
Netherlands	1.4	8.6	1.8
Switzerland	1.8	4.7	-1.7
United Kingdom	2.4	10.8	1.6
United States	0.1	5.9	1.2

Source: World Bank (1994).

less competitive. Whereas the *free-market* perspective is dominant in the market scenario, the *coordination* perspective is important in the intergenerational solidarity scenario.⁷ Moreover, in the market scenario the rate of return on financial capital is relatively high, while in the intergenerational solidarity scenario the return on human capital is relatively attractive. The relative return of financial versus human capital affects the Aaron condition (see Box 1) and is therefore an important determinant of how attractive PAYG schemes are compared to funded schemes. The rest of this section discusses in more detail the features of the two scenarios, which are summarized in Box 2.

3.1 The market scenario

Globalization and international convergence

Globalization is proceeding rapidly. Information technology allows capital to become much more mobile internationally, not only *within* but also *between* regional blocks. At the same time, outward-looking policies and good public governance enhance the investment climate in the developing countries. Also abundant labor resources and enhanced educational levels contribute to this improved climate. Growing inward direct investment allows developing countries to benefit from knowledge spillovers. Indeed, knowledge is easily transmitted between people and firms. Internationally mobile factors (i.e. capital and knowledge) rather than relatively immobile factors (such as human capital) are the main motors behind economic growth. Hence, developing countries feature high productivity growth as their productivity levels rapidly catch up with those in developed countries. Excellent investment opportunities in developing countries with relatively young populations result in high interest rates on world capital markets.

Growth in EU lags

Growth in EU countries lags growth in younger countries, including the developing countries. The older labor forces in EU countries have a hard time keeping up with rapid technological changes. Moreover, training and education of the young suffers as political tensions between generations weaken the informal intergenerational contract between the old and the young. Also the high interest rate favors investment in financial capital over that in human capital. Moreover, taxes and transfers become increasingly distortionary as the trade-off between equity and efficiency worsens (see the sub-section on public policy below).

⁷ See CPB (1992) for a discussion of these various perspectives.

Box 2 The main features of two scenarios

	Market	Intergenerational solidarity
<i>Growth performance of regions</i>		
EU and rest OECD	-	+
non-OECD	+	-
<i>Returns on investment in EU</i>		
return on capital	+	-
return on human capital	-	+
<i>Motors of economic growth</i>		
human capital	0	+
public infrastructure	0	+
private research and development	+	0
<i>International integration</i>		
capital mobility	+	0
labor mobility	0	+
trade between major trade blocks	+	-
international knowledge spillovers	+	0
<i>Macro-economic balances in EU</i>		
current account balance	+	0
government balance	-	+
private saving-investment balance	+	-
<i>Technology</i>		
biased towards low-skilled labor	+	0
process innovation	0	+
product innovation	+	0
innovative start-up firms	+	0
innovation in large, mature firms	0	+
tacit knowledge	0	+
<i>Human-capital formation in EU</i>		
public education	-	+
incen. to invest in firm-specific skills	-	+
incentives to invest in general skills	+	+

The main features of two scenarios (continued)

	Market	Intergenerational solidarity
<i>Income distribution</i>		
relative wages of low-skilled workers	-	0
relative primary incomes of the elderly	+	-
cost of medical care for the elderly	0	+
<i>Convergence of incomes</i>		
international	+	-
intergenerational	+	-
intragenerational	-	0
<i>Labor market</i>		
labor-market imperfections	-	+
participation rate	-	+
effective retirement age	-	+
labor mobility across firms	+	-
<i>Capital market</i>		
capital-market imperfections	-	+
capital mobility across firms	+	-
international capital mobility	+	-
<i>Industrial structure</i>		
stakeholder view of the firm	-	+
firm-specific investments	-	+
turnover of firms	+	-
large firms dominant	-	+
dominant market structure	monopolistic competition	oligopoly
<i>Cultural trends</i>		
individualization	+	-

The main features of two scenarios (continued)

	Market	Intergenerational solidarity
<i>Politics</i>		
international cooperation	+	-
intergenerational contract	-	+
faith in government	-	+
faith in market forces	+	-
size of government	-	+
<i>Social security</i>		
spending level	-	+
tagging	-	+
less moral hazard	-	+
level of insurance	-	+
<i>Income support in old age</i>		
Poverty alleviation through PAYG scheme	-	+
Old-age insurance through PAYG scheme	-	+
Occupational schemes of the DB type	-	+
Personal DC schemes	+	-

As their trade deficits grow after 2025, EU countries specialize in non-tradable service sectors, while many high-tech industrial sectors producing tradable goods move to younger countries. The narrowing gap in living standards between the EU and developing countries mitigates migration flows. Indeed, the world exploits the diverging needs and endowments of older, OECD countries and younger, developing countries through capital and trade flows rather than labor flows.

Intragenerational inequity and heterogeneity

Intragenerational inequities widen in EU countries as technological change is biased against low-skilled labor. At the same time, abundant supply of labor in developing countries keeps wages of low-skilled labor at relatively low levels. Moreover, overall supply of low-skilled labor in EU countries remains sizable because education and training in the EU fail to upgrade the skills of the low skilled. Schooling of low-skilled workers suffers from budgetary problems and political tensions that result in cuts in the funds earmarked for public education. Employers invest in their high-skilled workers rather than in flexible, low-skilled workers. All these trends increase wage disparities.

The weak labor-market position of the low-skilled reduces the overall participation rate. Many of these workers retire early, draw on social security, and participate in the black and informal economies. The productivity of high-skilled workers continues to grow as the educational level rises. At the same time, the elderly with high incomes benefit from high returns on their saving. Moreover, their medical expenses do not rise much, as low wages reduce the costs of medical services. Furthermore, the elderly generally remain in good health for most of their retired lives.

Thus, while convergence between the developed and developing countries reduces international inequities and high interest rates alleviate intergenerational inequities, intragenerational inequities within the industrial countries grow.

Market structures

In addition to incomes, lifestyles and work patterns become more heterogeneous. Individualisation is a major trend. Product differentiation becomes more important as tastes of consumers grow more heterogeneous. Accordingly, monopolistic competition becomes a dominant market structure. Start-up firms play a major role in product innovation. Indeed, firms turn over rapidly.

