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Sustainability of pension systems in Europe – the demographic challenge

Groupe Consultatif Actuariel Européen Position Paper

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Executive Summary

1. Most countries in the European Union (EU) are experiencing serious challenges to their pension systems, arising in large measure from the demographic ageing of the population. Populations are ageing because of relatively low birth rates and rapidly increasing expectation of life, particularly at older ages. The impact of ageing on national social security schemes is a matter of considerable concern in terms of financial sustainability, but sustainability in financial terms has to be balanced with adequacy of pension benefits and with political sustainability.
2. Although national social security schemes may be financed on a pay-as-you-go basis and private complementary pension schemes are most often funded in advance, all pension benefits represent a transfer of resources from the working population to the retired population and are affected in different ways by the ageing population and longer life-spans.
3. Many EU countries are facing very high levels of public expenditure on social security, with the situation becoming progressively more challenging over the next 50 years. Some countries have already introduced major reforms but more needs to be done to make the situation sustainable. Different analyses have been published which seek to identify which countries have the more sustainable systems, using a variety of different criteria. For the purposes of this paper we adopt a pragmatic approach to what is sustainable, without seeking to apply formal measures. Views on what is sustainable (and what is adequate) will inevitably vary from member state to member state, reflecting culture and current structures.
4. In this paper we report on some significant components of social security reform which may be considered to have contributed to more sustainable systems. There is no reform panacea which can be applied to all situations, since each country has unique history and characteristics, even when there is political will to work towards greater harmonisation.
5. The Groupe Consultatif, representing the actuarial profession in Europe, published an important study on Security in Occupational Pensions in 2010 and has been actively engaged with EIOPA in the response to the Commission's Call for Advice on revision of the IORPs Directive. However, actuaries also work in the financing of national social security schemes and on pension reform issues and the Groupe Consultatif believes that actuaries can make a useful contribution to the debate on sustainability and adequacy of pension systems, as well as to the technical aspects of demographic and financial projections.
6. At the international level the actuarial profession has been developing standards of practice for social security actuaries, which are supported by the International Social Security Association and the International Labour Office. The Groupe Consultatif supports the promulgation of good practice in social security evaluations within the EU.
7. One aspect of addressing financial sustainability may be the need to raise retirement age. However, to maintain the old-age dependency ration in 2050 at levels similar to those in 2010 is likely to require the retirement age to rise by as much as 10 years in some countries. To keep the expectation of life at retirement age constant could require the age at retirement to increase by over 1.3 years per decade for males and almost 1.2 years per decade for females.

8. The shift from defined benefit to defined contribution structures, both in the private funded sector of pensions and in national social security schemes with the introduction of Notional Defined Contribution, improves incentives to contribute for longer and to retire later. It also enables part of the cost of financing benefits up to an increasingly high average age to be passed on to the recipients of the pension benefits. However, defined contribution passes most of the risk to the members, which creates more uncertainty about retirement income.
9. Various forms of automatic balancing mechanisms have been introduced and provide some greater assurance of financial sustainability. However, the other side of the coin is that they entail reductions in benefit entitlement. Neat technical solutions cannot remove the need for democratic debate about achieving the most appropriate balance between financial sustainability and adequacy of incomes for the retired population.
10. Private funded pension arrangements provide an important diversification of structure and of risk. These are considerably more developed in some countries than others, but are generally considered to be part of a balanced approach to reforming pension systems. They have their own challenges of governance, affordability and fairness, particularly in the more difficult economic and investment environment in which we now find ourselves. Plans to revise the IORPs Directive will seek to address some of these issues and the Groupe Consultatif will continue to be actively involved in those developments towards a more sustainable private pension system in the EU.
11. In short, the issue of demographic ageing is an important one for our societies and, in particular, for the financing of retirement income (and, of course, health and long term care, although that is beyond the scope of this paper). The issues are complex and only partly technical, but actuaries have a unique level of expertise relating to understanding future risk and uncertainty, taking a long-term perspective on financing issues, analysing and projecting mortality trends and designing retirement income systems which will meet the objectives of the stakeholders. The actuarial profession in Europe, represented by the Groupe Consultatif Actuariel Européen, looks forward to contributing further to analysis and discussion of these issues.

1. Introduction

- 1.1 Most countries in the European Union (EU) are experiencing serious challenges to their pension systems. One of the main reasons for this is demographic ageing of the population, seen in a steady increase in the expectation of life and a worsening of the ratio of numbers at typical working ages to the numbers above retirement age. There is good evidence that each successive generation is living for longer, something which must be welcomed in principle, particularly if people are enjoying more years of healthy life, which does seem to be the case, although this is more difficult to establish and the evidence is not always clear cut (Jollans, 2011).
- 1.2 The European Union has limited powers to coordinate the form and level of social security and complementary pensions in member states. However, basic social security is a hot topic because of the heavy and growing burden on public expenditure. The cost of financing social security is becoming a significant issue for member states in meeting fiscal targets and ensuring overall economic viability. Recent EU publications focusing on the topic of ageing and the impact on social security include The 2009 and 2012 Ageing Reports (European Commission, 2009, 2012), the Green Paper (European Commission, 2010), the White Paper An agenda for adequate, safe and sustainable pensions (European Commission, 2012) and Pension systems in the EU – contingent liabilities and assets in the public and private sector (European Parliament, 2011).
- 1.3 The Groupe Consultatif has also published a study on Security in Occupational Pensions (Groupe Consultatif, 2010a) as well as responses to the Commission's Green Paper and to EIOPA's draft response to the Commission's Call for Advice on the review of Directive 2003/41/EC. (Groupe Consultatif, 2010b and 2011).
- 1.4 Pensions may be financed through funding in advance and investing the funds, or through pay-as-you-go, whereby the contributions in respect of today's workers (and sometimes from other sources of government revenue) are used to pay the pensions of today's pensioners (and other dependants or recipients of benefit)¹. In either case, although the structure is superficially very different, the payment of pensions depends on the generation of wealth by healthy economies. The investment process does not transfer wealth over time, except possibly by contributing to more sustained economic growth.
- 1.5 Pay-as-you-go pension financing for national social security schemes does not depend on the performance of investment markets, but it does depend on a wider range of demographic and labour market factors than private pension plans. The sustainability of a social security scheme needs to be looked at in terms of the future burden of financing on all those working in the national economy in order to pay the promised benefits to those who are no longer working. When people talk about an ageing population in this context, they are usually implying that there will be fewer workers in future years to finance benefits payable to each pensioner (or other beneficiary).
- 1.6 This aspect of the ageing of a population can be measured, at least in a stylised way, by the progression of the old-age dependency ratio. For simplicity we take this to be the ratio in a given year of the numbers in the population aged 65 and over to the number aged between

¹ In practice there is a continuum of degrees of advance funding.

