November 2004

Sustainability of Pension Schemes for Public Sector Employees in EU Member States

Report

Ministry of the Interior and Kingdom Relations

MERCER
Human Resource Consulting

MMC Marsh & McLennan Companies

Contents

1

Preface

In Lisbon, the SPC (Social Protection Committee) was commissioned to conduct a study on the long-term development of the social security system and the sustainability of pension systems in particular. In recent years a number of studies on these issues were undertaken.[1] During the Irish Presidency a study on public sector pension systems was presented.[2] In this study, a broad range of policy issues relating to demographic trends and the sustainability of the pension systems were investigated. Chapter 2 summarises the main conclusions of the study of the Irish Presidency.

In addition to the research done during the Irish Presidency, the Dutch Presidency, through the Ministry of the Interior and Kingdom Relations (responsible for the functioning of public administration and for issues relating to civil servants), has opted for a quantitative approach to investigating the problems relating to the sustainability of pension systems operated by state employers.

Ideally the policy discussion on the future and sustainability of the pension facilities provided by state employers is conducted on the basis of a quantitative comparative study of the pension systems of all Member States. This benchmarking of pension schemes and the measures taken to reform them is aimed at facilitating the discussion between Member States on pension scheme reform. However, given the relatively short time and the difficulties involved in gathering the required data, the quantitative part of this study is limited to a comparison of pensions applicable to civil servants and other employees of governmental bodies in the United Kingdom, Germany, Italy and Sweden. The pension systems of these four countries represent a wide variety of pension systems in the EU, as will be explained in chapter 4. Chapter 4 also deals with a broader qualitative comparison of the pension systems which apply to civil servants and (other) employees of governments of those Member States (19) that responded to the questionnaire.

---

1 See for instance the joint report by the commission and the Council on adequate and sustainable pensions, Ecofin 76/SOC115, 10 March 2003.

2 EIPA, 2004.

The quantitative analysis of the four sample pension systems provided in chapter 5 is based on the methodology and prescriptions of the International Financial Reporting Standards (IFRS), formally known as IAS, more specifically, on the IAS 19 directive on pensions and other employee benefits. This directive has been adopted by the European Council as the European Accounting Directive and is compulsory for all companies listed on a European Stock Exchange (approximately 7,000). Although the Accounting Directive is not applicable to pension provision by governments (either in the first pillar, as the social security system, or in the second pillar, as an employee benefit) it does provide an objective method for calculating the pension liabilities, which reveals the "hidden liabilities" of those pension schemes.[3]

The data for this report were gathered by means of a questionnaire sent out by the Dutch Presidency to all 25 Member States (the questionnaire is attached to this study). 19 Member States responded on the survey: Austria, Belgium, Czech Republic, Denmark, Finland, France. Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. 6 Member States did not respond: Cyprus, Estonia, Hungary, Latvia, Lithunia and Malta. This response mirrors the overall situation of the EU Member States quite well, with regard to size, geography, moment of joining the EU and their stage of economic development.

The answers were validated and analysed by Mercer Human Resource Consulting. Mercer also performed the quantitative analyses and produced this report.

The report includes recommendations on reform measures that promote the sustainability of pension systems in the long term. The report will be presented at the DG meeting in November 2004.

[3] Kuné, 2000.

2

The Report of the Irish Presidency: Main Conclusions

During the 42nd meeting of the Directors-General of the public services of the EU Member States (Dublin, May 2004) the Irish Presidency presented a report on the "implications of demographic changes on pension systems within the public sector of EU Member States".

Given the high degree of complexity and the variety of ways that pension systems are structured, the study was not designed to provide a comprehensive assessment of the pension systems of all Member States and the progress which has been made regarding recent reform processes. The study does, however, give insight into a broad variety of policy issues that are related to pension scheme reforms, i.e. employment and HR policies.

An important conclusion in the study is that "when reviewing the history of public pensions in many countries, it becomes clear that there have been numerous financial proposals ensuring sustainable pension systems (…); what is missing is the ability to implement them. This is intrinsic to the structure of the problem: the size of the "pension challenge" is such that proposals that look at the pension system in isolation seem unfeasible."[4]

"Even if measures seeking intergenerational justice are undertaken now" the report states, "it is likely that today's younger generations will have smaller pension benefits than their parents when they reach their parents' age."

Having said that, the report reaches to its final conclusion: "The sustainability of pension programmes is not achieved simply by fiddling with benefit levels, eligibility provisions or other financial parameters. The key to their sustainability is the future rate of economic growth which, in turn, depends on the growth of the labour force and the rate of increase

4 EIPA, 2004.

in worker productivity. However, in order to create favourable conditions for generating economic growth, the length of the contribution period and the link between contributions and benefits merit active policy promotion."

Although it can be agreed upon that there are general economic and social conditions which have to be fulfilled for successful pension reform, it goes without saying that an understanding of "best practices" in pension scheme reform requires a precise insight into the quantitative effects of reform measures. Therefore the present report and the report presented by the Irish Presidency are mutually supplementary.

3

The Aim and Scope of the Study

The aim of the study is to present a comparative study of the respective pension systems applicable to public sector employees in the EU Member States with a focus on quantitative measurement and the effects of reform measures. The report should facilitate a discussion on best practices in reaching adequate and sustainable pensions for public sector employees in EU Member States.

Cost measurement

A common method of cost measurement is presented as a starting point for analysing and benchmarking the effects of pension scheme reforms. The method is based on Accounting Standards and calculates the benefit obligations (accrued obligations) and service costs (cost in current year) of pension schemes. Both the benefit obligations and the service cost are projected for a ten-year period. Subsequently the effects of reform measures and demographic changes are quantified in the cost projection.

Limitations

In this report the quantitative analysis is limited to the pension schemes of four EU Member States, which can be considered to represent the variety of pension schemes of other Member States, as will be explained.

Because it was not possible to gather the required data within the time available during the study, we decided to measure the costs on the basis of a fictitious reference group. In this way we do not measure the pension cost of the four "sample" Member States, but the cost generating elements and the sensitivity of the pension schemes of those four Member States to demographic and economic parameters. So, using a fictitious reference group has the advantage that we measure the selected scheme types more or less on the same scale.

For a measurement of the real cost of pension schemes of public sector employees in Member States, one would have to have the reference data on public sector employees of all Member States at one's disposal. Although such a measurement would give a sound foundation for comparison between Member States – especially if the measurement is repeated periodically – this exercise lies far beyond the timeframe and budget of this study.

Definition of pension schemes

As in the survey of the Irish Presidency in this report, "pensions" means old-age pensions or retirement pensions, in contrast to survivor's pensions, disability pensions or other pension categories. In many Member States, a large part – if not all - of pension provision for public sector employees is covered by the social security system, or first pillar. Since the social security pensions are not provided exclusively to civil servants, one could argue that those pension schemes should be excluded from this study. However, pension systems in the second pillar normally assume the first pillar benefits.

Excluding the social security pensions in the comparison of – for instance – replacement rates would be like comparing apples and oranges. Therefore we compare both the first and the second pillar pensions. The third pillar (private pension provision), however, is excluded. [5]

Micro and macro analysis

Although this study deals with the public sector, primarily in its role as an employer (micro perspective), one cannot ignore the special social and economic role a government plays in society (macro perspective). In its role as an employer, the government will have to reckon with wider issues. Decisions on budgets, compensation and benefits cannot be isolated from the general budgetary constraints a government might have. Reform measures, or a lack of reform measures, in relation to public sector pensions will be assessed by the general public in the light of pension policies applicable to society at large.

In this report we will not discuss issues of general economic policy. However, we do place the pension strategies of the Member States in a broader perspective by paying attention to the government debt and the projected dependency ratio.[6] The higher the level of the projected economic dependency ratio and the current government debt, the more urgent pension scheme reform will be.

[5] In some cases, it is difficult to make a distinction between the three pillars (social security, occupational pensions and private pensions).

[6] This is an indicator of persons younger than 15 years of age plus the number of pensioners in relation to the number of people who are actually in employment.

4

A Qualitative Comparison of Pension Schemes for Public Sector Employees

Aspects of pension systems in the EU

There are many respects in which European pension schemes for public sector employees differ. The details of the respective pension schemes can be found in Appendix C. We will not try to find an explanation for those differences, because this would require a historical analysis which lies beyond the scope of this report. In this chapter we focus on those aspects that have an important impact on the issues of adequacy and sustainability, as will be pointed out. In this respect we distinguish the following aspects:

- the target level of the pension schemes;
- incentives for increasing the number of years of service;
- distinction between pillars: social security pensions, occupational pensions and private pensions;
- the way the risks are shared;
- the way the pension schemes are financed;
- the reform measures either undertaken in recent years or planned for the near future.

At the end of this chapter we will confront the target level of pension schemes (the major indicator for the adequacy of pensions,) with the current government debt and the projected economic dependency rate. Both parameters are indicators for the sustainability of pension schemes as seen from a wider perspective, A generous pension scheme seems all the more problematic if a country has a high level of government debt and a high projected economic dependency ratio. Or, formulated differently: adequacy is a relative social concept depending on what a society can afford economically.

Finally we will give our reasons for selecting five pension schemes for the quantitative analysis in the next chapter.

Target level

The target level of a pension scheme is basically determined by the replacement rate[7] and the retirement age. The higher the benefits provided and the earlier the retirement age, the more costly a pension scheme will be, regardless of the way the scheme is financed. A difference of one year in normal retirement age –with equal benefits at the normal retirement age - means a difference in cost of approx. 8%.

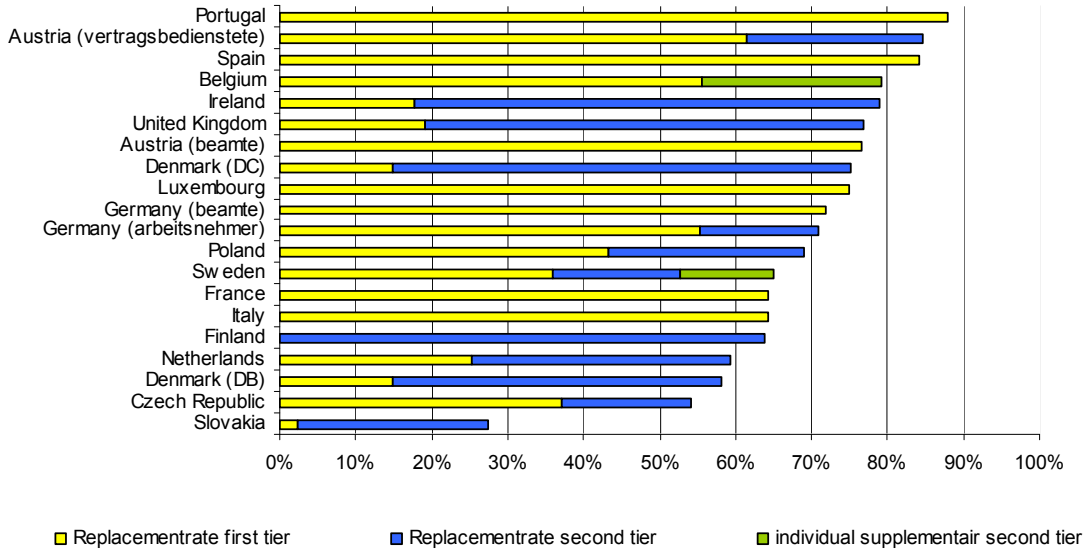
There may be many reasons why the replacement rate differs between Member States. The differences in tax systems, for instance, might be a major cause of differences in the gross level of benefits. Also societies may differ in their opinion of the appropriate, socially acceptable level of old-age benefits. These different opinions may well be influenced by differences in the economic strength of Member States. For occupational or supplementary pension schemes, labour market competition will influence the quality of the scheme as well.