As far as human capital is concerned, general skills are more important than firm-specific skills. Moreover, job mobility is high and the labor market is rather competitive. The same holds true for the capital market, as the shareholder view of the firm dominates the stakeholder view. Indeed, efficient financial markets rapidly reallocate capital from old declining firms to innovative start-up firms.

Public policy

Intergenerational solidarity through collective PAYG schemes comes under pressure. The old are becoming a heterogeneous group featuring both high and low incomes. Hence, age is no longer a good indicator for poverty. Indeed, EU countries feature both young workers with low (labor) incomes and retirees who collect high (capital) incomes.

With age being an inadequate indicator for poverty, tax privileges for the elderly are withdrawn. PAYG pensions substantially lag the standard of living of the young and are eventually integrated with poverty alleviation in general. To avoid a serious poverty trap, the government is not able to guarantee a high minimum income level. Indeed, taxes and transfers become increasingly distortionary because of two reasons. First, conditioning transfers on income is rather distortionary because flexible working patterns make labor supply rather elastic. Second, heterogeneous life styles imply that the government cannot use "tagging" as a means to identify needy groups, but has to rely instead on income as an indicator for poverty. Indeed, the government reduces income differentials and provides insurance against low incomes more through the tax system (i.e. a negative income tax) and means-tested benefits and less through social insurance benefits conditional on non-income information (e.g., age, marital status,

unemployment, disability). To prevent agents from exploiting means-tested benefits during retirement and to compensate for the withdrawal of tax privileges for pension saving, the government makes some private pension saving compulsory. This stimulates saving but reduces labor supply.

The heterogeneous population in combination with the trend towards individualisation causes the informal intergenerational contract between the generations to weaken. Fiscal imbalances originating in high interest rates, distortionary taxes, the low participation rate and the relatively low growth rate reinforce this trend. Consequently, the young receive less public education while the old collect less public transfers. Also occupational DB schemes become less important. These schemes are less appropriate for a flexible workforce with diverse needs. Moreover, in a rather competitive environment, firms can not sustain intergenerational solidarity among workers and can no longer commit to age-related pay schemes.

DC schemes become more popular. These individual schemes better fit the diverse needs of the heterogeneous and flexible labor force. Moreover, funded schemes benefit from risk sharing in efficient financial markets, high interest rates, and good investment opportunities in the younger, developing countries. Indeed, through their investments, the elderly in the EU become stakeholders in the economies of the developing countries.

3.2 The intergenerational solidarity scenario

Regionalisation and divergence

In this scenario, internationalization occurs within trading blocks. International political tensions and imperfections in capital markets due to asymmetric information inhibit sizable capital and trade flows between the main trading blocks. Hence, international capital and goods markets cannot take full advantage of differential demographic phases in developed and developing countries by moving capital towards the young, developing countries. Moreover, small inward capital flows imply that developing countries do not benefit from large knowledge spillovers. Growth in these countries suffers also from inward-looking policies and inadequate education and public infrastructure. Human capital, which is not very mobile internationally, is the main motor of growth. Indeed, knowledge is not very mobile internationally but rather is embodied in immobile people and rather immobile firms. Accordingly, productivity levels in developing countries fail to catch up with those in developed countries. Limited investment opportunities in the rest of the world and scarce labor in the EU keep interest rates in EU countries at rather low levels.

High EU growth

Productivity growth in the EU is rather high. Almost all domestic saving is invested in the EU. Scarce labor stimulates technologies that enhance the productivity of both high-skilled and low-skilled labor. Productivity levels benefit also from the older,

experienced labor force. Moreover, public education raises the educational level of the young further, as the implicit intergenerational contract remains strong. Rapid wage growth reflects the key role of human capital in the growth process. This wage growth, together with low interest rates, also stimulates investment in human capital, rather than that in financial capital. EU countries specialize in knowledge-intensive high-tech sectors.

Various developments offset the trend toward lower labor supply in EU countries due to aging. High wages stimulate the labor-market participation rate of women and the elderly. Moreover, the large gap in living standards between the EU and developing countries encourages some selective and controlled inward migration into the EU. Indeed, labor flows rather than capital and goods flows exploit the diverging demographic developments in various parts of the world.

Intragenerational inequities and heterogeneity

Intragenerational inequities in the EU are contained. Wages of low-skilled workers are upheld by the scarcity for labor and the abundance of capital. Public education and on-the-job training succeed in upgrading the skills of many low skilled, thereby increasing the wages of the remaining low-skilled workers. The stronger labor-market position of low-skilled workers protects their participation rate and raises their effective retirement age.

The elderly remain a rather homogeneous group featuring relatively low incomes. The elderly generations suffer from low rates of return on their saving. Moreover, medical expenditures are high, as many elderly suffer from poor health. At the same time, high wage growth raises the price of (medical) services provided to the elderly.

Thus, in contrast to the previous scenario, international and intergenerational inequities are maintained. Intragenerational inequities, however, do not widen.

Market structures

Lifestyles and work patterns do not become much more heterogeneous. Individualisation is a less dominant trend. Product differentiation is less important. Accordingly, R&D focuses more on process innovation than on product innovation. Most technological advances occur in large established firms that internalize knowledge spillovers rather than in start-up firms. Firms turn over slowly. Retained earnings are the main source of investment financing. Oligopolistic market structures become more dominant.

Human capital is rather firm-specific. Labor and capital mobility between firms is less important, as adjustments occur *within* rather than *across* firms. Labor and capital markets are not very competitive, while corporatist institutions help to alleviate labor market imperfections. Informal contracts play an important role in encouraging firm-

specific investments and binding workers to firms. The stakeholder view of the firm remains dominant in Europe.

Public policy

Intergenerational solidarity through collective PAYG schemes is maintained. Age remains a good indicator for poverty. More generally, the informal intergenerational contract between the generations remains intact. The high participation rates of old and young workers and the low interest rates create the budgetary room to provide both a good education to the young and sizable PAYG transfers to the old. Moreover, the elderly can enforce the intergenerational contract because their sheer number and their homogeneity makes them strong politically. Indeed, the informal intergenerational contract makes the elderly stakeholders in the high-yielding human capital of the young in their own countries. In the market scenario, in contrast, formal contracts cause the elderly to become stakeholders in developing countries.