15 and 65². A more sophisticated calculation would take into account the numbers of people economically active at each age, the numbers drawing a benefit and the amount of benefits in payment. Historic and projected population figures are available for all European countries both from Eurostat and also from the United Nations population database, on a variety of different sets of assumptions.

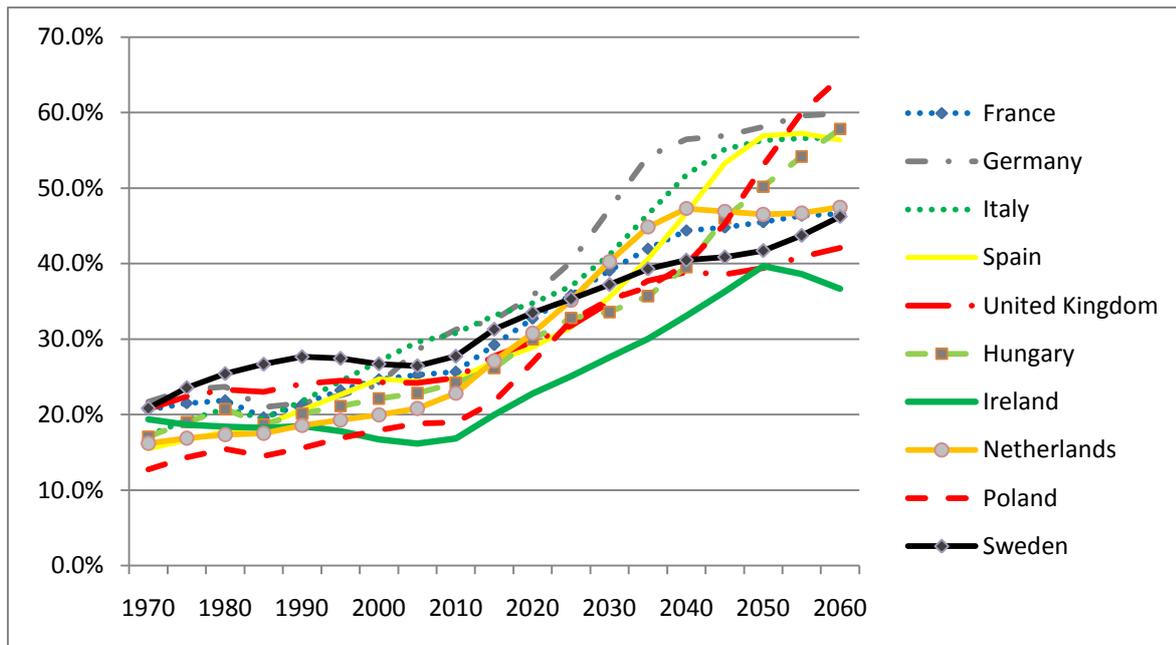
2. An ageing population – the demographic background

- 2.1 Figure 1 shows the progression of this old-age dependency ratio for ten EU countries, with actuals from 1970 to 2010 and projected figures to 2060. These and other projections quoted in this paper are the result of applying a given set of assumptions. Whilst these assumptions are intended to be reasonable ones, and follow substantial analysis and study, the outcome may differ significantly from the projections. To help in understanding the uncertainty, the UN and others who prepare population projections also offer variant projections with different assumptions. In some instances we will also refer to these, in order to give an idea of range of outcomes which would be quite possible.
- 2.2 Appendix 1 shows the old-age dependency ratios projected by Eurostat for each of the EU and EEA countries up to 2060. These are intended to be best estimate projections. It would be possible to envisage much lower projections of the working population and potentially significantly higher projections of the population over 65. The UN projections have low fertility variants which result in old-age dependency ratios some 5 to 7 percentage points higher in 2050. Allowing for a more optimistic development of life expectancy could add at least a further 5 percentage points. So it would be as well to consider that the old-age dependency ratios in 2050 could easily turn out to be 10 percentage points higher than the figures illustrated in Appendix 1.
- 2.3 The old-age dependency ratio did not change particularly rapidly for most countries in the years up to 2000, but from then on the increase projected to 2060 is quite steep. For 15 countries the ratio is projected to rise to more than 55% and for 5 countries to more than 60%, from current levels of around 20 to 30%. 18 countries are projected to see the old-age dependency ratio more than doubling from 2010 to 2060 and the projections for Poland, Romania and Slovakia show the ratio going up by more than three times.
- 2.4 It is also important to note that the ageing of the population takes place sooner in some countries than in others, as illustrated by Figure 1. In Germany, France Netherlands and Italy the old age dependency ratio is projected to reach its peak in 2040 and remain somewhat stable thereafter. By contrast, Hungary, Sweden and Poland are expected to experience further increases in the old age dependency ratio after 2040, higher than those expected to incur before 2040.
- 2.5 The most important contributory factor to this is the exceptionally low levels of fertility (defined as the number of children per woman) reached in these countries, particularly in the period 1990 to 2000. Expectation of life is increasing in all countries and this is expected to continue, although views of experts differ as to whether the rate of increase will be maintained (or indeed whether it might even get faster as a result of breakthroughs in medical and genetic research).

² This is already a simplification as not all countries have a pension age of 65. As pension age is increased in different jurisdictions this may become less useful as a formal measure.