We have calculated the replacement rates for the average income level in a country and we have also calculated the replacement rates for 1.25 times the average income. Incomes below average were neglected to avoid complications due to differences in minimum wage levels and minimum guarantees in benefit levels. A projection was made for 40 years service with career-related and inflation-related salary increases and with indexation of accrued benefits, where appropriate according to the pension rules. [8]

Figure 1: Replacement rate for the average income level

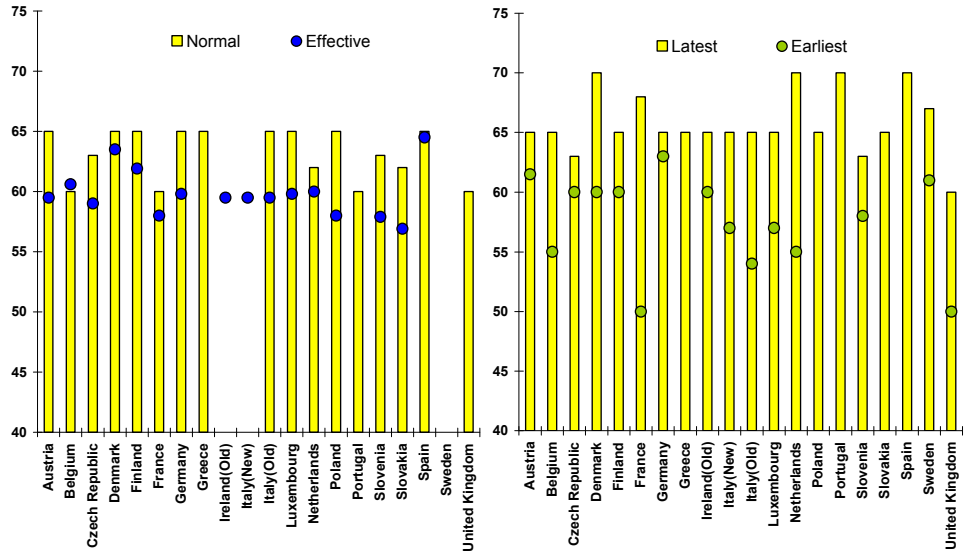
[7] By the replacement rate we mean the level of the benefit that can be acquired after the maximum period of service divided by the final salary before retirement. Both benefit and salary are taken before taxation. For reasons of comparison, we use a standard service period of 40 years. The replacement rates could also be compared in net terms. Differences in tax systems however lie outside the scope of this report.

[8] See Appendix B for the assumptions.


Portugal
Austria (vertragsbedienstete)
Spain
Belgium
Ireland
United Kingdom
Austria (beamte)
Denmark (DC)
Luxembourg
Germany (beamte)
Germany (arbeitsnehmer)
Poland
Sweden
France
Italy
Finland
Netherlands
Denmark (DB)
Czech Republic
Slovakia
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Replacementrate first tier
Replacementrate second tier
individual supplementair second tier

The differences in retirement age can be caused by early retirement provisions which are sometimes alternatives for unemployment or disability benefits for older employees. As can be seen in the next table, the most common retirement age is 65. Figure 2 shows the normal retirement age and the effective retirement age (left) as well as the earliest and latest retirement age possible (right).

Figure 2



Source: Questionnaire Public Sector Pensions Review EU Member States.

The replacement rates and the retirement age provide a rough indication of the differences between the target levels of the pension schemes in question. A more accurate calculation of the target levels of the four sample pension schemes is provided in the next chapter.

Incentives for lengthening years of service

Increasing the labour market participation of older workers is a major challenge for most European countries. There are many factors that cause the relatively low participation rates for the population between the ages of 55 and 65, the provision of generous pension benefits at a retirement age below 65 being one of these factors. In most Member States measures have been taken or are being introduced to lengthen the years of service.[9] In three cases (Austria, Finland and The Netherlands) the early retirement age has already been increased. In Austria, Finland and the Czech Republic, the normal retirement age was raised. In four countries (Finland, the Netherlands, United Kingdom and Italy), a (further) increase in the (early) retirement age is in the offing.

[9] See Appendix D.

An increase in the minimum years of service is already effective in two countries (Austria and Italy) and is in the process of being introduced in Germany, France and Italy. Several countries have introduced incentives for the voluntarily postponement of retirement and thus for increasing the years of service.

In general, actuarial fairness (a direct relation between years of service and the benefit level) will have a positive affect on the effective retirement age. Voluntarily early retirement below the normal retirement age will consequently lead not only to lower benefits, due to a shorter contribution period, but also to an actuarial reduction. The combination of these two elements would lead to a reduction or an increase in benefit levels of approx. 8% for retirement one year earlier or later.

Social security, occupational and private pensions

The literature on pensions generally makes a distinction between three pillars of pension provision: social security pensions (first pillar), occupational or supplementary pensions (second pillar) and private pensions (third pillar).

In Italy, Luxembourg, Portugal and Finland, the pensions for civil employees are provided exclusively by the general social security scheme. At the other end of the spectrum are the United Kingdom and the Netherlands where, besides a flat-rate social security scheme, a large part of pensions are provided through occupational pension schemes.

In the discussion on the sustainability of pensions, the increasing coverage by occupational and private pension schemes is presented as a solution for the need to reduce the pension burden of the state.[10] Seen form the point of view of the state, in its role of an employer, there is another argument in favour of pension provision through occupational schemes, since this would mean a change from pensions as general social security to pensions as an employee benefit. It would change pensions into an HR instrument and would also provide more opportunities to amend pension schemes. Although changes to an occupational pension scheme will (sometimes) involve a phase of negotiations with trade unions, it is perhaps politically less hazardous to change an employee benefit than a general social security scheme (with regard to the number of voters involved).

[10] EIPA 2004, page 37.

Sharing of risks

The risks associated with old-age pensions are longevity risk, investment risk (in the case of capital funded schemes) and inflation risk. In the case of a pure defined contribution scheme with investment options for the member, all these risks may be borne by the member of the scheme. This is at least the case until the moment of retiring. On reaching retirement age, the sum of contributions and the investment returns will normally be commuted into an annuity, thereby transferring part of the risk to an insurance company.[11]

Like any other employer, the state might prefer a DC scheme above a DB scheme because in the case of a DC scheme the state's liability is limited to the annual contributions paid to the employees. In the case of a DB scheme, the accrued pensions would result in future liabilities (for instance, future adjustments to inflation, or rising wages in the case of an indexed average pay or a final pay scheme). In this way, converting a defined benefit (DB) scheme into a DC scheme increases the sustainability of pension schemes.

The next table shows the division of Defined Contribution (DC) and Defined Benefit (DB) schemes amongst the Member States.

Table 1

	First tier	**Second tier**
Defined	Italy **(new)**	Czech Republic
Contribution	Poland **(new)**	Denmark (partial)
(PAYG/State)		Luxembourg **(new)**
		Poland **(new)**
		Spain (partial)
Defined	Sweden **(new)**	Austria
Contribution		Denmark (partial)
(Funded)		Greece (partial)
		Slovenia
		Slovakia
		Spain (partial)
Defined	Austria	Denmark (partial)
Benefit	Belgium	Germany (partial)
	Czech Republic	Greece (partial)
	Finland	Ireland
	France	Netherlands

[11] If this were not the case, the plan would have the character of a personal savings account.

	First tier	**Second tier**
	Germany	Sweden
	Greece	United Kingdom
	Italy **(former)**	
	Luxembourg **(former)**	
	Poland **(former)**	
	Portugal	
	Slovakia	
	Slovenia	
	Spain	
	Sweden**(former)**	
Flate rate	Denmark	
	Ireland	
	Netherlands	
	United Kingdom	

Source: Questionnaire Public Sector Pensions Review EU Member States.

** due to general pension reform (harmonisation of all pension systems) by the 1st of January 2005 the description of the Austrian pension system is outdated.*

Financing of pension schemes

Pension schemes are either financed on a pay-as-you-go basis (PAYG), out of the state budget, or on a capital funding basis. It seems that there is only a slight difference between PAYG and financing through the state budget. In both cases, pension expenses are directly related to the current pension benefits paid out. If the expenses are financed from tax revenues, the burden is probably shared by all taxpayers, including the elderly. If the expenses are premium financed, only the active working population will bear the burden of an increase in pension costs. As table 2 shows, the majority of Member States (9) have PAYG or budget-financed pension schemes. In 7 cases, there is a mixed situation with at least some capital funding.

Table 2: Financing basis

	First tier	**Second tier**
Austria	PAYG	Funding
Belgium	PAYG + Contribution	PAYG
Czech Republic	PAYG	PAYG
Denmark	PAYG	PAYG/Fund
Germany	PAYG	PAYG
Greece	PAYG	Fund

	First tier	**Second tier**
Spain	PAYG + Fund	PAYG + Fund
France	PAYG	PAYG
Ireland	PAYG + Reserve fund	PAYG + Reserve fund
Italy	**(Former)**: PAYG	**(Former)***:* None
	(New): PAYG	**(New)***:* None
Luxembourg	Fund	None
Netherlands	PAYG	Fund
Poland	***(Former)****:* PAYG	
	(New): PAYG	**(New)**: Fund
Portugal	PAYG	None
Slovenia	-	Fund
Slovakia	PAYG	Fund
Finland	PAYG + Reserve fund	None
Sweden	**(Former)**: PAYG	**(Former)**: Fund
	(New): PAYG	**(New):** Fund
United Kingdom	PAYG	PAYG

Source: Questionnaire Public Sector Pensions Review EU Member States.

** due to general pension reform (harmonisation of all pension systems) by the 1st of January 2005 the description of the Austrian pension system is outdated.*

Reform measures

Reforms, such as increasing the retirement age, introducing incentives to work longer, the introduction of partial retirement (4 cases), and the creation of occupational (capital funded) schemes, have been initiated in relation to all the issues discussed above. Considerable emphasis has also been placed on amending the pension systems. Final pay schemes have been converted into either moderate final pay, in average pay or even defined contribution schemes (8 cases in total).

It is clear that pension scheme reform is more than just an issue for policy debates and is being applied in practice. Appendix D gives an overview of the reform measures already implemented or planned. In chapter 5 we will examine the quantitative effects of some reform measures, such as the change from DB to DC and the introduction of a higher retirement age.

In most cases, pension scheme reform is like steering a super tanker; the effects of pension scheme reform only occur in the long term. In the first place many pension schemes have vested – unchangeable – pension rights. Secondly pension reforms are normally applied to younger generations only. This means that for a long time both the

old and the new scheme will be valid. Thirdly pension reform is such a sensitive issue that reforms are sometimes implemented gradually.

Government debt and economic dependency ratio

Whether or not the current state of pension provision in Member States is problematic is partly determined by the current government deficit and the projected dependency ratio. A high deficit demands pension reform. Also a high projected economic dependency ratio makes pension reform more urgent. The reform measures must be effective before the dependency ratio reaches its highest level.
In this respect, the figures provided in table 3 show that there are Member States where the urgency of pension scheme reform is very high.

Table 3

		Dependency ratio[12]		**Govt. debt as % of GDP(2003)**
	2000	2020	2050	2003
Austria	47.6%	52.0%	77.5%	65
Belgium	52.4%	56.3%	72.2%	100.5
Czech Republic	43.3%	52.2%	82.9%	37.6
Denmark	50.0%	56.5%	65.9%	45
Finland	49.4%	62.3%	71.7%	45.3
France	53.4%	59.3%	59.3%	63
Germany	47.2%	55.0%	76.3%	64.2
Greece	48.0%	54.1%	82.5%	103
Ireland	49.5%	53.7%	69.9%	32
Italy	47.4%	54.1%	84.0%	106.2
Luxembourg	49.7%	51.7%	59.3%	4.9
Netherlands	47.4%	53.6%	68.7%	54.8
Poland	53.4%	59.3%	71.4%	45.4
Portugal	49.5%	53.8%	78.0%	59.4
Slovakia	44.8%	47.2%	76.5%	42.8
Slovenia	42.3%	52.3%	86.7%	27.1
Spain	46.4%	52.3%	90.3%	50.8
Sweden	55.5%	61.1%	68.1%	51.8
United Kingdom	52.7%	53.1%	67.3%	39.8
EU	49.4%	55.0%	75.0%	55.9
Japan	46.7%	67.1%	88.4%	154.7
US	51.0%	57.0%	67.5%	63.1

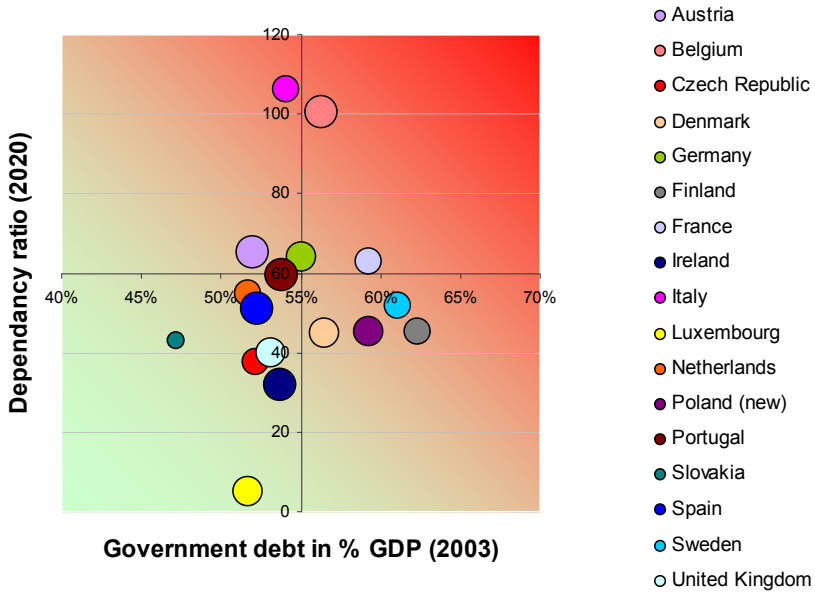
Sources: US Census Bureau; Eurostat; Joint Pension Report.