The economic cost associated with transferring incomes from the young to the elderly is rather low. First, the government can condition transfers on age rather than income. Second, marginal tax rates are not so distortionary because labor supply is rather inelastic.

DC schemes suffer from low returns and high transaction costs. The tastes of the population remain rather homogeneous. Accordingly, collective DB schemes remain popular as an instrument for intergenerational risksharing. Moreover, employers use these pension schemes as a means to motivate workers and to tie them to the firm.

4. Policies to protect retirement income

The scenarios above illustrate that the future is fundamentally uncertain, especially over a long time horizon. To diversify risks, policymakers in EU countries should take action on several fronts. The use of several instruments is attractive, not only from the point of view of risk sharing, but also for political reasons: costs and benefits are spread over various groups. Moreover, by using both carrots and sticks, policymakers prevent specific groups from being alienated and ensure that various groups become stakeholders in the reform process.

This section investigates various policy options involving European labor markets in general and human capital accumulation in particular. Indeed, whereas pension reform in the United States is aimed mainly at raising saving, malfunctioning labor markets are at the heart of the looming pension crisis in Europe.

4.1 Human capital of the elderly

Unemployment and early retirement

Over the last two decades, the effective retirement age has dropped substantially in European countries (see Table 1). Various policies encouraged older workers to leave the labor market in order to preserve employment opportunities for younger workers in the face of widespread unemployment.⁸ These policies, however, have set in motion a vicious circle. By narrowing the contribution base and raising the required financing for early retirement benefits, these policies require high premium and tax rates on younger workers, thereby further raising unemployment and depressing labor supply. Indeed, by harming the supply of experienced labor, early retirement is an increasingly shortsighted way to address unemployment. The associated distortions become more and more costly in an aging society.

Table 1: Employment rate of older workers in OECD countries^a

	1980	1985	1990	1995	1998
United States	53.8	51.8	54.0	55.1	57.7
Japan	61.3	60.5	62.9	63.7	63.8
Germany	..	37.1	39.2	37.8	38.8
France	..	37.2	35.6	33.5	33.0
Italy	..	33.3	32.0	27.0	26.9
United Kingdom	..	47.0	49.2	47.6	48.3
Canada	51.5	47.2	47.0	43.6	45.4
Belgium	..	26.0	21.4	23.3	22.5
Denmark	..	50.1	53.6	49.3	50.4
Finland	47.1	45.4	42.6	34.4	36.2
Greece	..	45.1	40.8	40.5	38.5
Ireland	..	40.0	40.0	39.2	41.6
Netherlands	36.3	27.3	27.3	22.7	33.3
Norway	63.9	65.5	65.5	63.1	66.9
Spain	44.7	38.2	38.2	32.1	34.8
Sweden	65.7	65.0	65.0	61.9	63.0

^a Employment of workers aged 55-65 as a percentage of the population aged 55-64.

Source: OECD *Labour Force Statistics*, 1978-1998, part III.

⁸ Gruber and Wise (1999) document how various government policies have contributed to lower labor force participation of older workers. They compute effective tax rates on continuing to work and relate these tax rates to the effective retirement age.

Indexing retirement age to life expectancy

Together with a drop in fertility, a higher life expectancy is the main force behind the aging of the population. Higher longevity implies that human capital lasts longer, so that investments in human capital become more attractive. Moreover, workers can benefit more from experience and from learning by doing. Indeed, it is somewhat paradoxical that a longer expected lifetime is seen as a threat, especially because people are able to learn up to high ages. The most natural way to insure society against a longer average lifespan of its citizens is the indexation of the official retirement age⁹ (and also the age at which individuals can take advantage of tax-privileged private pensions) to life expectancy. In this way, the risk of a longer life is shifted to those who can best bear it (i.e. those close to retirement) rather than those who cannot adjust easily to this risk (i.e. the retired, who would bear the risk if pension benefits were cut).

Raising the effective retirement age is a powerful instrument to maintain solid financing for pension systems in an aging society. Pension systems reap a double dividend by keeping older workers employed longer: not only do they avoid having to pay out the most expensive pension year, but they also collect one more year of pension contributions. The elderly rely less on the solidarity of the young and more on their own human capital. By redistributing human capital more equally over various generations, a higher retirement age attacks at the root the potential fiscal and social problems due to aging. Indeed, the labor income of the elderly could become another major pillar of old-age insurance (as the elderly enjoy greater longevity and better health). The automatic adjustment of the retirement age to life expectancy prevents ad-hoc political interventions. By thus reducing political risk, it allows workers to anticipate a longer working life by better maintaining their human capital through life-long learning.

Life-long learning and higher retirement age

Raising the effective retirement age requires a stronger labor-market position of elderly workers. Without such a stronger labor-market position, elderly workers would end up in expensive disability and unemployment schemes if the official retirement age were increased. Preventing this calls for a higher level of labor productivity and/or lower wage costs for elderly workers. Raising the productivity of elderly workers is difficult to achieve without eliminating the policies that encourage workers to retire early. The longer time horizon associated with a higher retirement age (together with higher longevity) encourages workers to maintain their human capital better through life-long training. Hence, raising the retirement age and facilitating life-long learning are complements. The faster obsolescence of knowledge in a modern dynamic economy requires life-long learning. Life-long learning will also become more attractive as the aging of the population renders human capital scarcer compared to physical capital, thereby raising the return of human capital compared to the return on financial capital.

⁹ The official retirement age is the age at which not only public pension benefits are paid out but also the work test for welfare benefits is no longer applied.

Wage flexibility of older workers calls for social insurance reform....