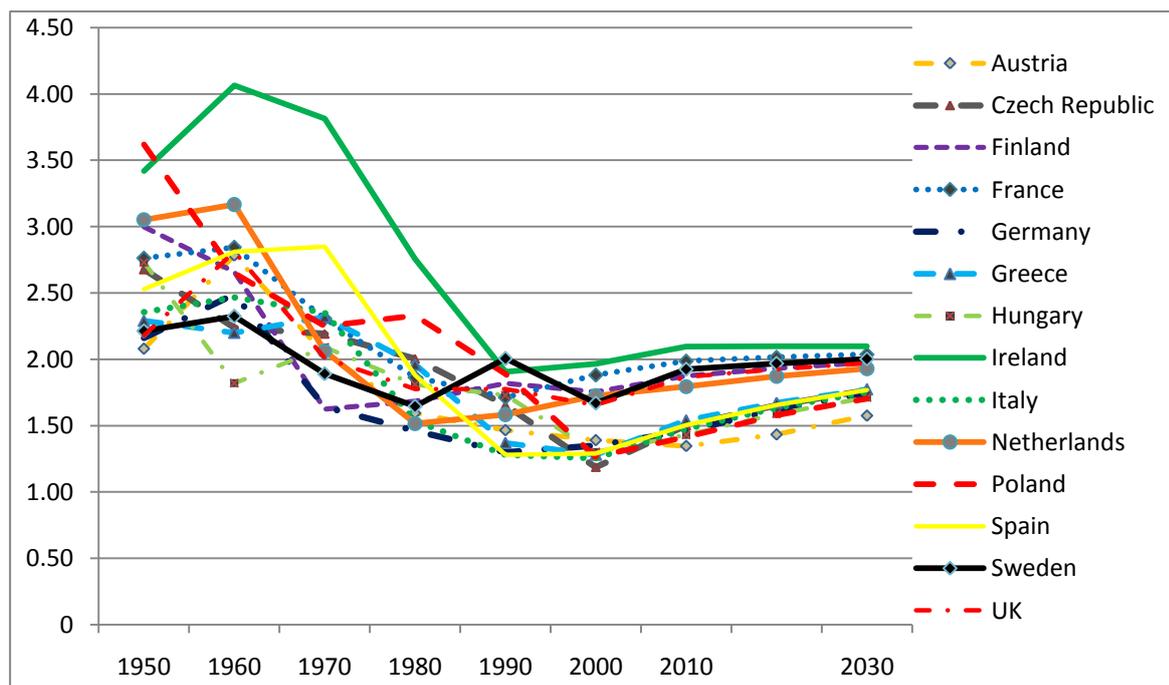
2.6 The other factor which can assist (or hinder) a healthy development of the old-age dependency ratios is migration. Significant inwards migration at working ages reduces the old-age dependency ratio, even though some of the migrants will eventually form part of the elderly population in later years. This is an important factor contributing to the somewhat less adverse projected development of dependency ratios in the United Kingdom (UK). Other countries, such as Poland, are seeing the other side of this coin, with net outwards migration at working ages exacerbating the development of old-age dependency ratios.

Figure 1 Old-age dependency ratios in selected EU countries 1970-2060



Source: UN Population Projections, 2010 Revision and Eurostat

Figure 2 Graph of Total Fertility Rates, 1950 to 2050



Source: UN Population Projections, 2010 Revision

- 2.7 Figure 2 illustrates the total fertility rate for a selection of EU countries from 1950 to 2010, and projections to 2050. It should be noted that the UN medium variant projection, from which these figures are taken, assumes that in the long term the total fertility rate for European countries will asymptotically approach 2.1, the theoretical replacement level, at which a population without migration would sustain itself. In practice only Ireland has remained at or above this level in recent years. A more complete set of data for total fertility rates is presented in Appendix 2.
- 2.8 Although the development of old-age dependency ratios is a helpful concept for looking at the sustainability of national social security schemes, it is not so useful for private pension plans. A more relevant indicator is the expectation of life of a member at retirement age. Expectation of life at age 65, say, is the average of all the possible periods for which someone currently aged 65 could live, from dying immediately to living for 50 years (or even more). It is not the same as subtracting 65 from the expectation of life at birth, since it is conditional on the individual having already survived to 65. When expectation of life at 65 (or any other age) in a particular year is quoted, it is generally derived from the mortality rates at all different ages in that year. This makes it a somewhat artificial concept, as these are not the mortality rates which would actually be expected to apply to a group of people aged 65 today. The resulting figure is called the period expectation of life.
- 2.9 To calculate the expectation of life that someone aged 65 in 2012 will experience requires a projection of the mortality rate in 2012 for someone aged 65, the rate in 2013 for someone aged 66 and so on, up to the rate in 2062, say, for someone then aged 115. This is known as the cohort expectation of life, which provides a more useful indicator of what it would cost to buy an annuity for a 65 year old or to estimate the present value of the liability of a defined benefit pension plan to pay a pension to a 65 year old for the rest of their life. Unfortunately, this data is not readily available for most countries and it involves making assumptions about how mortality rates will evolve in future, rather than just using historical data. We recommend that much more emphasis should be placed on publishing cohort expectations of life instead of period expectations.
- 2.10 To illustrate improvements in expectation of life, Figures 3 and 4 show the historic development of period expectations of life at birth for males and females for a selection of European countries, together with long-term future projections. Figure 5 shows the historic and projected development of cohort expectations of life at age 65 for males and females for the UK, for which complete data is publicly available on both a period and cohort basis. Figure 6 compares the period expectations of life at 65 for future years with cohort expectations of life for those attaining age 65 in each future year. If this is the reality in all countries of the EU, as seems probable, the consequential increase in cost will represent a huge challenge for the financing of private pensions.

It is a given that people are on average living to much higher ages. Even the published projections suggest huge challenges to the financing of pensions unless retirement ages are increased. However, future improvements of expectation of life are uncertain. They could turn out to be much greater than the official projections. Pension systems need to be robust enough to be able to survive even greater ageing of the population than we have seen up to now. Migration is also very uncertain and for some countries the loss of working population through emigration will have a significant impact on financing social security. Employers and employees need to plan for later retirement and a more flexible approach to working at higher ages. There is no doubt that pensions will need to be financed for much longer periods in future and we need to plan for this.