We are now able to confront the target level of pension schemes (the major indicator for the adequacy of pensions,) with the current government debt and the projected economic dependency rate (indicators for sustainability).

In the figure 3 the 2020 dependency ratios and the government dept are plotted along two axes. The size of the "bells" represents the replacement ratio: the bigger the bell, the higher the replacement ratio.

[12] The number of pensioners in relation to the number of people of age 16-65.

Figure 3



The figures shows that Member States which are plotted more towards the upper right corner are in a situation were the sustainability of pension schemes is problematic. This is even more so if the replacement rate is higher (as is indicated by the size of the "bell"). To mention the extremes: Slovakia (blue bell on the left side) has a low score on all three aspects, which is a positive indicator for the sustainability. Luxembourg (purple bell below) has a relatively comfortable position as well, although the replacement rate is quite high. France and Belgium are both in the upper right quadrant, indicating a high urgency for pension scheme reform.

Selection of sample pension systems

We have selected five sample pension systems for further quantitative research, one from each of the four boxes in table 1: the Italian, Swedish, German (two systems) and British systems.[13] Using these systems as examples does not imply an assessment of the situation in the four countries mentioned. Since we used a fictitious reference group, it is not possible to link the results of the quantitative analysis directly to the actual situation in the four Member States, as was explained in chapter 3.

The Italian and Swedish DC schemes are both very interesting with regard to pension reform. The Italian scheme is financed on a PAYG basis while the Swedish scheme is capital funded.

[13] The countries also represent the different welfare regimes as distinguished in: Soede et al, "unequal welfare states", report by SCP and CeRP.

Although one could argue that the new Italian system still has a DB character from an accounting perspective (due to indexation during years of service),[14] within the system there is a clear relationship between the contributions paid during years of service and the level of benefits. During the years of service, the total sum of contributions is adjusted in line with the growth rate of the Gross Domestic Product. Consequently this system has a built-in "brake"; when the economy slows down, so does the growth in pension liabilities.

The German scheme (the scheme applicable to "*Arbeitnehmer*") consists of two pillars, both of the average pay type.

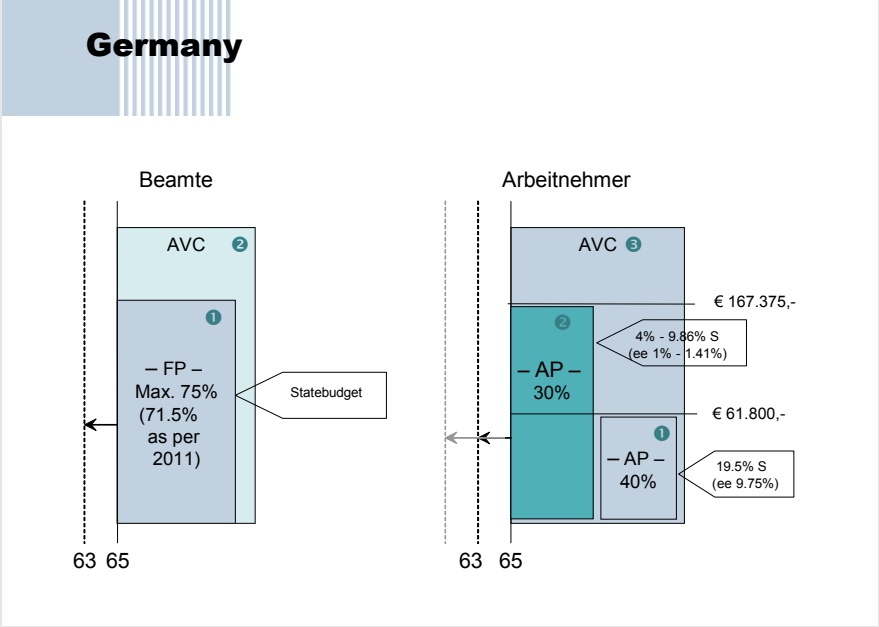
The UK scheme has a first pillar consisting of a flat rate social security benefit and a second pillar with an occupational scheme. The occupational scheme for civil servants replaces the state pension ("opting out").

Box 1 shows a more elaborate description of the selected schemes.

[14] The opinions about this topic differ.

Box 1: Description of selected pension schemes

Germany



Beamte pension

The pension for a *Beamte* is funded on the basis of the last monthly salary earned plus a November bonus. In 2002 the relevant figure was equal to 12 times the monthly salary and bonus, the bonus amounts to 86.31% of the monthly salary. The accrual rate amounts to 1.875% subject to a maximum total figure of 75%. As of 2003 the accrual rate will drop from 1.875% to 1.79375% per annum in 2009.

In this case the maximum number of years of service that the participant can accumulate may not exceed 40 (a maximum of 35 years of service applied until 1991).
This means that the maximum pension the participant can accrue will drop from 75% to 71.75% in 2009.

State pension for Arbeitnehmer

First tier

The state pension is calculated using a complex formula containing variables such as individual pay, average earnings, revaluation and the term of the relevant insurance. In addition, any years devoted to education, military service and absence due to children also have an impact on the amount of the pension. The maximum salary in respect of

which the participant can build up a pension is EUR 61,800 (2004) in the case of a resident of West Germany and EUR 52,200 (2004) for an East German resident.

The standard formula for calculating a monthly pension:

$$\text{Pension} = \text{Pension value factor} \cdot \sum_{i=j}^{d} \frac{\text{Pensionable salary}_i}{\text{Average pensionable salary}_i}$$

$$j: \text{Year of starting of building up pension}\ ;\ d: \text{Last year of building up pension}$$

In the case of a West German resident the current pension value factor is equal to EUR 26.13, while the corresponding figure for a resident of East Germany is EUR 22.97.

Second tier

In addition, an *Arbeitnehmer* also builds up a company pension. This is funded by means of notional premiums amounting to 4% of the gross salary subject to an upper limit equal to a pensionable salary of EUR 167,375. The pension is calculated in a point system.

Table 4 Point system

Age	Points	Age	Points	Age	Points	Age	Points
17	3.1	29	2.1	41	1.5	53	1.0
18	3.0	30	2.0	42	1.4	54	1.0
19	2.9	31	2.0	43	1.4	55	1.0
20	2.8	32	1.9	44	1.3	56	1.0
21	2.7	33	1.9	45	1.3	57	0.9
22	2.6	34	1.8	46	1.3	58	0.9
23	2.5	35	1.7	47	1.2	59	0.9
24	2.4	36	1.7	48	1.2	60	0.9
25	2.4	37	1.6	49	1.2	61	0.9
26	2.3	38	1.6	50	1.1	62 +	0.8
27	2.2	39	1.6	51	1.1		
28	2.2	40	1.5	52	1.1		

Accrued points:

$$\text{Accrued points} = \sum_{i=j}^{d} (1{,}015)^{d-i} \cdot \frac{\text{Yearly pensionable salary}_i}{12000} \cdot \text{Points}(\text{leeftijd} = i)$$

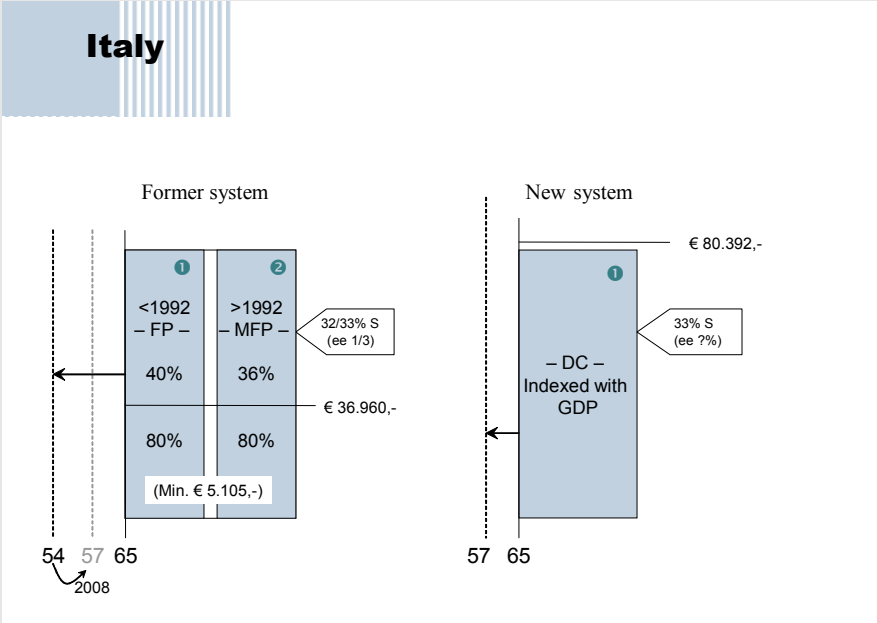
$$j: \text{Age of starting of building up pension}$$

$$d: \text{Age in last year of building up pension}$$

Pension:

$$\text{Monthly pension} = 4 \cdot \text{Accrued points}$$

Italy



Former system

The system is a defined benefit system.

Pension = 2%. (C1.W1 + C2.W2).

W1 and W2 refer to salaries.
C1 and C2 refer to the number of contribution years.

In the case of contribution years prior to 1992 (C1) W1 is equal to the salary last earned before retirement. With regard to the contribution years subsequent to 1992 (C2) W2 is equal to the average salary earned in the last four years. In this respect it should be noted that as of 2008 W2 will change from the average salary earned in the last four years to that earned in the last 10 years. In both cases the salaries used for the purposes of W2 must be indexed to the rate of inflation plus 1%.

Where income exceeds EUR 36,960 (2003) the rate of accumulation of any amount in excess of this figure has been reduced from 2% to 1% in the case of W1, and from 2% to 0.9% in respect of W2.

New system

The system is defined as a defined contribution.

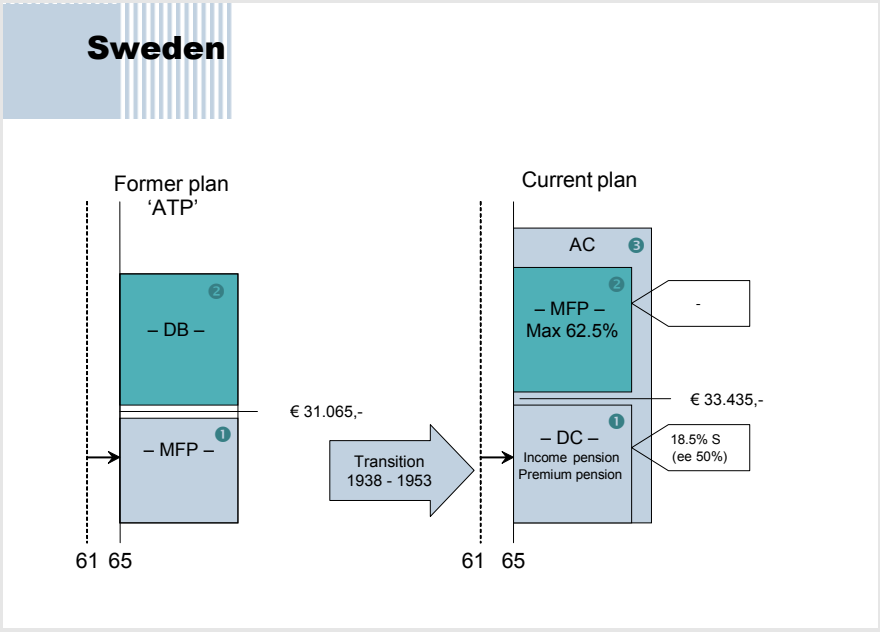
Pension = c_t . M

c_t is a conversion coefficient; and

M is the total contributions accumulated throughout the period of participantship adjusted in line with the GDP index.

The conversion coefficient can extend from 4.72% at the age of 57 to 6.14% at the age of 65. Beyond the age of 65 the conversion coefficient will be identical to that applicable at this age. These conversion coefficients will be adjusted every 10 years.