A higher employment rate of older workers requires that the wages of these workers become more flexible so that wages can be more in line with individual productivity. To achieve this, age-related pay schemes have to be reconsidered.¹⁰ For example, occupational pension systems that link pension benefits to final pay discourage gradual retirement through occupational downgrading with lower rates of pay. Ljungqvist and Sargent (1998) show how generous unemployment and disability benefits that are based on previous earnings inhibit the labor market from easily adjusting to adverse shocks. In particular, in the face of generous insurance benefits that exceed their labor productivity, skilled workers who face a substantial capital loss on their human capital (e.g. as a result of being laid off) are discouraged from searching for new jobs and from reducing their reservation wage in line with their productivity. In this way, social insurance sets in motion a vicious circle of high unemployment and skill loss. This explains the high incidence of long-term unemployment and disability among older European workers (see Table 2). As the work force ages, these moral hazard problems associated with social insurance benefits based on previous earnings become more serious. Indeed, generous social insurance benefits based on final pay discourage workers from maintaining their human capital, since workers can rely on generous social benefits when their human capital becomes obsolete.¹¹

One can distinguish two possible directions for social-insurance reform. The first direction focuses on reducing the level of social insurance, while the second aims at preserving the European legacy of social equity by reducing improper use of social insurance. The second option requires tightening the requirements for social benefits (e.g., stricter evaluations of disability, making unemployment benefits conditional on retraining or accepting less desirable jobs), tightening checks on improper use of social benefits, and enhancing the efficiency of the organizations administering benefits. In this way, active labor-market policies help the elderly to remain in employment and to upgrade their skills. Moreover, by gathering of more information about health status, the government reserves disability and sickness benefits for those individuals with serious health problems.

¹⁰ More wage flexibility, however, may worsen the hold-up problem associated with investments in firm-specific human capital. In fact, a rising wage schedule may be viewed as an implicit contract between workers and employers. This implicit contract not only facilitates investments in firm-specific human capital, but also provides incentives to workers to provide effort. Hence, in the face of more wage flexibility, firms must employ other instruments to address these moral hazard and hold-up problems.

¹¹ At the same time, social benefits based on final pay increase the incentive to invest in human capital early in life since higher wages associated with more human capital raise social insurance rights.

Table 2: Unemployment rates and the incidence of long-term unemployment, 1998

	Unemployment rate (percentage of labor force)		Unemployment for 12 months or more (as percentage of unemployed)	
	15 to 64 years	45 to 64 years	15 to 64 years	45 to 64 years
United States	4.5	2.7	7.8	12.1
Japan	4.2	3.5	17.9	23.4
Germany	9.3	11.2	39.6	45.9
France	11.9	8.5	40.5	56.0
Italy	12.2	5.1	66.1	62.6
United Kingdom	6.2	4.4	32.8	50.6
Canada	8.4	6.4	9.8	16.8
Australia	7.9	5.6	33.6	47.0
Austria	5.5	5.8	43.6	72.0
Belgium	9.4	6.5	61.7	76.3
Denmark	5.1	4.6	27.1	45.9
Finland	11.5	9.9	34.0	52.4
Greece	11.9	5.4	51.6	48.7
Luxembourg	2.8	1.4	31.3	44.3
Netherlands	4.3	3.3	43.5	62.0
New Zealand	7.6	4.8	17.8	28.5
Norway	3.2	1.5	12.2	25.0
Portugal	4.9	3.4	43.8	63.3
Spain	18.8	11.1	62.4	46.9
Sweden	8.4	6.2	42.6	56.9
Unweighted averages:				
North America ^a	5.3	3.5	6.1	10.2
European Union	8.7	6.3	44.3	56.0
OECD Europe	7.8	5.5	40.0	50.9
Total OECD	7.4	5.2	32.9	42.6

North America comprises Canada, Mexico and the United States.

Source: OECD Unemployment Duration and Labour Force Databases.

Both strategies may be combined, in part to diversify risks. Moreover, the first strategy aids the second: Lower benefits help to prevent improper use of social security. Furthermore, given the income floor established by welfare payments, the second

strategy is more appropriate for unskilled workers lacking substantial earning abilities, while the first strategy can be applied more to higher skilled workers.

...and deregulation of labor- and commodity markets

The growth of self-employment and part-time work may help retirement to become a less abrupt process and may allow workers close to retirement to bear a larger part of the risks associated with pension systems. Self-employment, entrepreneurship, and part-time work may be stimulated by deregulating not only the labor market but also markets for various non tradables. To illustrate, sectors providing services and care to the very old seem to offer considerable scope for employing older persons who want to retire on a part-time basis. When labor becomes increasingly scarce and the need for these non-tradable services grows, older workers face more incentives to remain active on the labor market, provided that markets for labor, goods and services function efficiently. In this way, the labor income of the older workers can be a fourth pillar¹² providing old-age income.

4.2 Human capital of the young

Increasing labor-market participation more generally

The employment rate (computed as employment divided by the number of persons aged between 18 and 65) in Europe is considerably below that in the United States and Japan. Boosting the European employment rate would strengthen the base for financing old-age benefits. Stimulating labor supply of not only older but also younger workers calls for enhancing the labor supply of vulnerable groups with few marketable skills through a more empowering social insurance system (see also the sub-section above).

Higher female participation rate....

Besides greater longevity, a lower fertility rate is the other main cause behind the aging of the population. This lower fertility rate is closely related to better schooling of women. By making participation in the formal labor market more attractive, the higher human capital of women has raised the opportunity cost of raising children. In fact, the higher labor-force participation of women can be seen as the other side of the coin of aging on account of lower fertility.

Another way to strengthen the contribution base of the pension system is to further raise the labor supply of women. More flexible labor and commodity markets facilitating part-time work would help to enhance the labor-market participation of women. Making it easier for women to maintain their human capital will reduce the need for women to rely on public transfers when old - an added benefit from the point of view of reducing the claim of old-age pensions on the budget. Moreover, a stronger labor-market position of women has produced an increasing number of dual-income families, which allows

¹² The other three pillars are discussed in section 5.

partners to insure each other against temporary income losses. Indeed, as the traditional family with a single breadwinner becomes less important, the minimum wage and the benefit levels in the welfare system can be reduced. To contain the claims on spending, the welfare state relies not only on an efficient labor market, but also on the family as a risk-sharing device.

...while protecting fertility and investments in human capital of children

A potential danger of stimulating female labor supply is that it harms fertility and more generally discourages parents from investing in the human capital of their children. Whereas stimulating labor supply may thus in the short run alleviate the financial difficulties of pension systems, it may worsen them in the long run, as it harms the quality and quantity of human capital embodied in children. To prevent these latter adverse effects on the accumulation of human capital, the government should assist low-income families with children through specific child allowances. Due to their responsibilities for children, these families are least able to exploit intra-family risk sharing. In addition to child allowances, facilities that help parents to return to the labor market after they have cared for their young children help protect fertility and long-run human capital accumulation.¹³ Moreover, a well-functioning market for child-care facilities can help families to combine the responsibilities of rearing children with labor-force participation. Indeed, the Scandinavian countries, which feature good facilities for reconciling family and working lives, exhibit not only higher female labor-force participation but also higher fertility than the European countries that lack such facilities (like Germany and Italy).