Figure 3 Period expectation of life at birth, 1950-2090, Males

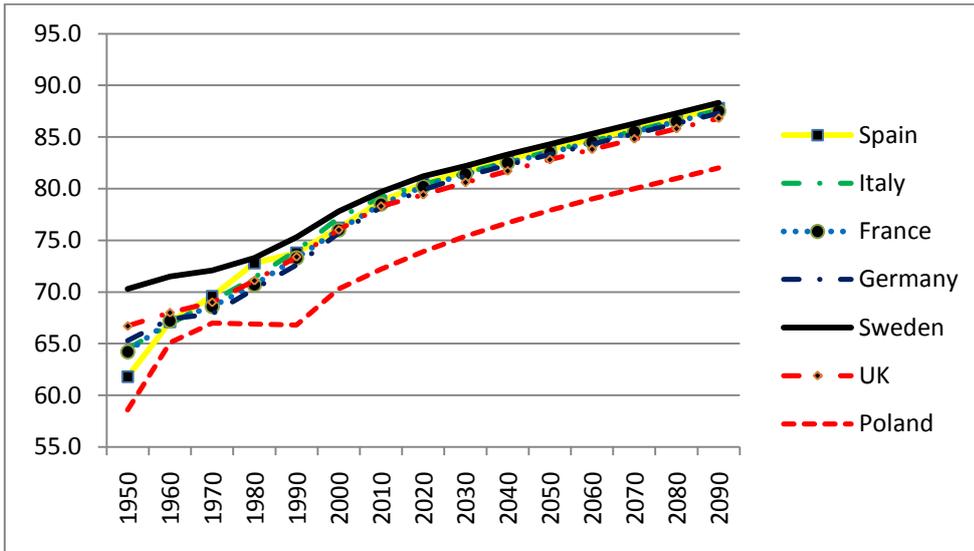


Figure 4 Period expectation of life at birth, 1950-2090, Females

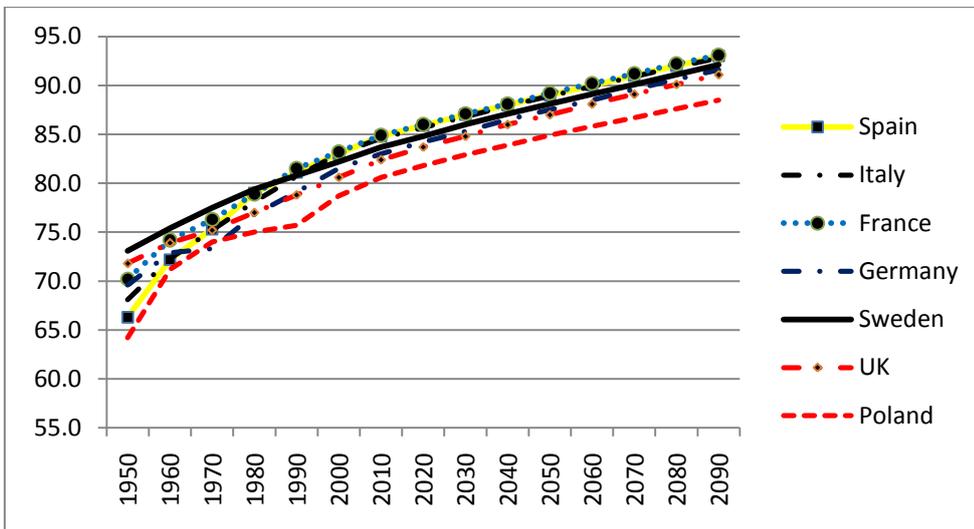


Figure 5 Expectation of life at 65 according to the mortality rates experienced or projected for cohorts reaching 65, 1850-2060, England & Wales

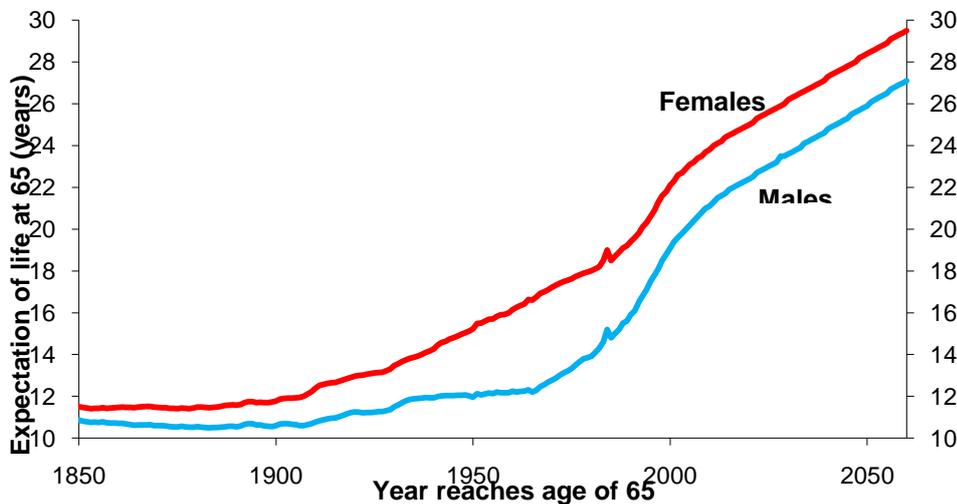
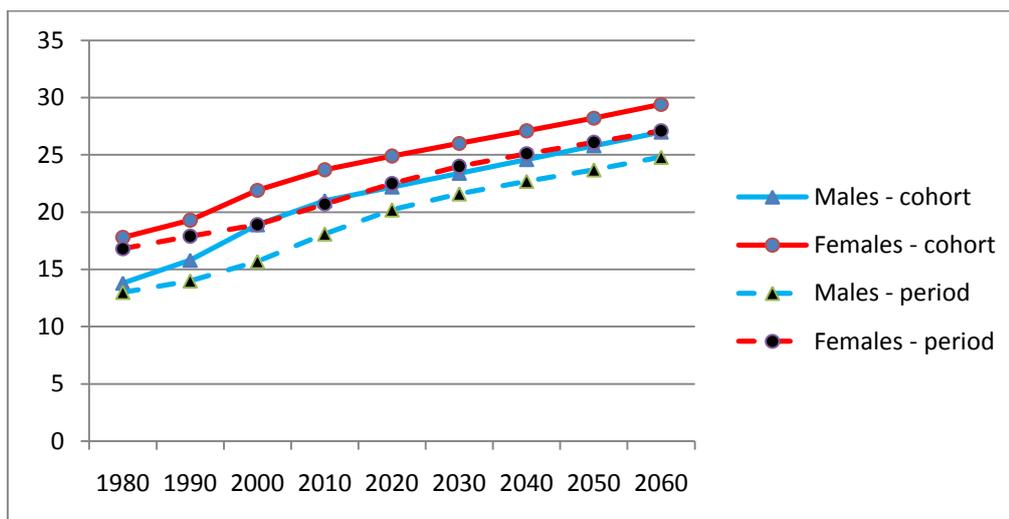