Sweden



First tier

In the case of residents born after 1953 the first tier is a defined contribution system. A government pension consists of the following two components: an income-based and a premium-based pension. Within the Swedish system a pensionable salary is subject to a ceiling in the first tier.
This ceiling is equal to 7.5 times the increased price base amount. In this case the income

base amount is linked to the income index. Of this salary premiums amounting to 18.5% are paid in respect of the entire first tier. Of this, the income-based pension accounts for 16% and the premium-based pension for 2.5%.

Income-based pension

The income-based pension is payable on attaining the age of 61. Upon retirement the annual income-based pension is determined by dividing the total accumulated funds (The return on the accumulated funds are equal to the growth of the average wage rate) by a life expectancy denominator. This is done once only upon retirement and, as such, results in stable pension benefits.

$$\text{life expectancy denominator}\,(x) = \int_{x}^{\infty} e^{-\delta \cdot t}\, {}_{t}p_{x}\, d(t) \quad \textit{(Palmer E. and Klevmarken, N.A.)}$$

${}_{t}p_{x}$ is the survival formula

A ${}_t p_x$ taken from a unisex mortality table is used to determine the life expectancy denominator along with an δ equal to 1.60%.
This system ensured that later retirement will result in a higher annual pension based on actuarial accrual. Every year the income-based pension is adjusted in line with variations in the income-based amount.

Premium-based pension

The premium-based pension is based on a unit-linked insurance system. This means that pension capital is saved in security funds. In this case a member decides for himself in which funds this capital is to be invested. If a member fails to make a choice as to where he should direct his investments, they will be placed in the national pension fund. As in the case of the income-based pension, premium-based pensions may be paid out from the moment at which the participant attains the age of 61. The amount of the pension will depend on the capital that has been saved and the interest received.

Second tier

Supplementary PFA income-based pension

There are various plans in the second tier. In the case of a supplementary PFA income-based pension the participant can accumulate additional premium-based pension benefits in respect of that part in excess of 7.5 increased price base amounts. This may be done on the basis of moderated final pay using the following formulas:

$$\text{Pensionpoints} = (\text{pensionlevel}) \cdot (\text{average yearly points}) \cdot \frac{\text{workinglife up to 30 years}}{30}$$

$$\text{Yearly points}_i = \frac{\text{Pensionable income}_i}{\text{increased price base amount}_i}$$

$$\text{Pension}_j = \text{Pension points} \cdot \text{increased price base amount}_j \text{ with } j = \text{time of pension}$$

The average yearly points for state employees are calculated by taking the average of the last five yearly points prior to their retirement date. The average yearly points for local and provincial government staff may be calculated by taking the average of their best five yearly points within the seven years up to two years prior to their retirement date.

Pension level:

Table 5

Average Yearly Points	Pension Level (Counties / Municipalities)	Pension Level (State)
0 – 7.5	0%	0%
7.5 – 20	62.5%	60%
20 – 30	31.25%	30%
30 +	0%	0%

Source: Mercer International.

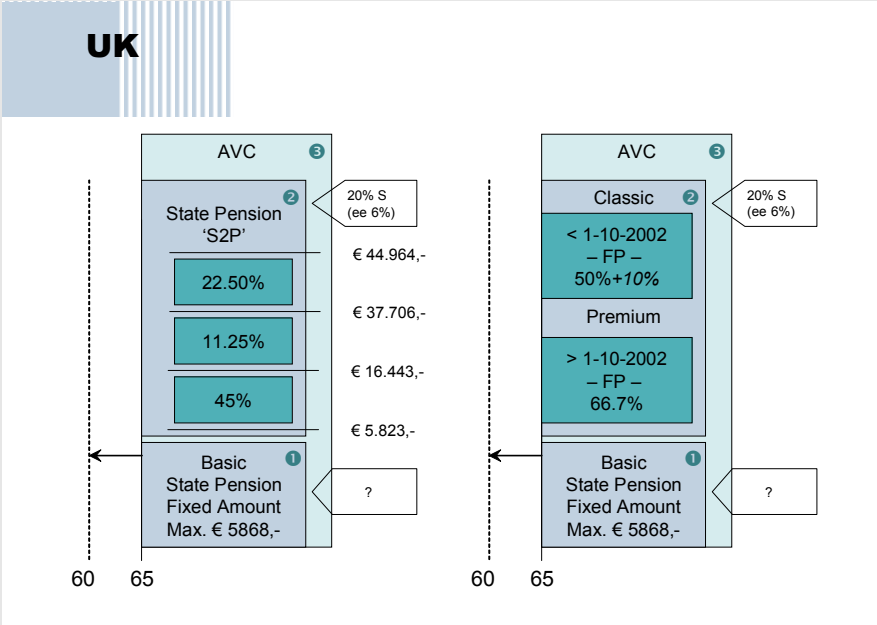
Supplementary individual premium-based pension

Based on a collective agreement entered into by government corporations and their participants, supplementary individual premium-based pension benefits accrue through a defined contribution system. For the purposes of the defined contribution component of the pension, premiums amounting to 3.5% and 4.5% of the salary are paid up until 7.5 income base amounts of the salary, while the corresponding figures for the amount in excess of this are 1% and 2.1%.

At the end of every year the participant is required to decide with which insurance company the participant wishes to save and to what extent. In this respect the participant has a choice between a traditional pension-based insurance policy and a unit-linked insurance. In addition, the participant can also arrange additional cover for certain risks. When the participant retires, the individually accumulated pension capital is divided by a life expectancy denominator, so as to determine his/her pensionable income.

The UK plan has a first tier consisting of a flat rate social security and a second tier with an occupational plan. The occupational plan for civil servants comes in the place of the State Pension ("opting out").

United Kingdom



First tier

The first tier in the United Kingdom consists of the BSP. A person can only obtain this if he paid flat rate National Insurance contributions (NICs) for at least 50 weeks prior to 6 April 1975 or if he has paid or been treated as having paid[15] sufficient NICs in any single tax year after that date. In addition, the person must have paid, been treated as having paid or been credited with NICs[16] for at least 90% of the time from the age of 16 until they reach State Pension age in order to obtain a full pension. The full amount which the person can obtain is EUR 112.84 (GBP 79.60) per week. A married woman can get a BSP of 60% of her husband's, if her entitlement based on her own contributions is less than this (this will be extended to married men whose wives reach State Pension age on or after 6 April 2010)

Those who are older than 80 and who fail to satisfy the requirements are entitled to a pension amounting to EUR 67.54 (GBP 47.65) per week, subject to certain residence conditions being met.

Over and above the pension the person obtains in this manner, an additional pension benefit of EUR 14.18 (GBP 10.00) is paid at Christmas. Any household which includes a

[15] NICs are treated as having been paid if an employee earns between EUR 111.99 (GBP 79) and EUR 129 (GBP 91) a week

[16] Credits can be awarded to people who are registered as unemployed and seeking work, or who are unable to work because of illness or caring responsibilities, for example.

person aged 60 or over receives a Winter Fuel Payment of EUR 283.50 (GBP 200.00). From 2003/04 any household which includes a person aged 80 or over receives an additional Winter Fuel Payment of EUR 141.75 (GBP 100.00).

Second tier

Civil Service Occupational Pension Schemes

Pension benefits accrue in various ways in public sector pension schemes. In the case of membership of the Civil Service pension scheme prior to 1 October 2002 a pension is built up in the 'classic' scheme. Within this system the participant receives a pension which is equal to 1.25% of their final pensionable pay for each year of reckonable service. Reckonable service is limited to 40 years at age 60, but members can earn extra years after normal retirement age up to a maximum of 45 years in total at 5 years after pensionable age.

$$\text{Pension} = \frac{\text{Pensionable pay . years of service}}{80}$$

In addition, a tax-free lump sum is paid on the retirement date. the accrual rate for this lump sum is 3.5%.

In the case of members joining the Civil Service pension scheme after 1 October 2002, pensions are built up in the 'premium' scheme. Within this system the participant receives a pension equal to 1.67% of their final pensionable pay for each year of reckonable service, subject to a maximum of 40 years of accrual.

$$\text{Pension} = \frac{\text{Pensionable pay . years of service}}{60}$$

The participant can also choose to exchange some pension for a lump sum. For every reduction of the pension by EUR 1.42 (GBP 1.00), the participant receives a lump sum of EUR 17.01 (GBP 12.00).

In the case of those who were already participants of a pension plan before 1 October 2002, it is possible to transfer to the 'premium' scheme or to add benefits from both systems. This involves a number of minor adjustments of the pension component of the 'classic' pension. In addition, it is possible for the participant to purchase additional years of service within the Civil Service pension schemes. What these additional years of service cost depend on the person's age.

From April 2002 civil servants may also be entitled to a second tier pension from the State as well as their Civil Service Occupational Pension. For 2004/05 they will get some State Second Pension if their annual earnings are between EUR 5,823.19 (GBP 4108) and EUR 37,706.16 (GBP 26600). The amount reduces as earnings approach the higher limit.

5

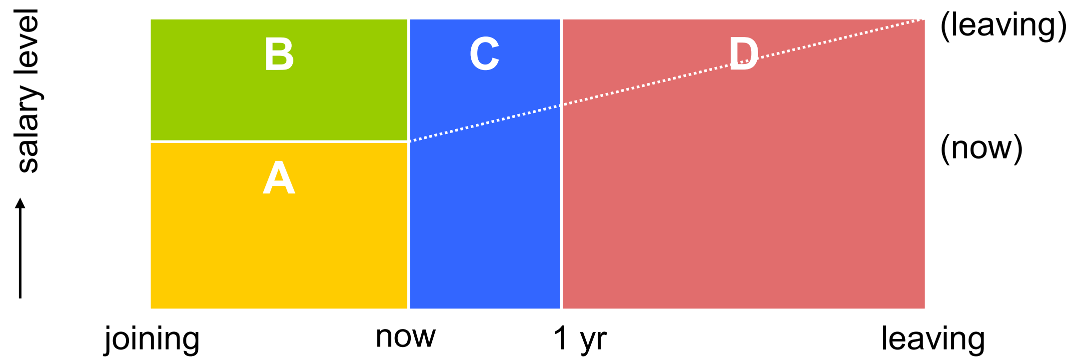
Quantitative Comparison of Pension Schemes

The method used

In this chapter we have compared the pension systems which were selected in chapter 4 in relation to the aspects "defined benefit obligation", "service cost" and "the replacement rate". We will explain these concepts below. An extensive explanation of the method used is included in box two.

The method used to value the pension costs is derived from the International Financial Reporting Standards (IFRS). In IFRS, the method of valuing the liabilities is prescribed. The valuation method is referred to as the Projected Unit Credit (PUC) method. PUC takes into account the future development of the member and his present and future pension accrual. The pension entitlements to be accrued have been included in so far as they can be attributed to the past. The Defined Benefit Obligation (DBO) (A+B in the figure below) is the pension obligation which is included on the company's balance sheet. The Service Cost (C in the figure below) is the annual pension burden which is charged to the profit-and-loss account. The expected future developments with regard to the member in the period in which his employment ceases are also taken into account in the Service Cost.

Figure 4



The method which IFRS prescribes therefore allocates all costs to the various years of service, including costs which will only be known with certainty in the future. This means that various assumptions are necessary in order to value the uncertain costs incurred in the future. Examples of these are variables which affect the pension basis, such as general salary rounds and the member's career path, but also variables due to which the member may not attain pensionable age with the employer in question. In other words, it is necessary to take into account the probability that employment will cease due to death, resignation or dismissal, and disability, as well as obligations which remain towards the dormant members, pensioners or partners.

The importance of this valuation method is its prospective nature. Future obligations and costs arising from accrued entitlements become visible.

The replacement rate indicates the level of the attainable pension benefit expressed as a percentage of salary immediately prior to the retirement date. In calculating the replacement rate, salary increases during the member's career are taken into account.

Box 2 European accounting rules for pension plans

Companies listed on a European stock exchange are required to prepare their consolidated financial statements using International Financial Reporting Standards (IFRS) for the financial year beginning in or after 1 January 2005.

The basic philosophy of pension expense accounting standards is that the company has made certain pension promises and has usually set aside some invested assets to make good those promises. The cost of the benefits promised should be met over the working life of the employees. To the extent that the invested assets are less than the value of benefits allocated to service already completed, the company should recognise a liability to meet this shortfall, i.e. the shortfall should be shown as a liability in the company's balance sheet.