Facilitating the accumulation of human capital is an important way to strengthen the contribution base for PAYG pension systems and to protect the return in funded pension systems. In this connection, Heckman (2000) stresses the importance of early learning

¹³ Facilities for raising children offset the distortionary effects of PAYG pension systems on fertility. By pooling the earnings capacity of children, PAYG systems provide fertility insurance but at the same time distort fertility. Indeed, the major distortion of the PAYG system is its negative impact on fertility (and hence human capital formation) rather than that on financial savings (which is stressed in the literature on PAYG). In this connection, Sinn (2000) provides a related equity argument for child allowances: Persons should expect to care twice during their lifetimes, once for the elderly and once for the young. Those who shirk on the second duty should compensate those who do carry out both of their two tasks.

A related argument for child allowances for low-income households is that low-income parents typically do not leave bequests and thus can not enforce an implicit contract with their non-altruistic children. This contract involves the parents first raising the children and the children subsequently caring for their aged parents. By providing PAYG pensions and child allowances, the government in fact helps to enforce this contract (see Razin and Sadka (1995)).

in families as a source of key non-cognitive skills. In his view, learning is most effective when it begins at a young age, since learning begets learning. Together with the positive external effects of human capital accumulation, this insight provides an additional argument in favor of targeting learning subsidies at the very young through child allowances.¹⁴

5. Pension design

Pension schemes serve various objectives: alleviating poverty, providing insurance against longevity and other risks in old age, and combatting adverse selection, myopia due to bounded rationality, and high information and transaction costs.¹⁵ Depending on the particular objective, one type of pension scheme may perform best. In particular, alleviating old-age poverty is best accomplished by a nationwide public PAYG system that provides a minimum standard of living in old age. The objective of relatively uniform insurance against longevity and income risks in old age may require compulsory insurance. This would help in avoiding moral hazard involving means-tested benefits, preventing high transaction costs due to adverse selection in annuity markets, containing myopic behavior due to bounded rationality, and facilitating intergenerational risk sharing. Since this insurance function is not explicitly aimed at poverty alleviation, contributions can be closely linked to benefits, thereby mitigating disincentives. Those high-income workers who are better able to deal with the investment risks and want to go beyond the mandatory level of pension insurance can rely on supplementary private pension plans of the DC type. The separation of tasks in three pillars allows each of the pillars to focus on a clear goal, thereby avoiding non-transparent and perverse redistribution (see World Bank (1994) and Holzmann (2000)).

Before the next three sections turn to the proper design of each of the three pillars, the rest of this section investigates the requirements that apply to all pension systems. A common key requirement is transparency about objectives and risk sharing. Explicit agreements about how to share risks become even more important, as aging makes pension systems more vulnerable to shocks. Being explicit about the risk-sharing

¹⁴ Higher productivity growth, however, may actually worsen the financial problems of pension systems if pension benefits are indexed to wages. Accordingly, raising productivity growth makes PAYG and DB schemes more sustainable only if pensions are not fully indexed to wages. Indeed, since the elderly care both about their absolute and relative living standard, pensions may be indexed to a mix of prices and wages.

¹⁵ CPB (1997) discusses the following market failures in pension insurance that give rise to these objectives: lack of intergenerational risk sharing, adverse selection, myopia, high transaction and information costs, lack of intragenerational solidarity, and moral hazard in exploiting means-tested benefits.

agreement by setting clear rules¹⁶ (and more transparent accounting) increases the costs associated with breaking the contract, thereby reducing political risks surrounding public PAYG and private DB schemes that are engaged in intergenerational risk sharing. To the extent that not all risks can be foreseen and pension contracts remain incomplete, the governance structure of pension systems is crucial. The interests of the stakeholders of the pension funds should be well represented in the decision-making bodies. In this way, collective pension systems can optimize the trade-off between commitment (to the implicit contract safeguarding the interests of the stakeholders) and flexibility (to respond to unforeseen shocks).

Transparency about the exact nature of the pension contract (including the nature of administrative charges) is important not only for PAYG and DB schemes, but also for individual DC schemes. It combats agency costs by allowing better supervision and more transparent competition between the providers of these complex products. Moreover, it facilitates the role of the reputation mechanism in disciplining pension providers. The debacle of selling personal pensions in the United Kingdom in the beginning of the eighties revealed that a strong, transparent and simple regulatory framework is essential to achieve these objectives.

5.1 The public PAYG system

Focus PAYG on poverty alleviation

Several large OECD countries, including Germany, France and Italy, have integrated two main functions of pensions (i.e. poverty alleviation and old-age insurance) into a single comprehensive public pension system. These countries should consider focusing the public scheme on poverty alleviation by gradually reducing PAYG benefits for those earning higher incomes.¹⁷ This yields a better balanced portfolio between funded and PAYG schemes, as workers with middle- and higher incomes would substitute private, funded pensions for public PAYG benefits. In this way, they would better diversify political and market risks. Table 3 provides information about the current mix of funded and unfunded pension obligations in OECD countries.

¹⁶ Such rules may involve for example indexing the retirement age to life expectancy and linking pension benefits to the elderly and the acquired pension rights of workers to wages after pension contributions have been deducted (so that the risk-sharing base is broadened).

¹⁷ A flat public pension may be preferred over means-tested public pensions because means-tested benefits may be stigmatizing. These latter benefits may also discourage saving. Finally, they may undercut political support of the middle class for public pensions: targeted programs for the poor may result in poor benefits.

**Table 3: Funded and unfunded pension rights in the European Union, 1999
(as a percentage of GNP)**

	(1) Funded rights	(2) Unfunded rights	(3) Public debt	(4) Corrected public debt ^a	(5) Funding ^b
Belgium	10	75	117	192	12
Denmark	89	87	58	145	51
France	6	83	59	142	7
Germany	12	138	61	199	8
Ireland	43	55	52	107	44
Italy	19	157	119	276	11
Netherlands	141	103	68	171	58
Portugal	10	93	58	151	10
Spain	4	93	66	159	4
United Kingdom	86	68	49	117	56

^a. This column is computed as the sum of columns (2) and (3).