Figure 6 Period expectations of life at 65 from 1980 to 2060 and cohort expectations of life for those attaining age 65 from 1980 to 2060, England and Wales



3. The impact of demographic ageing on pension systems

- 3.1 The net effect of these demographic changes on the financing of social security is shown in Table 1, taken from The 2012 Ageing Report (European Commission, 2012), which gives the expenditure on social security pensions as a percentage of GDP in 2010 and in 2060.
- 3.2 The impact is quite striking, with 23 of the 27 countries in the EU expected to be spending more than 10% of GDP on social security pensions by 2060 (and another two very close to that), compared to 14 in 2007. Five countries expected to see an increase of spending of more than 5% of GDP between 2010 and 2060. This picture is not as adverse as that shown by The 2009 Ageing Report, which indicates that actions are being taken to reduce the upward pressures on social security expenditure. Five countries are now projecting decreases over the next 50 years in the percentage of GDP allocated to pensions.
- 3.3 A feature of most social security systems has been the existence of a fixed retirement age – or age at which people become entitled to pension. If retirement dependency is measured by comparing numbers over a fixed retirement age with numbers below that age (and above the deemed age of the start of working life, be that 16, 18, 21 or some other age), then increasing life expectancy and reducing fertility will naturally result in worsening dependency ratios. Another way of looking at it is to work out the retirement age needed in each future year which would maintain the dependency ratio at current levels. Table 2 below gives the projected ages which would apply in 2050 in order to maintain the old-age dependency ratio (based on a pension age of 65) at the 2010 level.
- 3.4 Whilst increasing longevity and a moderation in overall population growth might be welcome from the perspective of quality of life, the impacts of these developments present a challenge for the financing of pension systems. Whether these are organised on a pay-as-you-go (*répartition*) basis or on a funded (*capitalisation*) basis, the economics effectively entails the resources needed to support those not economically active (in broad terms those over retirement age) being generated by the wealth-producing activities of those who are economically active (in broad terms those who are of working age, excluding those in education, sick or unemployed).

- 3.5 Maintaining the old-age dependency ratio constant may not be possible or necessarily desirable. The variations by country are not solely the result of differences in life expectancy but also reflect different history of the development of the population, such as the impact of the baby boom after the second world war and up to the mid-1960s.
- 3.6 There are several ways to address the demographic challenge but most of them are difficult to achieve, are politically controversial and have complex wider implications. Examples of outcomes which could in the short to medium term reduce the adverse impact of an ageing population would be higher numbers of births and greater levels of inward migration at working ages. However, there are social and political implications of adopting specific population policies with a view to achieving these outcomes, which go far beyond pensions and are not discussed in this paper. It is also worth noting that policies intended to increase births or inwards migration may only be effective for a period in easing the pressures of an ageing population, and that additional pension liabilities may be created for the longer term.
- 3.7 Other policies might address directly the issue of retirement age and longevity:
- raising the effective age of retirement by encouraging people to retire later;
 - reducing the cost of pensions by decreasing the level of pension to offset the longer period of time for which they will on average be paid; and
 - reducing the incidence of early retirement by making more stringent the conditions for taking an early pension, e.g. on grounds of disability.
- 3.8 Another indirect policy response to the demographic challenge is greater pre-funding through setting up of pension reserve funds or paying down of national debt. In essence through such an approach some of the costs of the population ageing are brought forward to allocate them over longer periods and across generations.
- 3.9 There is much talk about the sustainability of pension systems, but no unique way of defining or measuring this. A traditional academic measure of sustainability was that the implicit rate of return on pension contributions should be at least equal to the growth in average earnings subject to contributions plus the rate of growth of employment. With falling numbers in the working population this type of measure would most likely show all EU pension systems to be unsustainable. Another measure involves looking at the income from contributions compared to the expected outgo on benefits – what might be described as the pay-as-you-go equilibrium. However, also on this basis few countries can foresee sustainability, with there being a necessity for contributions to be increased or benefits to be reduced (or retirement age increased). Here sustainability will be a factor of to what extent contributions can be increased whilst still being at a level acceptable to the working (and voting) population. More effort is needed to define measures of sustainability and the Groupe Consultatif intends to conduct further work in this area.
- 3.10 It is also evident that sustainability cannot be considered solely as a financial or technical measure, because changes necessary to achieve sustainability must be politically acceptable. Alternative sources of income to contributions may be found from general tax revenues (and some countries finance their pension system from general tax revenues anyway) but here also there is a question of what is acceptable to the electorate and economically feasible.
- 3.11 Furthermore, the question of sustainability is inextricably linked to the question of adequacy

of benefits and whether the pension system is achieving the ultimate goal of providing a reasonable income to people in their retirement. Adequacy can also be measured in different ways, whether it be setting in broad terms a relationship between standard of living in work and standard of living in retirement, or attempting to measure sectors of the population who are at risk of poverty, as defined in some way. These questions of adequacy and sustainability are discussed in considerable technical detail in the European context by OECD (2012) and are also referred to in the questions asked in the Green Paper (European Commission, 2010). For the purposes of this paper we adopt a pragmatic approach to what is sustainable, without seeking to apply formal measures. Views on what is sustainable (and what is adequate) will inevitably vary from member state to member state, reflecting culture, history and current structures.