Present value of 'Defined Benefit Obligation' - **Invested assets** = **Company liability**

The annual pension expense is made up of three basic components: the current service

Current service cost + **Interest cost** - **Expected return on assets** = **Annual pension expense**

cost, the interest cost, and the expected return on the assets as follows:

The Standard requires a company to make estimates (actuarial assumptions) as to future financial and demographic variables that will influence the value of its liabilities. These estimates should be unbiased and consistent with each other. The primary financial assumptions are the discount rate, the rate of inflation, the pay increase assumption, the pension increase assumption, and the expected rate of return on the assets of the plan. The Standard requires the discount rate to be the yield on an AA-rated corporate bond of similar term and currency as the liabilities. The primary demographic assumptions are mortality, disability, staff turnover and early retirement.
Defined Contribution (DC) plans are pension benefits where the company's obligation is limited tot the amount that it agrees to contribute to the fund or the employees. Thus the amount of the post employment benefit received by the employee is determined by the amount of contributions paid in on his behalf and the investment return achieved on these contributions. This means that a DC plan normally does not bring about any liability on the balance sheet of a company. However, there is still discussion on the way DC plans with guaranteed rates of interest should be treated.

In the context of this study, we limit ourselves to the calculation of the DBO and Service Cost.

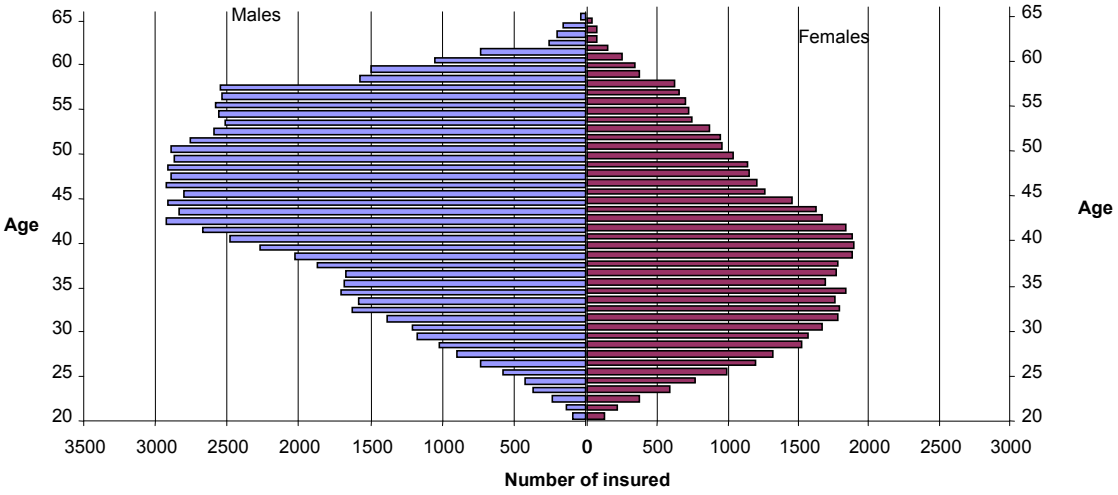
In summary, the method which we have used for the quantitative research has the following advantages:

- the method is officially prescribed within the European Union for the valuation of the pension obligations of listed companies;
- as such, it is an objective and tried and tested method;
- it is a prospective method, because it makes the future development of the pension obligations visible.

The prospective character is enhanced in our approach because we have provided a projection of the development of the DBO and the Service Cost over a period of 10 years. For each year in this projected period, we have therefore calculated the DBO and the Service Cost. As a result, the effects of demographic and economic variables have become visible (sensitivity analysis) and the effects of reforms can be calculated.

Calculations have been made for all four pension systems using the same employee database. This is the database of Dutch civil servants employed by central government. This database consists of 126,000 insured, of whom 62% are male and 38% are female. The average age is 42 years. The age composition of the database is as follows.

Figure 5



The use of this database for all four pension systems has its disadvantages, as well as one great advantage. The disadvantage is that in using this database no conclusions can be drawn with regard to the actual pension costs in the four countries. After all, the outcomes are not based on the actual situation in these countries. The advantage, however, is that by using one and the same database, the differences between the pension systems emerge more clearly without distortions due to differences in the employee databases.

Additional options in the pension systems studied

In chapter 4, we selected the pension systems of Italy, Germany, the United Kingdom and Sweden as systems which could serve as examples for the quantitative study. On further consideration, the pension systems of Italy and Sweden appeared to have a hybrid character, while Germany has two systems. We therefore made the following choices in making our selection.

- Germany has a Final Pay system for "*Beamten*" (civil servants) and an Average Pay system for "*Arbeitnehmer*" (employees employed in accordance with a civil law employment contract). Both systems were studied. In the Average Pay system, a distinction is made in relation to several pension variables between inhabitants of West and East Germany. For this study, we use the amounts applicable in West Germany.

- In Italy, a new system has been introduced on the basis of a defined contribution (DC), but a final pay and a moderate pay scheme still applies to certain periods and groups of members (see Addendum C 10.1). For the purposes of calculating the replacement value, we only assumed the new DC system. In calculating the costs, we took as our point of departure the hybrid system, but we also compared the costs that would be incurred if the DC system were to apply to all members. This provides an

insight into the effect of the gradual introduction of pension reform (hybrid system) and the immediate introduction of the reform (only a DC system).

- With regard to the Swedish system, we also assumed the new system for determining the replacement rate, but have assumed the hybrid system for calculating the costs. The new system includes a pure DC plan ("premium pension") in addition to a notional defined contribution system ("income pension"). For this DC plan, we have assumed an age-related investment mix with a decreasing share of equity investments as the member grows older (see Addendum B).

To avoid the misunderstanding that we are expressing judgements about the pension situation in the four Member States, in the discussion below we will refer to the following systems:

1. **Defined Contribution (DC)**: Full DC system for new years of accrual (from 1996) with a moderate final pay system for certain groups (derived from the Italian system);
2. **Defined Contribution / Average Pay (DC/AP)**: Notional DC system and pure DC system in the first tier and a moderate final pay in the second tier (derived from the Swedish system).
3. **Average Pay (AP)**: Average Pay system in the first and second tiers (derived from the German system applicable to "*Arbeitnehmer*").
4. **Flate Rate / Final Pay (FR/FP)**: Final pay system in the second tier and a flat-rate pension in the first tier (derived from the United Kingdom).
5. **Final Pay (FP)**: For Final Pay system (derived from the German system for "*Beamten*").

All in all this amounts to five systems, which provide a good reflection of the pension systems within the European Union.

In the remainder of this chapter, we investigate the difference between the 5 pension schemes selected with regard to their replacement rate, defined benefit obligation and service cost. As many factors have an impact on the calculated results, sometimes in the opposite direction, it is difficult in some instances to interpret the outcome of the calculations. The outcome may even conflict with common sense expectations. Where necessary, for a thorough understanding of the outcomes we have discussed the technical details that explain the results of the quantitative analysis. However, in general we have tried to avoid a technical exposé and we have concentrated on those implications that are interesting from a policy perspective.

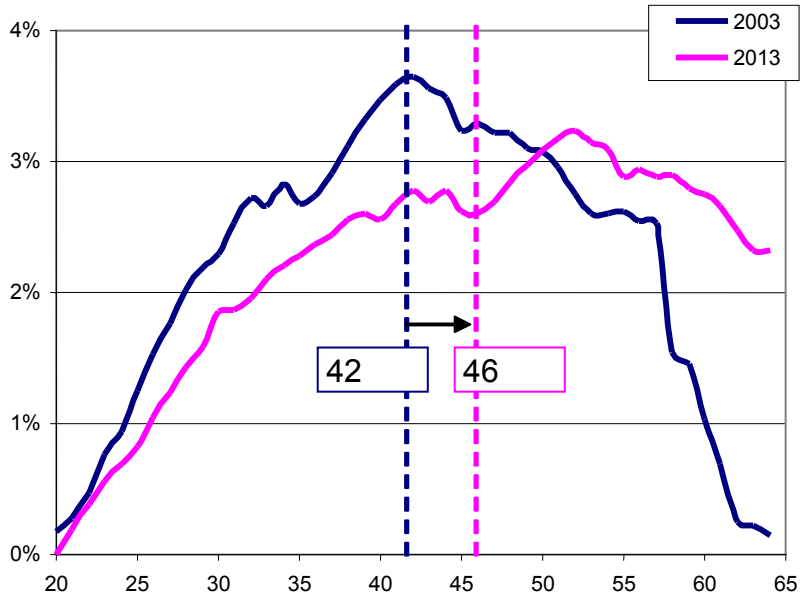
Base scenario

Firstly we wish to study the difference between the pension systems in a base scenario with regard to their replacement rate, Defined Benefit Obligation (DBO) and Service Cost. The DBO and Service Cost are calculated for a 10-year period (2003 to 2013).[17] An

[17]The assumptions used in this base scenario are set out in Addendum B.

important effect which occurs in this projection is the ageing of the database population. The average age increases on the basis of the assumptions used from 42 to 46 years (see figure 6).

Figure 6



The replacement rates of the five systems vary from 47% (average pay) to 77% (flat rate/final pay) (see figure 7). It is clear that the target benefit level and the pension system are different dimensions. Defined contribution plans may result in higher benefits than defined benefit plans, as appears from the difference between the "defined contribution" scheme (47%); the risks, however, of pure defined contribution plans are borne by the members and not by the employer. Consequently it is possible that the target benefits within a defined contribution plan will not be attained. There are almost no differences between salary levels (the normal starting salary and 1.25 * the starting salary).

Figure 7: Replacement ratio for selected pension schemes

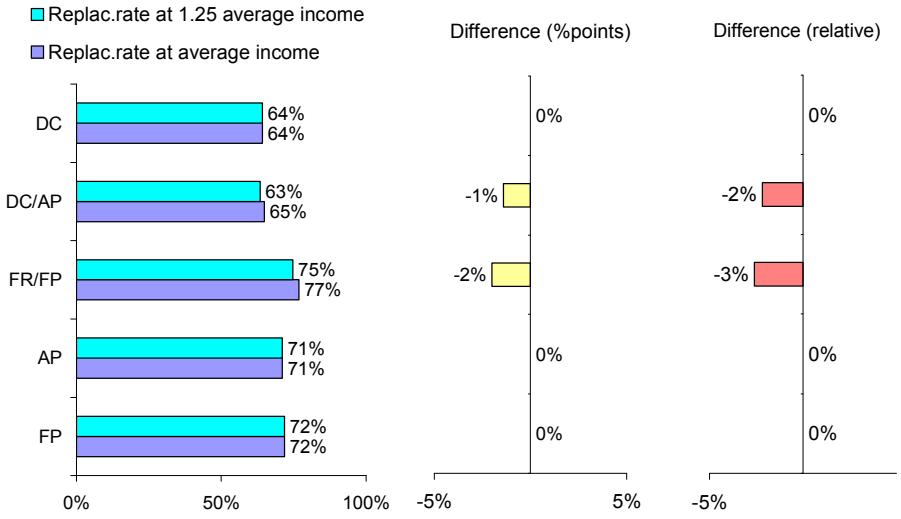


Figure 8 provides a projection of the service cost; the defined contribution-scheme has the highest cost.[18] Logically, the costs partially reflect the level of benefits in the previous figure. The average pay system has the lowest costs.[19] It is clear that the costs increase during the 10-year projection. The cause of this is, for instance, the ageing of the employee base with an increase in the average age from 42 to 46 years.

[18] The absolute figures measuring the DBO and service cost represent the fictitious situation that the pension schemes would apply to the Dutch civil servants (* € 1,000). The importance of the figures lies in the comparison

[19] The service costs of the defined contribution plan are highest, while the replacement ratio of the defined contribution plan is not the highest. The cause is, for instance, the assumed Gross Domestic Product (2% per annum). The premiums paid are adjusted by this percentage during the accrual phase. The growth in salary, however, is higher: 2.5% per annum plus the age-related career increase.