^b. This column is computed as column (1)/(column (1) + column (2)).

The public scheme dealing with poverty alleviation is explicitly redistributive and should be financed from general tax revenues. Relying on broad-based taxes paid by the entire population rather than on payroll taxes shifts the tax burden away from workers to those outside the labor force, including the retired. Including retirement benefits in the base of the progressive income tax allows the tax system to continue to play an effective role in intra- and intergenerational risk sharing. In this way, the tax system can pool risks and shift these risks to those who can bear them best (see Box 3).

A more heterogeneous older population calls for intragenerational transfers

Reducing PAYG benefits for, and increasing the tax payments by, the more affluent elderly is consistent with the trend towards a more heterogeneous older population. When PAYG schemes were established, the second world war had impoverished the older generation. Since poverty was thus concentrated among the elderly, poverty alleviation called for transfers from the younger to the elder generation. At present, in contrast, age is generally no longer a good indicator of poverty, as many elderly have accumulated substantial financial wealth and more risks have shifted to the beginning of the life cycle. Hence, information on age should increasingly be supplemented by other information (in particular on incomes and family status) to identify those most in need of income support. In an aging society with a heterogenous population, alleviation of old-age poverty requires transferring resources from rich to poor pensioners (i.e. intra-

Box 3 The tax treatment of pensions

Most OECD countries treat pensions on a cash-flow basis under the personal income tax (see Dilnot and Johnson (1993)). Hence, pension contributions (i.e. saving) are tax deductible, while pension benefits (i.e. dissaving) are subject to the income tax. Capital income (i.e. interest, dividends, capital gains) in funded schemes is not taxed when it accrues. This tax treatment implies that the government delays the collection of the income tax until retirement. In this way, the government, in effect, participates in the pension funds. The return on this public investment amounts to the taxes the government eventually collects on the retirement benefits. If the tax rate against which contributions are deducted coincides with the rate at which benefits are ultimately taxed, the return on this implicit equity share of the government corresponds to the return pension funds collect on their investments.

The cash-flow treatment yields a number of important advantages. In particular, the cash-flow treatment broadens the tax base when aging boosts public spending. If the government would abolish the cash-flow treatment of pensions by taxing pension contributions, it could alleviate future fiscal imbalances by cutting public debt now. However, such a reduction of public debt would require a lot of fiscal discipline.

In a “grey” society with mature pension funds, the broader tax base under the cash-flow tax implies that unexpected shocks in public spending require smaller adjustments in tax rates, as income taxes are levied not only on workers but also on the retired. When higher age-related public spending requires higher public revenues, the cash-flow treatment mitigates the associated rise in tax rates on workers and thus alleviates the adverse effects of the higher tax burden on labor-supply incentives. The cash-flow treatment of pension benefits thus supports the role of the tax system as a device to pool risks across generations. By including retirement benefits in the income tax base, tax deferral provides the government with an additional instrument to ensure an equitable distribution between generations without adversely affecting the distribution within generations. Employing indirect (consumption) taxes (such as the value-added tax or excises) rather than the income tax to pool risks would put a relatively heavy burden on those elderly with low incomes.

generational redistribution) instead of only transferring resources from the small young generation to the elderly (i.e. intergenerational distribution). Since many elderly lead longer, healthier lives than preceding generations, they are in a position to be net contributors to the budget for a longer time.

Intragenerational redistribution implies that the link between individual contributions and benefits becomes less tight. Accordingly, pension contributions are perceived as a tax rather than a price paid for a future pension benefit. The associated distortions in labor supply are the inescapable implication of a worsening trade-off between

efficiency and equity that is due to increased heterogeneity of the population. Indeed, more heterogeneity makes poverty alleviation more expensive. By clearly separating the two main roles of a pension system (i.e. poverty alleviation and pension insurance), however, the government may be able to eliminate non-transparent, undesirable redistribution, thereby improving the trade-off between efficiency, redistribution and risk sharing.¹⁸ Indeed, by more closely linking pension contributions and benefits in the insurance part of the pension system, the government may well be able to reduce the overall marginal tax rate. As workers become more flexible in selecting how and when to retire and, more generally, in deciding whether to supply labor to either the formal or the informal sectors, lowering the marginal tax wedge becomes all the more important.

The transition and the credibility of public promises

The presently retired generation has not been able to anticipate lower public PAYG benefits. Moreover, this generation cannot adjust easily because it has already depreciated its human capital. The short horizon of the elderly implies that they are risk averse and that they value stable rules. Accordingly, a strong case can be made for changing the rules of the game (i.e. reducing PAYG benefits and increasing taxes on the elderly) only gradually.¹⁹ Accordingly, PAYG systems aimed at poverty alleviation involve not only intragenerational redistribution but also extensive intergenerational redistribution. Extensive grandfathering provisions protecting those who are currently old are expensive, however, and would eliminate benefits in terms of enhanced fiscal sustainability and higher national saving. Indeed, grandfathering implies that younger generations have to pay not only for their own private benefits but also for the public benefits of the currently old. Hence, the government faces a trade-off between flexibility and stability.²⁰ To enhance confidence and trust in a stable social contract

¹⁸ More generally, by using information efficiently, redistributive transfers can be targeted at those in need while eliminating perverse redistribution. An example of this is relying on information of life-time incomes, which allows the government to eliminate redistribution to agents enjoying high life-time incomes. Redistribution through compulsory individual saving schemes discussed in sub-section 5.3 achieve exactly that.

¹⁹ Relative PAYG benefits can be reduced gradually by indexing benefits to prices rather than wages.

²⁰ This trade-off applies more generally to all policy reforms, including the various policy options discussed in this paper. Indeed, policy reforms tend to be politically feasible only if extensive grandfathering provisions are included and reforms are introduced gradually and with advance notice. The option value of the status quo is another reason to address the aging of the population by employing various policy instruments rather than relying on a single policy instrument.

The trade-off between flexibility and stability can be phrased also as a trade-off between efficiency and equity. Policies that enhance aggregate welfare tend to come at the cost of older generations (who bear an unanticipated capital levy or suffer from broken public promises) or the poor. Hence, Pareto-improving reforms are difficult to come by.

while at the same time facilitating timely adjustments, governments should announce early any prospective changes in the social contract. This allows the large baby-boom generations to anticipate reduced public transfers in retirement.