Table 1: Public pension expenditures in 2010 and 2060, gross in % of GDP

Country	Total expenditure on social security pensions as % of GDP		Increase in % of GDP spent on pensions	Improvement since 2009 Ageing Report (% of GDP)
	<u>2010</u>	<u>2060</u>	<u>2010-60</u>	
Austria	14.1	16.1	2.0	-2.5
Belgium	11.0	16.6	5.6	-1.9
Bulgaria	9.9	11.1	1.1	0.2
Cyprus	7.6	16.4	8.7	1.3
Czech Republic	9.1	11.8	2.7	-0.8
Denmark	10.1	9.5	-0.6	-0.3
Estonia	8.9	7.7	-1.1	-2.8
Finland	12.0	15.2	3.2	-1.8
France	14.6	15.1	0.5	-1.1
Germany	10.8	13.4	2.6	-0.6
Greece	13.6	14.6	1.0	9.5
Hungary	11.9	14.7	2.8	-0.9
Ireland	7.5	11.7	4.1	-3.1
Italy	15.3	14.4	-0.9	-0.8
Latvia	9.7	5.9	-3.8	-0.8
Lithuania	8.6	12.1	3.5	-0.7
Luxembourg	9.2	18.6	9.4	5.3
Malta	10.4	15.9	5.5	-2.5
Netherlands	6.8	10.4	3.6	0.1
Poland	11.8	9.6	-2.2	-1.6
Portugal	12.5	12.7	0.2	0.7
Romania	9.8	13.5	3.7	1.0
Slovakia	8.0	13.2	5.2	-3.0
Slovenia	11.2	18.3	7.1	0.3
Spain	10.1	13.7	3.6	1.4
Sweden	9.6	10.2	0.6	-0.8
UK	7.7	9.2	1.5	0.1
Norway	9.3	14.2	4.9	
EU27	11.3	12.9	1.6	2.4
EEA	12.2	14.1	2.0	

Source: The 2012 Ageing Report (European Commission, 2012), Table 2.5

Table 2 Pension age in 2050 to maintain old-age dependency ratio at 2010 level

Spain	76.0
Netherlands	75.5
Ireland	75.0
Italy	74.7
Poland	74.3
Germany	73.9
France	72.8
Hungary	72.1
United Kingdom	71.7
Sweden	71.3

Source: Own calculations based on UN 2010 Population Projections, 2010 Revision

4. Design issues

- 4.1 Although all EU countries are experiencing population ageing to a greater or lesser extent, not all pension systems are subject to the same stresses and challenges. This is because some pension system designs are better suited to cope with the changing demographics. This depends first of all on whether the pension scheme is pay-as-you-go or funded (or partially funded or a mixture) and whether the design is defined benefit (DB) or defined contribution (DC) or with some characteristics of each.
- 4.2 A DB pension is characterised by having the amount of pension, or the formula by which it is to be calculated, set out in advance, requiring financing to be adjusted, in one way or another, to meet the cost as it emerges, which will depend on how long people live and may also depend on earnings growth, adjustment of pensions in payment, investment returns (in the case of funded pension schemes) and dependency ratios (in the case of pay-as-you-go pension schemes).
- 4.3 A DC pension is derived directly from the contributions paid in. In the case of funded DC pensions, the benefit will depend, either directly or indirectly, on investment performance, albeit in some cases there may be guarantees offered, for example of the capital invested, or even a minimum rate of return. In the case of pay-as-you-go DC pensions, the benefit may depend on the application of an economic adjustment factor (such as indexation in line with an earnings index or national wage mass) or may depend on the definition of the value of the pension purchased with the accumulated amount (such as the value of the pension point with the French complementary schemes).
- 4.4 In general terms DB schemes are typically less easily adapted to changing demographic economic circumstances, since the benefit promises are fixed well in advance and financing generally needs to follow the emerging cost of benefits. In DC schemes the contributions paid by definition determine the resources available and benefits are adjusted accordingly, either as a result of investment performance, or the triggering of guarantees (which need to be financed from an external source unless a premium has been charged to fully cover the economic cost of providing the guarantee) or through the annuitisation process (the way in which accumulated assets are used to purchase an annuity).

- 4.5 Although DC designs may be less challenging from a public financing point of view, there is normally a much greater level of risk for the members. Investment returns may be lower than expected, and may vary a great deal according to the period of investment, resulting in greatly different returns for different cohorts or generations. Furthermore, general improvements in longevity and falls in interest rates will be reflected in a worsening of terms for annuitisation. In other words, the fact that a generation is expected to live longer on average impacts directly on the annual amount of pension that pensioners in that generation receive, even if the expected value of the benefit remains the same.
- 4.6 Annuitisation may also appear costly for the member, unless there is a really transparent and competitive immediate lifetime annuity market (also referred to as pay-out annuities), which is not the case at the moment in many EU countries.
- 4.7 DB pensions could introduce some similar flexibilities, although this was not envisaged in the original design of most existing systems. The benefit could be defined as a lump sum payable at retirement age, with an annuitisation process analogous to a DC pension. Revaluation, either of accruing rights or of pensions in payment, may be made subject to investment returns or demographic factors (or both). Adjustment factors may be introduced, with a view to keeping the finances in balance. The implementation of changes along these lines may be needed in order to secure greater sustainability, although there may be political and legal limitations on the extent to which existing entitlements can be changed.