Figure 8: Projected Service Cost of selected pension schemes

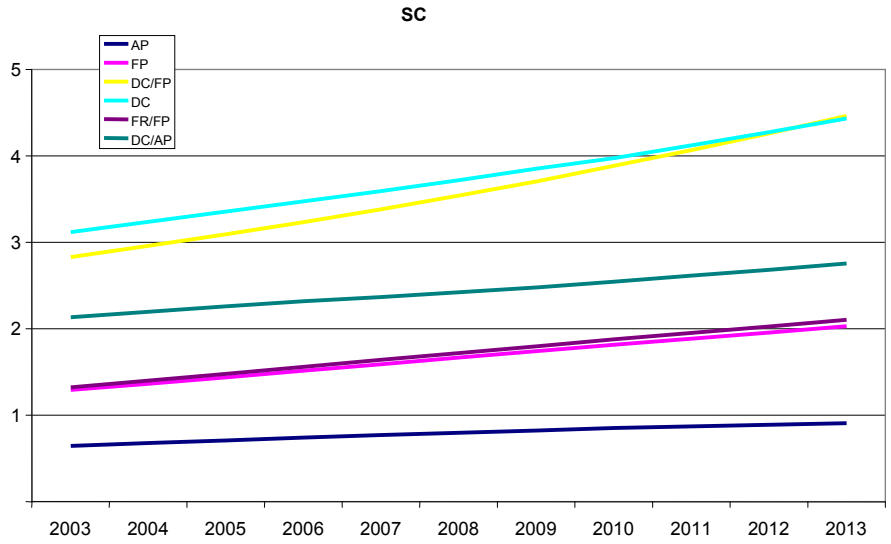
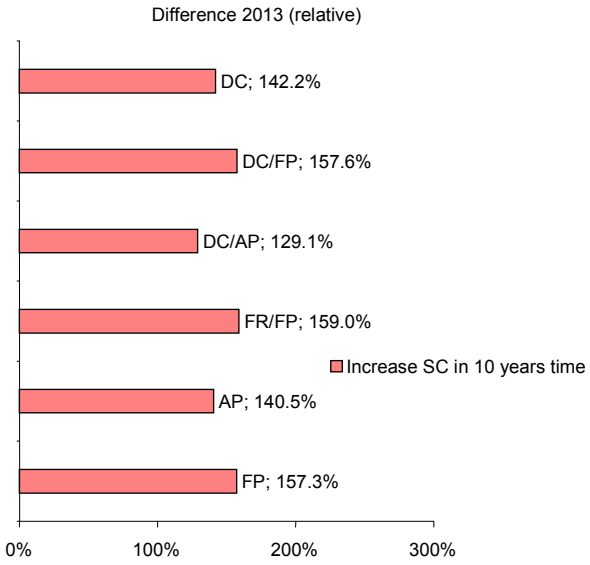


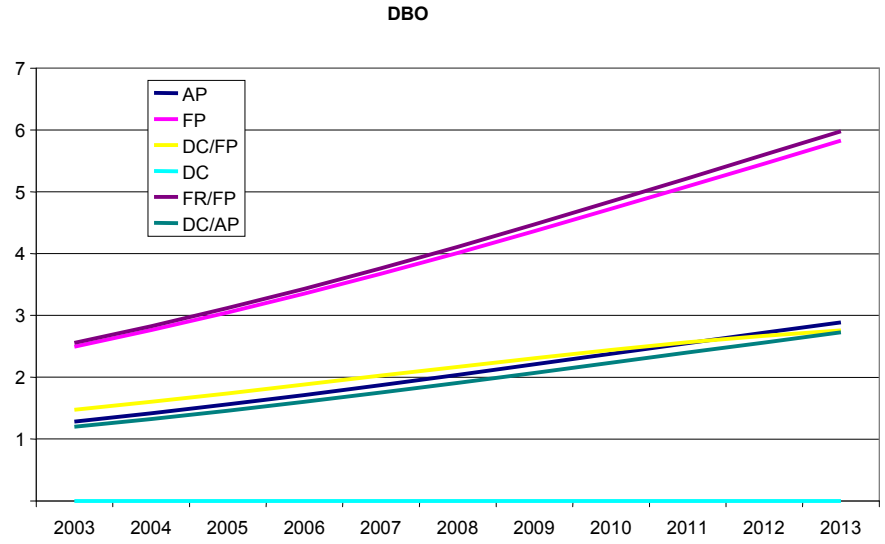
Figure 9: Increase Service Cost in 10 year time



The fact that the DBO increases (see figure 9) over the 10-year period has several causes. First of all, the increase is simply a result of inflation (an annual inflation rate of 2% is assumed). Secondly, the growing number of (former) participants has an impact. Employees who retire are replaced by younger new hires. For retirees there is still a benefit obligation and for the new hires the accrued benefits are added. Finally the effect of ageing is also part of the explanation. As the workforce ages, both their years of service and their salary also increase. In final pay schemes, this combination has an accelerating effect.

The DBO increases for all pension systems, but clearly does so more strongly in the case of final pay systems (brown and red lines). The difference between the final pay systems (the topmost lines), the average pay systems and the hybrid systems with DC elements (the lower group of lines) is clearly visible. The DBO in the final pay systems is approximately twice as high as that of the other systems, which means that under a final pay system, the employer incurs a considerable obligation, which also develops further in the future. Added to the stronger sensitivity to population ageing, this makes final pay systems very vulnerable with regard to the sustainability of the pension systems in the longer term.

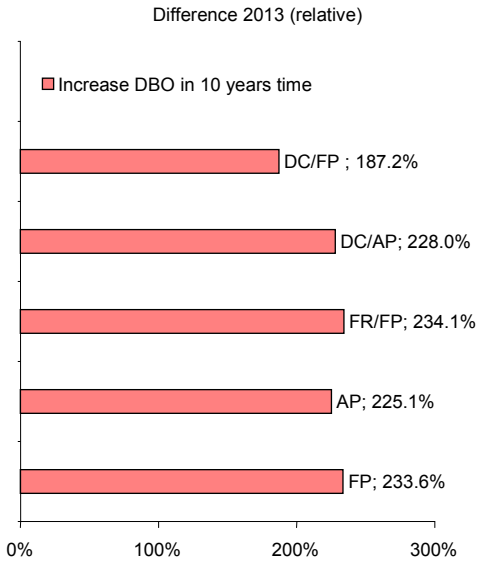
Figure 10: Projected Defined Benefit Obligation of selected pension schemes



The system derived from the Italian situation has transitional provisions, on the basis of which the defined benefit plans applicable prior to the most recent pension reform apply to certain groups of (older) members. If the defined contribution system, derived from the Italian situation, is stripped of these transitional provisions, this gives rise to a pure defined contribution system applicable to all members. This “defined contribution” system is represented by the green line and lies on the bottom axis, which reflects the fact that a pure defined contribution system does not have a DBO; all liabilities are settled at the moment that the premium is paid. Due to the transitional provisions, there is therefore still a substantial DBO.

If we compare the replacement rates and the DBO, it appears that a system with a low DBO does not necessarily have a low replacement value. Systems partly based on a defined contribution, as reflected in system 2 "DC/AP", have a relatively high replacement rate but, at the same time, a relatively low DBO.

Figure 11: Increase Defined Benefit Obligation in 10 year time



The effect of ageing is underestimated in the calculations due to the fact that a stable mortality table is applied. The increase in life expectancy is therefore ignored. Based on the experience of recent years, the increase in longevity leads to an increase of 5% in DBO over the 10-year period.

In this respect the Italian and Swedish systems are very interesting, because the have a built in restraint on the effect of longevity. Both systems apply an actuarial transformation coefficient to the total sum of premiums in calculating the old-age pension benefit. This transformation coefficient can be adjusted as life expectancy increases.

Sensitivity analysis

We also calculated the pension systems for several deviating scenarios to measure their differences in sensitivity to economic and demographic variables. We studied the following scenarios:

- higher salary increases; the annual salary increase due to career development here is 1 percentage point above the annual increase in the base scenario;
- lower salary increases; the general salary trend is 1% below the level of inflation (in the base scenario, the general salary trend is 0.5% above the level of inflation);
- higher inflation; inflation is 3% rather than 2%;
- a lower increase in the average age of the employee base; the average age does not increase by four years in the coming 10 years (as in the base scenario) but only by 1.5 years.
- an increase in pensionable age of 1 year; the pensionable age will be 66 rather than 65 years.

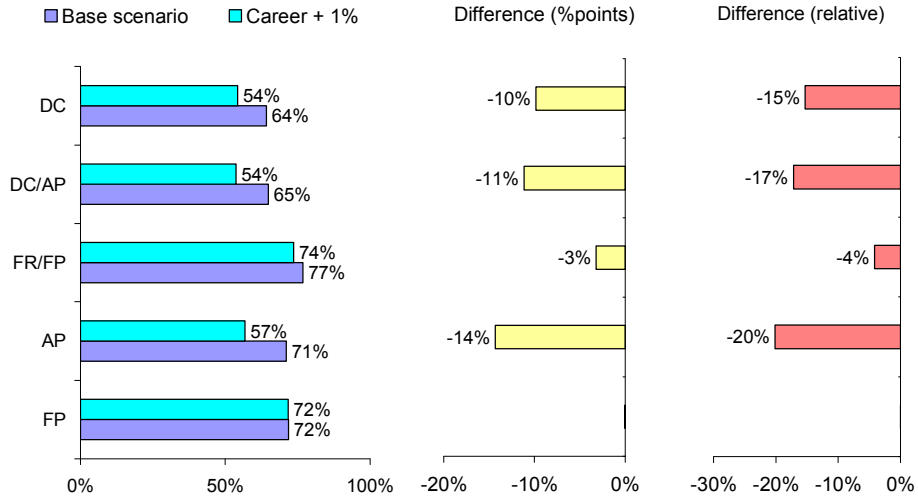
In the sensitivity analysis many elements and variables influence the results. Different variables may have a countervailing effect. Therefore the results of the calculations are sometimes difficult to comprehend and sometimes seem to contradict outcomes that were expected form a "common sense" perspective. Where necessary, for a proper understanding of the results we will discuss the technical details to explain unexpected results. In general, however, we will try to avoid a technical discussion.

Economic scenarios

Higher salary increase

In this scenario the merit (career effect in salary) lies 1 percentage point above the level in the base scenario.

Figure 12: Replacement rate with salary increase + 1%

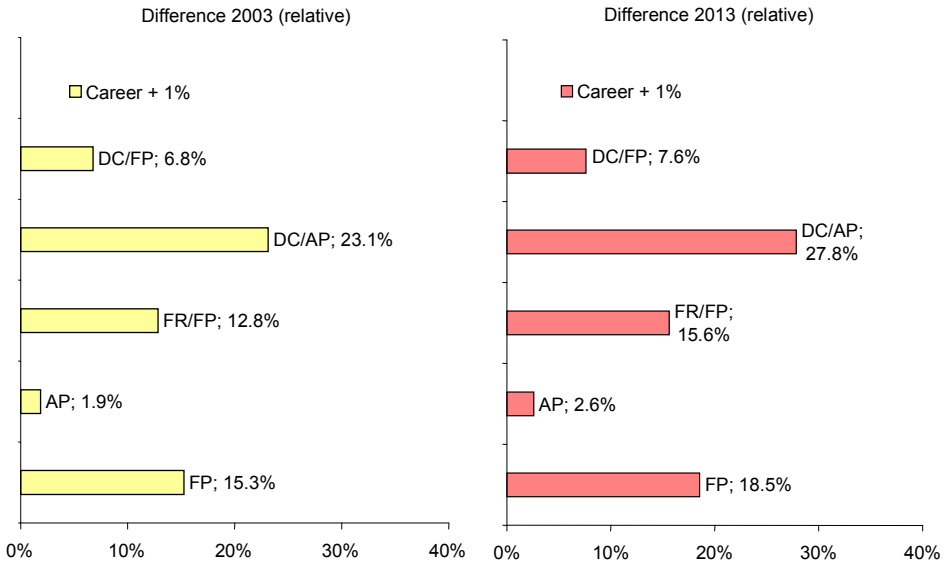

Base scenario
Career + 1%
Difference (%points)
Difference (relative)
DC
DC/AP
FR/FP
AP
FP
54%
64%
54%
65%
74%
77%
57%
71%
72%
72%
-10%
-11%
-3%
-14%
-15%
-17%
-4%
-20%
0%
50%
100%
-20%
-10%
0%
-30%
-20%
-10%
0%

Except for the final pay scheme, a higher career-linked salary increase leads to a lower replacement rate. This is somewhat misleading, however, because a lower replacement rate (benefits as a percentage of final salary) may represent a benefit that is higher in absolute terms than the benefit which is the result of a lower salary increase during the years of service.

In the defined contribution-scheme the replacement rate lags behind due to an increasing gap between the annual increase in salaries and the rate of return (assumed 2% growth rate for GDP). In the average pay schemes, the distance between the average income and the final income increases as the pace of salary increases rises. The final pay scheme does what it promises, linking the old-age pension to the final salary.

The level of protection afforded by final pay schemes has its price, as is shown in the next table. The table shows the relative change in DBO compared to the base scenario for 2003 and 2013.