The literature has discussed extensively whether shifting from PAYG schemes to funded schemes can be Pareto improving. The major lesson of this literature is that a Pareto improvement, which protects also presently retired generations, is feasible only if such a pension reform succeeds in reducing a distortion somewhere in the economy. Examples of these distortions are the corporate income tax, inefficient redistribution, labor-market distortions due to incentives to retire early, inability of the political process to commit to promises (and the associated political risks), missing insurance markets (e.g. due to aggregate risks or the inability of agents to commit to insurance contracts before they are born), capital-market imperfections due to transaction costs or hold-up problems (which may give rise to the equity premium), distorted fertility decisions, and knowledge externalities. If the gains from reducing these distortions are sufficiently large, the government may employ public debt policy in such a way that all generations benefit from the efficiency gains. In particular, by financing part of the reform by issuing public debt, future generations, who tend to reap most the efficiency gains, pay part of the costs of the reform.²¹

5.2 Compulsory pension insurance

Privatize the second pillar

Privatizing the insurance function of pensions yields a number of benefits. It strengthens the commitment to the pension insurance contract by reducing the temptation of politicians to tamper with the contract (see Bovenberg (2000a)). Funding a larger part of the pension system through private schemes strengthens the commitment of the political system to secure property rights more generally; since a larger part of the population acquires a stake in the return on capital, the political system is less tempted to expropriate these returns, thereby protecting entrepreneurs and investors against political risks (and the hold-up problem). Funding may generate positive externalities also on financial markets through greater capital market deepening and by allowing a larger part of the population to take advantage of the equity premium. Finally, funding is likely to encourage fiscal discipline, thereby stimulating saving and promoting fiscal sustainability in an aging society.

²¹ On the one hand, the provisions of the Stability and Growth pact may prevent EMU countries from pursuing this strategy. On the other hand, this strategy of replacing implicit by explicit public debt may prevent governments from having to buy up their stock of debt, which may facilitate the functioning of financial markets.

Risk sharing in DB schemes under siege

In contrast to the first, public pillar aimed at poverty alleviation, the second should involve a strong actuarial link between contributions and benefits. In an aging society, DB schemes are likely to look more and more like DC schemes. The main reason is that the relatively small contribution base (compared to the outstanding obligations) makes it more difficult to shield the retired generations from adverse shocks through intergenerational risk sharing. Also the increased mobility of labor within and between industries threatens intergenerational risk sharing, as young workers can escape the implicit taxes associated with this risk sharing by moving to young firms that do not carry large pension obligations to retired workers. In order to protect intergenerational risk sharing in DB plans, risks should be shared broadly and explicitly over the young and the old (e.g. through a flexible retirement age, conditional indexation of pension rights, and rapid adjustments of contributions), pensions must be overfunded, and pension governance should be efficient (see Bovenberg (2000b)).

Government continues to play key role

The government could reduce the need for intergenerational risk sharing through collective DB funds by conducting more of this risk sharing through the tax system (see Box 4). Alternatively, it could issue new financial instruments, such as (wage) indexed bonds and so-called “survivors bonds,” which allow private insurers to hedge against aggregate mortality risks. In these ways and by proper regulation, the government can facilitate financial innovation in the annuity market. Indeed, various imperfections in this market due to adverse selection and uninsurable aggregate risks pose a serious obstacle towards more individual pension provisions²² (see Blake (2000)).

5.3 Individual, voluntary pension insurance

More heterogeneity: larger third pillar

In setting the mandatory level of pension insurance above the minimum level provided by the public PAYG system, the government needs to trade off, on the one hand, providing enough risk sharing and combating adverse selection and, on the other hand, tuning pensions to individual needs. Setting the mandatory level too low harms inter- and intragenerational risk sharing and might induce workers to exploit means-tested benefits. Setting the level too high, in contrast, forces some households to save more than they would like. The associated implicit tax distorts saving and harms employment.

²² To illustrate, whereas deferred and flexible annuities allow individuals to diversify interest rate and asset price risks, they expose these individuals to mortality risks and may result in adverse selection.

Box 4 Intergenerational risk sharing through the tax system

The government can reduce the need for intergenerational risk sharing through collective pension funds by performing more of this risk sharing through the tax system. By participating in the pension funds through the cash-flow tax treatment of pensions (see Box 3), the government shares in the investment risk. The government can alleviate the investment risk further by levying a tax rate on the investment income of pension funds that rises with the average return on all pension saving. If the average return is low, the government can transfer resources to the pension funds. Since the tax rate depends on the average return of all pension funds rather than on the individual return of each pension fund, this tax treatment does not affect the incentive of each individual pension fund to invest in high-yielding assets.

This tax treatment yields a number of advantages. The government, in fact, insures the pension funds against long-run macro-economic investment and inflation risks that these funds cannot hedge on financial markets. Consequently, the risk premium in pension contributions can fall, thereby lowering wage costs and improving international competitiveness. Moreover, DC schemes become more attractive. By reducing the marginal tax wedge on labor, DC schemes improve the functioning of the labor market. Furthermore, since pension funds no longer need to transfer resources across generations, workers and firms can be left free to select their own pension plans. This allows more competition among pension funds, which may reduce the overall costs of pension provisions. Moreover, it allows pension provisions to better fit the diverse needs of a heterogeneous population. Whereas all pension funds would be required to participate in this risk sharing arrangement, firms and workers would be free to select their own pension funds.

As an alternative to this tax system, which may suffer from substantial political risk, the government may bear only part of the macro-economic risk -- for example, by issuing indexed bonds. In this way, pension funds are protected against inflation risk but still bear real interest-rate risk. By issuing longer maturities, however, the government can absorb part of this risk as well. The disadvantage of indexed government bonds compared to risk sharing through the tax system is that pension saving would not flow directly into the corporate sector. Hence, pension funds would contribute less to enhancing corporate governance. As an alternative, the government may issue various options (see Blake (2000)).

Increased heterogeneity in preferences and life-cycle patterns calls for a reduction in the mandatory, collective part of old-age insurance for the middle- and higher incomes. The earners of these incomes are typically better able to deal with old-age risks. The third,

voluntary, pillar of pension insurance is thus likely to become more important. One way to increase the flexibility and personal responsibility in pension insurance would be to reduce compulsory levels of collective insurance and provide more tax privileges to registered individual accounts that would be taxed on a cash-flow basis (see Box 3).²³

Insure human-capital risk...