5. Sustainability of pension systems

- 5.1 Much has been written about the sustainability of different pension systems. Several different authors and firms have published studies which rank countries by the sustainability of their pension systems. The different studies by no means come up with consistent rankings. This is because sustainability is at least as much a matter of perception as fact – and there are many facets to sustainability. Some pension systems rank highly on financial sustainability but a consequence may be that pension levels will be low, or significantly reducing, thus raising the question as to whether they will be politically sustainable. If benefits are reduced to offset the impact of demographic ageing, will the point be reached where there will be a strong political reaction that the benefits are unacceptably low?
- 5.2 Other facets of sustainability are whether the economy of the country is strong enough to absorb higher pension costs, and whether the current level of benefits from public and private sources is high enough to permit a reduction in benefit levels, whilst still providing an adequate retirement income.
- 5.3 The 2011 Pension Sustainability Index study published by Allianz Investors covered all EU countries and 17 other countries. Greece came out as the least sustainable, followed by India and China. The low position of Greece related in part to the sovereign debt crisis and the severe problems affecting the economy but also reflected two other key problem areas – low effective retirement ages and very high levels of benefit promises through a publicly financed pay-as-you-go system in the light of a rapidly ageing population prognosis.
- 5.4 Many other EU countries were registered as being in the danger zone, including Spain, Italy, Hungary, Slovenia and Portugal. These countries are there for different reasons, including the fiscal and economic outlook but also because in most cases there are quite

generous benefit promises and relatively low retirement ages, resulting in benefit commitments which may not be sustainable. Hungary shows some differences, as it has undertaken significant reforms with the introduction of a funded second pillar (and third pillar) in order to reduce pressures of the rather expensive social security system, but these changes have recently been reversed, making the prognosis for the future rather uncertain.

- 5.5 If we look at the other end of the spectrum we find high positive rankings for Sweden, Denmark and Netherlands, followed by Finland, Latvia, UK and Estonia. These all have rather different social security systems. Sweden underwent fundamental reform in 1994 and has introduced a notional defined contribution scheme with strong automatic balance mechanisms to enforce financial stability. Political sustainability, once the automatic balance mechanisms bite, may be more in question. Denmark, Netherlands, Finland and the UK all rely substantially (albeit with significant structural differences) on a basic flat-rate pension (or pension guarantee in the case of Finland) which is independent of earnings levels during the working life. This provides effective protection against poverty in retirement and offers a strong platform on which to develop either funded or pay-as-you-go earnings-related pensions. In Appendix 3 to this paper we provide a brief pen picture of the social security pension systems of each of these countries.
- 5.6 The Global Aging Preparedness Index, most recently updated in October 2010, includes only 8 EU countries out of the 20 countries in the survey. It ranks countries separately on a fiscal sustainability index and an income adequacy index. Netherlands comes out top on income adequacy and almost bottom on fiscal sustainability. The rankings in this study raise some interesting questions, with the UK coming high on income adequacy and well down the table on fiscal sustainability, whereas most commentators have seen it the other way round!
- 5.7 The third such study is that published by benefit consultants Mercer, most recently in October 2011. This analyses 16 countries (including 6 from the EU) according to these different sub-indices: adequacy, sustainability and integrity. The last of these is somewhat different from anything covered by the other published studies, and relates to the integrity of the private sector pension system. The Netherlands and the UK are ranked high on this sub-index and, together with Sweden, perform well on the overall index, which is a weighted combination of the three sub-indices (40% adequacy, 35% sustainability and 25% integrity).

6. Significant reform measures

- 6.1 The Groupe Consultatif would hesitate to prepare its own sustainability index, as many of the factors involved are political in nature and sustainability involves perceptions and value judgements as well as facts. As an independent and objective commentator, representing some 20,000 individual actuaries, many of whom work day by day with public and private sector clients on social security and pension sustainability and design issues, we would offer a few comments on some effective elements of reform which have been or are being implemented in different countries and which have the potential, in combination with other design elements, and given appropriate economic and demographic conditions, to make systems more sustainable in the long term.
- 6.2 Given that financial sustainability and social sustainability (adequacy) are the opposite sides of the same coin, countries should aim to maintain an adequate balance between financial

sustainability and pension adequacy in the long-term. A well-designed and integrated national pension policy should aim to mitigate the risk of poverty in old-age and secure an adequate pension income which would allow old-age pensioners to maintain, to a reasonable degree, the standard of living they used to enjoy before their retirement. However, the weight given to these different objectives and the extent to which they are achieved through public and private elements of the pension system, will vary greatly from country to country.

- 6.3 There is no one-size-fits-all retirement income system design for all countries. A good system can be constructed with different mixes of the general design types of social security schemes in varying degrees taking into account countries' different weights on their pension policy objectives, economic and demographic circumstances, fiscal positions and implementation capabilities.
- 6.4 Public pension systems play a key role in protecting the elderly from poverty, while accomplishing other public pension objectives, by guaranteeing a minimum income security for all and therefore securing a minimum, basic level of standard of living at retirement.
- 6.5 Poverty relief objective can be achieved through a number of different social security instruments, but the chosen approach should, at minimum, ensure that a universal coverage is achieved.
- 6.6 Income maintenance objective can be achieved through appropriate employment-based, earnings-related pension provision via a public social security scheme and/or private occupational complementary funded pension schemes typically with mandatory or quasi-mandatory participation.
- 6.7 A common element in several of the systems considered to be more sustainable is to have a significant flat-rate element in the national pension, i.e. independent of an individual's career earnings history or contributions made. This provides protection for lower earners in a more affordable and targeted way than earnings-related pension designs. In Denmark and Netherlands this is based on a residence qualification, which is easy to administer, although it has the disadvantage that it may discriminate against immigrants. Entitlement to the UK's basic pension is based on the quality (and not the quantity) of the contribution record, but there are generous provisions to grant credits to those out of the workforce for various reasons, the qualifying entitlement period is short relative to a normal working life, and partial pensions are available for those with incomplete contribution records.
- 6.8 Finland has a primarily earnings-related pension system, but there is an underlying flat-rate guaranteed level of pension ensures top-up of very low earnings-related pensions to a minimum pension level.
- 6.9 Flat-rate pensions, which for affordability reasons are likely to be set at a modest level, clearly do not generally provide good replacement rates for middle to high earners. As a result the policy is usually for them to be complemented by appropriate funded earnings-related private sector pension provision. Although funded pensions introduce other risks, there are also some benefits from a risk management point of view in having a balanced mix between pay-as-you-go public pensions and funded private pensions.