Figure 13: Defined Benefit Obligation with salary increase + 1%



In general, the changes are in line with the changes in replacement rates, as shown in figure 10. An exception is the relative change in the defined contribution/ average pay scheme (23.1% and 27.8%). Here the extra salary increase results in a larger share for the second pillar average pay scheme in the total pension provision. The second tier produces a larger DBO than the first tier. For that matter, it is important to realise that the figures represent the relative change. The absolute increase in the DBO of the final pay schemes is greater than that of the defined contribution/ average pay scheme.

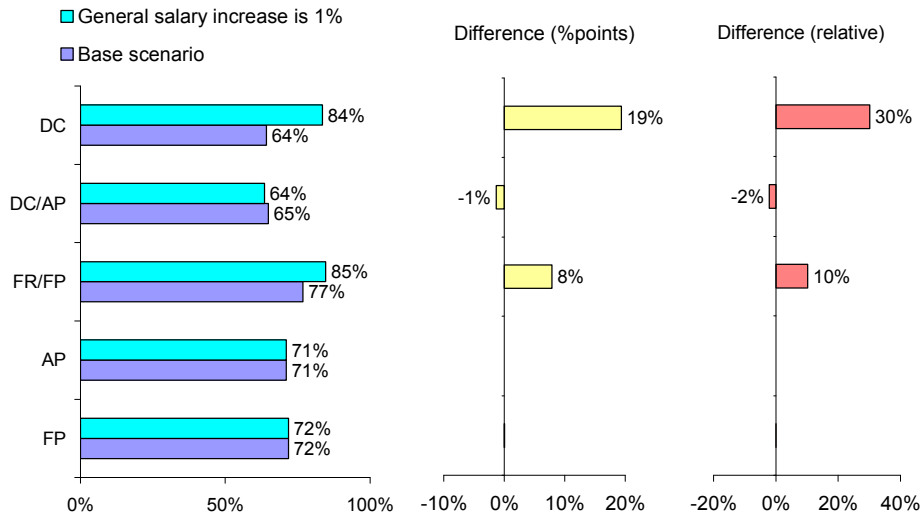
In this scenario, the extra 1% in the career-linked salary increase is applied equally to employees of all ages in the workforce. The differences between the final pay schemes and other schemes are even more significant if the extra salary increase would only be

awarded to older workers. Final pay schemes are very favourable for those who make a career in the autumn of their working lives.

Lower salary increase

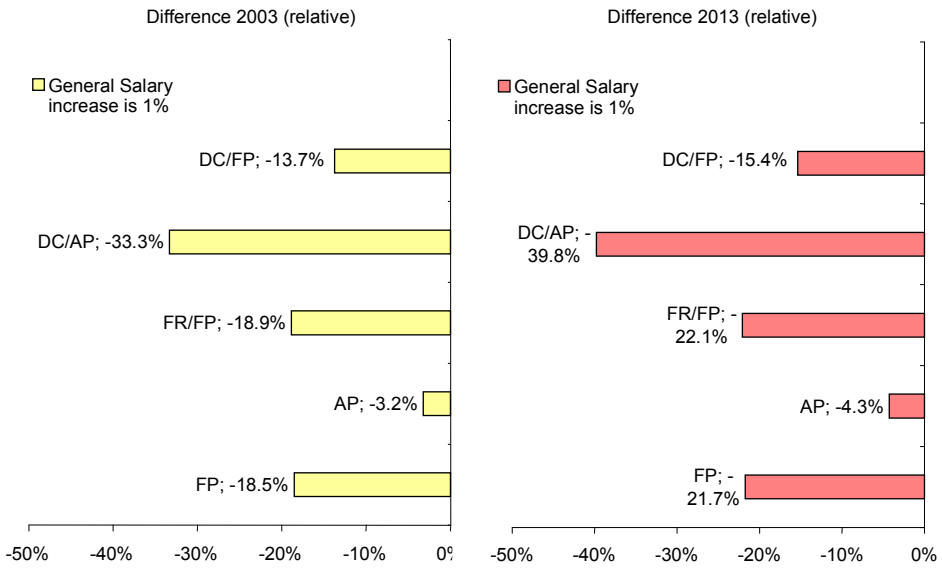
In this scenario the general wage increase is structurally 1 percentage point below the rate of inflation. Although this is a highly unlikely scenario in the long term, this scenario is added to measure the contribution wage restraint may have on the sustainability of pension schemes. Ironically this scenario of impoverishment leads to a higher replacement rate in the defined contribution and average pay arrangements, but again this gives a wrong impression. What happens is that the difference between the average salary during the years of service and the final salary becomes smaller and so the numerator (pension benefits) increases relative to the denominator (final salary).

Figure 14: Replacement rate with salary increase 1% point below inflation rate



The DBO projections mirror the results of the preceding scenario. The wage restraint has a significant impact on the DBO, as well as on the service cost.

Figure 15: Defined Benefit Obligation with salary increase 1% below inflation rate

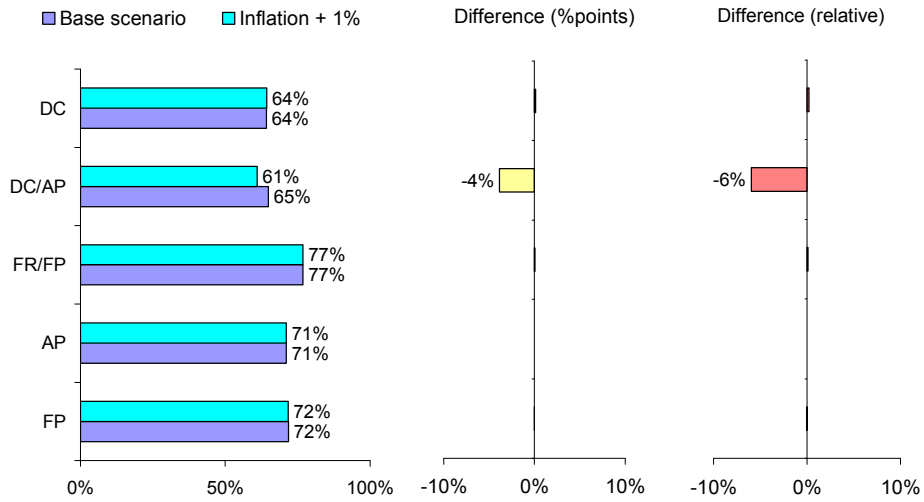


Higher inflation

One should realise that the effects in this scenario have nothing to do with the inflation factor in the pension formulas. In a scenario with higher inflation (3% instead of 2%) the replacement rate remains (almost) unchanged in most schemes, due to the inflation adjustment mechanisms in the schemes.[20]

Figure 16: Replacement rate with 3% inflation

[20] In the defined contribution scheme it is assumed that growth rate of GDP (adjustment criterion during active service period) follows the rate of inflation.



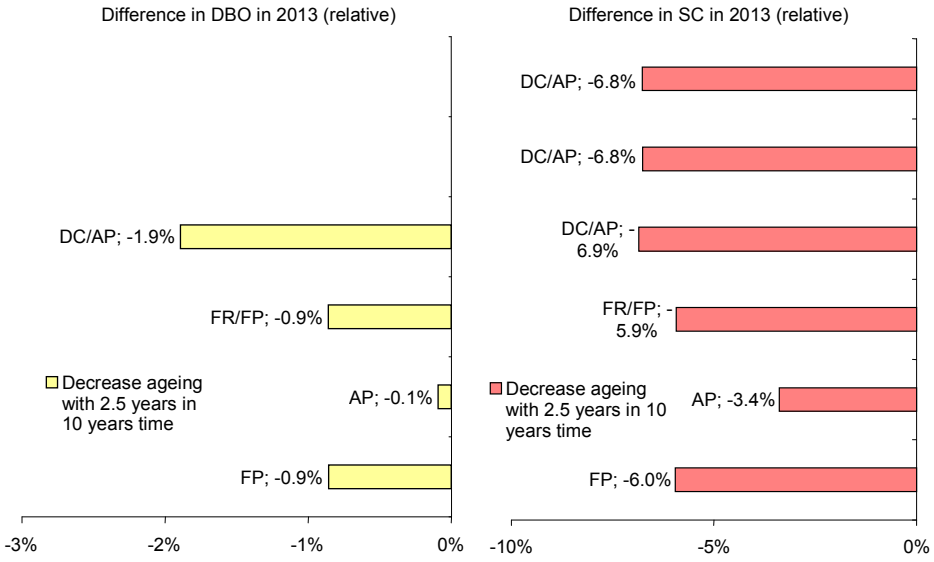
The other side of the story is that this protection against inflation leads to a higher DBO if a higher rate of inflation is assumed.

Demographic scenarios

Ageing

The base scenario already assumes that the average age of the workforce increases by 4 years over a period of ten years. The effect of ageing is shown here by introducing a more moderate rise of the average age: 2.5 years in a period of ten years. Such a scenario could be the result of human resources policies aimed at replacing older workers by younger ones. In the calculation retirees and employees whose employment ceases before retirement are replaced by people who are 25 years old (instead of people in the age group of 25 to 45). The positive effect on the DBO is relatively moderate, because in the 10-year period a large part of the workforce is still aged 45 or older. The impact of rejuvenating HR-policies would be much greater if the turnover of the group above the age of 45 were to be actively encouraged.

Figure 17: Decrease of ageing: relative change of DBO and service cost in 2013



The positive effects on the service cost of rejuvenating the workforce are visible in all types of pension schemes. In the defined benefit schemes, it has a downward effect on the actuarial cost of pensions and in the final pay schemes, in particular, the back service costs are reduced due to a shorter past-service period. In the defined contribution-type plans it is the lower salary that reduces the amount of premiums paid. The effect on the DBO is small, due to the abovementioned effect that the pace of replacing "old for young" is too slow to have a significant effect over the ten-year period.

Increase in the retirement age

The effects on the service cost of an increase in the retirement age by 1 year on the service cost and the DBO is shown in figures 16 and 17.

Figure 18: 1 year rise of retirement age; relative change in service cost

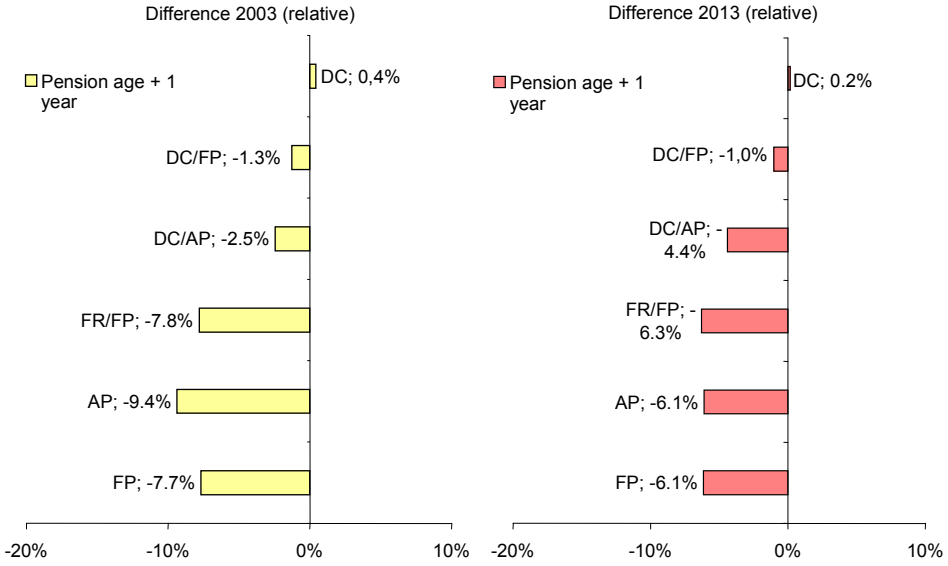
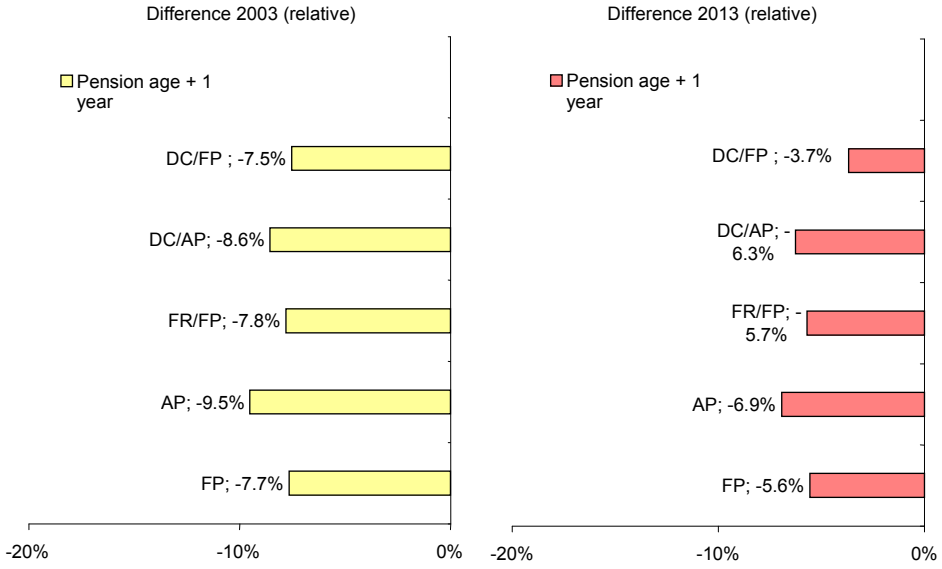


Figure 19: 1 year rise of retirement age; relative change in DBO



The cost reducing effect of setting the retirement age at 66 is substantial, both in terms of defined benefit obligation as in terms of service cost. The cost reduction is the net effect of higher cost due to the premiums paid during the extra year of service and the cost diminishing effect of a shorter period of disbursement (amongst other factors such as mortality). By exception, the service cost increases in the defined contribution scheme. This is the result of the extra year of service which ensures that the contribution level is unchanged. In reality, an increase in the retirement age also results in lower costs in the case of a defined contribution scheme. The level of contributions could then be reduced.