These individual accounts would insure individuals against not only old-age risks but also other human-capital risks such as unemployment and obsolescence of human capital. Indeed, these accounts could be viewed as an insurance device against human capital risk. Individuals would thus be allowed to withdraw some funds from this account before their retirement age, for example to invest in their own human capital²⁴ or that of their children (by taking time out to care for them). In this way, savings are used to protect and maintain human capital rather than to write off this capital.

....encourage investments in children....

By allowing people to care for their children, individual saving schemes would strengthen the implicit intergenerational contract, protect fertility, and encourage high-yielding investments in human capital. Moreover, individuals could save for old-age risks in the form of not only financial capital but also human capital. Indeed, by investing in and maintaining their human capital (e.g. in the form of a second career after one has cared for young children), individuals would be able to work longer and partners could share risks better. For example, individuals could draw on the account when being unemployed or when having cared for their young children in order to invest in training to strengthen their position on the labor market.

....stimulate a longer active working life....

The individual accounts would facilitate flexible retirement at an actuarially fair price, thereby contributing to a strong fourth pillar (i.e. labor income) for providing income in older age, extending the life time of human capital, and alleviating moral hazard in maintaining human capital. Doing justice to the heterogeneity of elderly workers is particularly important, as people tend to become more heterogeneous in their tastes and abilities as they grow older. More generally, the registered accounts would meet new needs due to a less rigid allocation of learning, working, and retiring over the life cycle.

²³ Some payments into these individual accounts could be made mandatory, especially if these accounts are meant to substitute not only for collective pension insurance but also other social insurances (see below).

²⁴ Rather than financing institutions providing educational services, the government could put an initial starting balance in the account of young adults, which they could draw on to buy educational services during their lifetime. The government could also allow agents to accumulate negative balances in their accounts and forcing agents to pay off these negative balances through the tax system. This is the so-called equity participation model, which Australia applies to allow students without sufficient liquid funds to participate in higher education.

This latter development is strengthened by the improved education of women who participate more fully on the formal labor market and the more rapid depreciation of knowledge in a modern economy; the modern working life tends to be interrupted by retraining and caring for others in the home. More flexibility in the use of pension rights allows resources to be moved from later in life (old-age poverty has been cut substantially) to earlier in life (risks early in life have increased, as indicated by child poverty and stress among young families).

....alleviate moral hazard in social insurance and encourage wage flexibility....

The drawing rights in the registered account could help to reduce the need for not only collective pension insurance but also other collective social insurances. The accounts would thus alleviate moral hazard in social insurance and enhance work incentives more generally, especially for the middle- and higher incomes. Indeed, as labor markets become more flexible and life cycles more heterogeneous with voluntary spells of non-work, distinguishing between voluntary and involuntary inactivity becomes more difficult, thereby increasing the risk of moral hazard. The individual accounts could break the vicious circle of high unemployment and skill loss set in motion by social insurance benefits based on previous earnings (see Ljungqvist and Sargent (1998)). By reducing the reservation wage of older workers, these accounts would combat the high incidence of long-term unemployment and disability among older European workers.

....while protecting vulnerable groups

In order to protect vulnerable groups, the government could top-up the contributions of poor people or compensate those with little human capital (for example, because of a handicap) in the form of a higher initial balance in the individual accounts. In this way, the accounts would shift more responsibility to the individual without relinquishing redistributive goals. If experiments show these registered accounts to be successful, governments could move a larger part of the insurance policies provided by the welfare state in this direction.²⁵ When a person has exhausted the account due to long-term unemployment, he or she would be allowed to accumulate some negative balances (which would be remitted at retirement or death). Eventually, such an individual could resort to social assistance.

In order to combat moral hazard, the government would have to require working individuals to put some money in the accounts while regulating withdrawals from the account when individuals do not participate on the labor market. Moreover, social assistance would provide conditional transfers that would balance the carrot of the benefit with the stick of particular obligations. Government transfers associated with public insurance would thus be better targeted at vulnerable groups. Whereas redistribution would involve some costs in preventing moral hazard and affecting the

²⁵ For similar proposals to reform the welfare state, see Orszag and Snower (1997), Feldstein and Altman (1998), and Fölster (1999).

privacy of individuals, the overall costs of redistribution would fall. Hence, the trade-off between equity and efficiency would improve. Indeed, the same amount of redistribution could be achieved at much lower marginal tax rates for the middle- and high income earners.²⁶ Eliminating undesirable redistribution to agents with high life-time incomes thus provides scope for Pareto-improving reforms.

6. Conclusions

Aging makes pension insurance more expensive by making pension systems more vulnerable to risks. In order to diversify these risks, countries are well advised to act on several fronts, some of which go beyond the pension system. At the same time, pension policies are affected not only by demographic trends (such as aging), but also by other trends (such as technological change, financial innovation, more heterogeneity in preferences and life-cycle patterns of work, and increasing labor mobility and female labor-force participation). Enhancing the sustainability of pension insurance in an aging society requires investing in human capital (especially that of children) and boosting labor force participation (especially that of the elderly). In the latter way, the labor income of the elderly can become the fourth pillar of a diversified mix of pension insurances. A higher labor-force participation of the elderly requires reforming social insurance with more emphasis on private saving schemes.

Countries that presently rely heavily on public PAYG schemes can diversify risks by stimulating private pension provisions through gradually reducing PAYG benefits offered to middle- and higher income individuals. The PAYG scheme would thus be targeted at alleviating old-age poverty. Governments can stimulate private pensions by issuing new financial instruments, conducting intergenerational risk sharing through the tax system, and increasing the transparency of the market through regulation and supervision. More generally, public insurance schemes should be more explicit about how they share demographic and other risks. In this way, the government continues to play a role in facilitating risk sharing. The search continues for efficient mixes of private and public arrangements in providing pension insurance.

²⁶ See Fölster (1999). Reducing marginal tax rates for those agents earning low life-time incomes is much more difficult. These agents continue to face a poverty trap as their additional incomes are used in part to reduce their debts or to replace social assistance benefits.

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