6

Conclusions and Recommendations

Although the key to the sustainability of pension schemes is probably the future rate of economic growth, the growth of the labour force and the rate of increase in worker productivity, there are good arguments not to limit measures aimed at increasing sustainability to general economic policies. Reconsidering the current arrangements for pension provision within the European Union, including the pension schemes for public employees, is equally important.

First of all, the way pension schemes are structured may have a negative effect on the labour market, and therefore on economic growth and the growth of the labour force. A pension scheme with a generous target level and an early retirement age far below 65 is costly. No matter how these schemes are financed, pay-as-you-go, through the state budget (tax based), or by capital funding, the high cost will have an impact - directly or indirectly on labour costs and profits. This has a negative effect on employment. Moreover, early retirement is an important pull factor responsible for the low labour market participation of older workers.

In addition to this argument, it is promising that in most Member States measures have been taken or are being introduced to increase the number of the years of service. Reforms, such as increasing the retirement age, introducing incentives to work longer, the introduction of partial retirement (4 cases), and the creation of occupational (capital funded) schemes, have been initiated in relation to all the issues discussed in this study. Considerable emphasis has also been placed on amending the pension systems. Final pay schemes have been converted into either moderate final pay, average pay or even defined contribution schemes (8 cases in total). It is also true, however, that it takes a long time before the effects of pension reform are felt.

Secondly, pension schemes, at least the defined benefit type of schemes, incur considerable risk. Accumulation of these risks might hinder future economic growth. The effort of protecting individuals against the risk of inflation and longevity may worsen the

economic situation in times of rising inflation and a high economic dependency rate. Risk protection of individuals is, of course, the *raison d'être* for pension schemes and (other) social security arrangements. However, with accumulating risks in the future even the State may find it difficult to fulfil its commitments.
Whether or not it will be possible to change existing and agreed arrangements will depend on legal and political circumstances. It seems preferable to be ahead of such a situation and reconsider current arrangements in time and with care.

Within the European Union the method of "open coordination" is applied with regard to pension reform. In this respect, it seems wise to choose a common framework for the measurement and assessment of cost and of the impact of pension plan reform. Such a framework exists and is, in fact, endorsed by the European Union for companies listed on a European stock exchange: the rules of the International Financial Accounting Reporting Standards or, more specifically, the IAS 19 directive. The importance of the IFRS ruling is the transparency of the balance sheet and the profit-and-loss account for shareholders. The same transparency could be desirable for governments as well, at least for the purpose of comparison. The method used in this study has the following advantages:

- the method is officially prescribed within the European Union for the valuation of the pension obligations of listed companies;
- as such, it is an objective and tried and tested method;
- it is a prospective method, because it makes the future development of the pension obligations visible.

In this study we applied the IFRS framework to a selection of pension schemes. By using the same fictitious census group it was possible to compare the relative size of the defined benefit obligation and the service cost. For a true comparison and evaluation of the situation in different Member States, a valuation based on the real census data would be necessary.

The quantitative analysis revealed number of aspects. Firstly it showed a large difference in the defined benefit obligation of the final pay schemes and schemes of other types. Furthermore, the sensitivity analysis demonstrated that most pension schemes are very sensitive to wage inflation. The sensitivity to salary increases (relative change 15% or more) is much greater than the effect of increasing the retirement age by one year. This also shows that general economic measures – in this case, wage restraint – sometimes have a greater impact than reform of the scheme itself.

A solution for achieving sustainable pension schemes seems to be to rebalance the way risks are shared. The Swedish and Italian systems (but only those systems) are interesting examples, with their notional defined contribution systems and their actuarial transformation coefficient, which restrains increases in costs due to the effects of longevity.

Transferring risks to individuals has its downside, however, and may conflict with the desire to provide adequate income protection. If the State cannot bear the risk, why should it be supposed that individuals can do so? A strategy aimed at increasing the years

of service and reducing the replacement rate to a level that is still adequate may therefore be another sound option.

Reforming pension schemes is more then a financial and technical enterprise. First of all it is a matter of conflicting values and choices for which a solution is imposed on society through the political process.

The urgency of pension plan reform differs from country to country. This study does not yield a clear-cut diagnosis of sustainability of pension schemes in the various Member States. Notwithstanding this conclusion, there are enough indications that several Member States may be in the danger zone. This is the case when different variables coincide: a high level of current government debt, a relatively high projected dependency rate (see table 3, chapter 4), a final pay or even an average pay scheme, a relatively high replacement rate and a reform programme which does not appear to be ambitious enough. Since this study by no means has the intention of levelling criticism at individual Member States, the combination of indicators have not been applied to specific Member States. The study does deliver the ingredients for combining these indicators in this way and applying them to individual Member States.

Appendix A

References

Amina Nasir (Ed.), *Worldwide Benefit & employement Guidelines Eastern Europe.* Geneva: Mercer Human Resource Consulting SA

Amina Nasir (Ed.), *Worldwide Benefit & employement Guidelines Western Europe.* Geneva: Mercer Human Resource Consulting SA

Benallah, S., Concialdi, P., Math, A., *The French Experience of Pension Reforms,* IRES, France

Comité Européen des Assurances, *Pensions 2000-2001,* CEA

Dutch ministry of the Interior and Kingdom Relations (2004). Homepage (http://www.bzk.nl/), 5 august.

European Association of Public Sector Pension Institution. Homepage (http://www.eapspi.org)

EIPA, European Institute of Public Administration / Irish Ministry of Finance, *Implications of Demographic Changes on Pension Systems within the Public Sector of EU Member States*, Dublin, 2004

European Union (2000), *Progress report to the Ecofin Council on the impact of ageing populations on public pension systems,* Homepage (http://europa.eu.int/)

European Union (May 2000), *Study on Pension Schemes of the Member States of the European Union,* Homepage (http://europa.eu.int/)

European Commission, Directorate-General for Employment and Social Affairs (DG EMPLY), *Joint Report by the Commission and the Council on Adequate and Sustainable Pensions*, Brussels 2003

Feldstein, M., en Siebert, H.. *Social security pension reform in Europe.* Chicago: The University of Chicago Press.

Holzmann, R., Orenstein, M., Rutkowski, M., *Pension Reform in Europe: Process and Progress*, Washington: Social Protection Unit, Human Development Network, The World Bank

J. B. Kuné, *Issues in Pension Finance*, Netherlands Foundation for Pension Studies, The Hague 2000.

Klevmarken, N.A., *Swedish pension reforms in 1990's.* Sweden

OECD, *Civil Service Pension Schemes,* Sigma Policy Brief No. 2, OECD: Paris (www.oecd.org/dataoecd/60/52/1820878.htm)

Palmer, E., *The Swedish Pension Reform Model: Framework and Issues*, Washington: Social Protection Unit, Human Development Network, The World Bank

Rother, P.C., Catenaro, M., Schwab. G., *Aging and Pensions in Euro Area Survey and Projection Results*, Washington: Social Protection Unit, Human Development Network, The World Bank

Soede, A.J., Vrooman, J.C., Ferraresi, P.M., Segre, G., *Unequal Welfare States; Distributive consequences of population ageing in six European countries,* SCP: The Hague, 2004

The Pension Service, Part of the Department for Work and Pensions, *a guide to State Pension april 2004,* UK: Department for Work and Pensions

UK Civil service-pensions.
Homepage (http://www.civil.service-pensions.gov.uk/Menu.asp) 11 July 2004

US Census Bureau (2004). Homepage (http://www.census.gov), 8 June 2004.

Whitehouse, E., *OECD social, employment and migration working papers No. 9 The value of pension entitlements: a model of nine OECD countries,* OECD.

Appendix B

Assumptions

Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities under the schemes.

Table 6

	Assumptions
Discount rate	5.25% per year
Rate of return on assets DC schemes	See table 7.
Start salary replacement ratio's	Country dependable
Salary increase	See table 8.
Wage Index	2.50% per year
Consumer Price Index	2.00% per year
Mortality	GBM/V 1995-2000 -2 /-1.
Disability	0% per year
Withdrawal	Decreasing from 5% to 0% at the age of 60.
Expenses DC scheme	10% per year
Retirement age	See appendix C (normal retirement age)
Age difference	A male is assumed to be 3 years older than his spouse
Contributions	At the end of the year
Contributions DC old age pension	For DC schemes with a contribution with the disability pension included. We assume that the disability pension is equal to 70% old-age pension.

Table 7

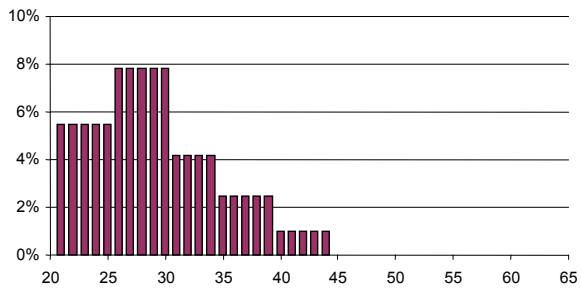
Age	Rate of return on assets in DC schemes
from 25 to 30	7.20% per year
from 30 to 40	6.40% per year
from 40 to 50	5.60% per year
from 50 to 60	4.80% per year
from 60 to retirement age.	4.00% per year

Table 8

Age	Carrier effect on salary
from 25 to 35	3.00% per year
from 35 to 45	2.00% per year
from 45 to 55	1.00% per year
from 55 to retirement age	0.00% per year

Age distribution of new hires

Figure 20



Glossary

Actuarial Accrued Liability. The portion of the present value of prospective benefits allocated to service before the valuation date in accordance with the actuarial cost method.

Actuarial Cost Method. Sometimes called "funding method," a particular technique used by actuaries for establishing the amount and incidence of the annual actuarial cost of pension plan benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily, the annual contribution to the plan comprises the normal cost and an amount for amortisation of the unfunded actuarial accrued liability.

Actuarial Present Value. The current worth (on the valuation date) of an amount or series of amounts payable or receivable in the future. The actuarial present value is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Discount Rate. Also referred to as the "settlement rate," the discount rate represents the employer's estimate (as of the valuation date) of the interest rate at which pension benefits could be effectively settled. Assumed discount rates are used in the measurement of the present value of the obligation.

unrecognised past service cost, amortisation of the unrecognised transition amount, amortisation of gains and losses, along with settlement and curtailment charges (if any).

Fair value of plan assets. The assets out of which the obligations have to be settled, measured at their market value.

IAS 19 (Statement of International Accounting Standards No. 19). The accounting standard governing an employer's accounting for employee benefits.

Interest Cost *(component of net periodic pension cost)***.** The increase in the present value of obligation due to passage of time.

Present Value. Sometimes called "actuarial present value," the current worth (on the valuation date) of an amount or series of amounts payable or receivable in the future. The present value is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Sustainability of pension schemes

Ministry of the Interior and Kingdom Relations

Report November 2004

MERCER
Human Resource Consulting

Mercer Human Resource Consulting
Marten Meesweg 50 – NL 3068 AV Rotterdam
P.O. Box 84132 – NL 3009 CC Rotterdam
Netherlands
Tel +31 10 28 97 544 - Fax +31 10 28 97 598
joost.de.winter@mercer.com
www.mercerHR.com