7. Retirement age

- 7.1 Raising retirement age is undoubtedly politically controversial in most countries, but most studies have pointed to the need both to raise pension age and also to increase employment levels at older ages (such as the European Commission's White Paper and the European Parliament's report). With expectation of life at any fixed retirement age rising fast, maintaining a reasonably constant expectation of life at retirement age would require retirement age to be steadily increased.
- 7.2 Table 3 is based on official population projections for England & Wales and shows for successive decades the age which maintains the cohort expectation of life constant at 21 for males and 24 for females.
- 7.3 This shows that to maintain a constant cohort expectation of life at retirement, the age of retirement would need to increase by over 1.3 years per decade for males and almost 1.2 years per decade for females. No EU countries have yet put in place measures to increase formal retirement age as quickly as this, although the reforms already announced in the UK are of a similar order of magnitude for the next 20 years. The incentive structure of defined contribution schemes may encourage people to retire later to avoid lower than expected retirement income.

Table 3 Retirement age required to maintain cohort expectation of life at 21 for males and 24 for females

	2010	2020	2030	2040	2050	2060
Expectation 21 for males	65.1	66.6	68.0	69.2	70.5	71.8
Expectation 24 for females	64.8	66.1	67.3	68.4	69.6	70.7

Source: Our calculations based on England & Wales expectation of life from Principal 2010-based population projections.

- 7.4 Some countries envisage raising retirement age step by step over a long period. The UK has already legislated increases from 65 to 68 over the period to 2046, although the increase to 66 has been brought forward to 2020 and the further increases are now to be brought forward as well, with a recent announcement in the March 2012 Budget that there will be an automatic review of the state pension age to ensure it keeps pace with increases in longevity. Others have implemented single step changes, in some cases from quite a low starting point. Another approach has been to pass on the some of the cost of increasing longevity to those reaching pension age (see next section).
- 7.5 From a theoretical viewpoint, increasing retirement age is an optimal solution. It reduces the period for which pensions need to be paid, whilst at the same time increasing the period over which contributions are made. However, there are many practical implementation issues. Although everyone on average is living longer, not all are fit enough to go on working to a higher retirement age. There is plenty of evidence to suggest a wide variation in expectation of life according to level of income or wealth, education or type of occupation. Those with low incomes, in lower socio-economic classes, in more dangerous or arduous occupations or living in some geographic regions,

may experience significantly lower life expectancy and may feel discriminated against if retirement age is raised uniformly for all.

- 7.6 Another problem is that employees may be unwilling to go on working to older ages, or the opportunities to work might not be there, notwithstanding age discrimination legislation. Some would argue that increasing retirement age will simply increase unemployment at later working ages and the incidence of sickness absence and incapacity retirement.

8. Benefit calculation at retirement age

- 8.1 Another way to approach the issue of raising retirement age may be to create incentives for people to work longer, rather than changing the formal pension age. This is a normal feature of a defined contribution pension system, applied in a number of countries such as Poland, Estonia, Sweden, Italy or Latvia. Accumulated rights can be converted into pension using annuity factors appropriate to the age at which annuitisation takes place (this does not have to be the same age at which retirement takes place).

- 8.2 Those who delay annuitisation to a later age should have more accumulated assets (although this is subject to the risk of investment values fluctuating in a funded system) and will get a larger pension because the annuity factor is lower for a higher age of conversion.

- 8.3 A similar effect can be achieved in a defined benefit pension design by defining the benefit as a lump sum at a given retirement age, increased if retirement age is deferred, and converted into pension using a factor appropriate to the age at which the pension is taken. Another approach with similar effect, adopted by Finland in its latest reforms, requires the pension payable at the specified retirement age to be adjusted by a factor which passes on to the new pensioners the improvement in life expectancy at that age from an agreed base level. The Finnish reform also involves having higher pension accrual factors at higher ages, thus increasing the incentive for people to go on working and take their pension later.

- 8.4 Although all pension systems depend for sustainability on satisfactory economic growth, the risks affecting funded and pay-as-you-go systems differ and optimum solutions include substantial elements of both.

9. Notional defined contribution

- 9.1 The reforms adopted in Sweden and Italy in 1994, and subsequently in several other countries (e.g. Poland and Latvia) introduced the concept of notional defined contribution (NDC), which in a somewhat less transparent form, had already operated for many years in the French complementary pension schemes (AGIRC and ARRCO). The French system operates with accumulation of pension points, but the new NDC schemes accumulate contributions as though they were funded pension schemes, using an economic index (such as earnings growth or total wage mass) instead of investment returns.

- 9.2 The contributions are not in fact invested but used to pay benefits, as in any pay-as-you-go scheme. However, the benefit calculation is based on the notional accumulation of contributions up to the chosen retirement age, at which point the "individual account" is converted to pension using an appropriate age-related retirement annuity. In the Swedish version of NDC the pension increase adjustment allows only for increases in

circumstances where the economy is growing satisfactorily.

- 9.3 In Sweden the value of the individual account prior to retirement is also subject to the application of an automatic balance mechanism. This takes into account the value of individual accounts and the value of pensions in payment, compared to the value of real investments held in the buffer fund and the value of future contributions, assessed rather crudely, with a view to arriving at an automatic balance mechanism (ABM) factor. If this is less than unity, all accumulated individual account balances are reduced by the application of this factor in order to bring the system back into formal balance. Whilst the existence of the ABM has been widely applauded (notably by the World Bank, 2006) as a way of genuinely achieving long-term financial sustainability, there are some serious concerns in Sweden that it will lead to more or less arbitrary reductions in benefit levels without proper democratic debate about the balance between affordability and adequacy.

10. Other approaches

- 10.1 There are many other measures which have been taken in different countries. One of these is the sustainability index implemented in Germany. This also adjusts benefit levels to offset the impact of demographic change but does so by adjusting benefits in payment directly to offset changes in the dependency ratio.
- 10.2 Another important element of reform in many countries has been to encourage, or facilitate through the introduction of new pension vehicles, a diversification of the provision of pension benefits between pay-as-you-go and funded systems. The introduction of effective funded systems brings several challenges of its own, notably the need for effective regulation. There is at present a fairly low level of harmonisation of pension regulation in the EU, achieved through the Institutions of Retirement Provision Directive (2003/41/EC) (referred to as the IORP Directive). The European Commission is proposing to review and revise this directive, possibly with a view to adopting some of the features of the Solvency II Directive for insurance companies (2009/138/EC). In April 2011 the Commission issued a Call for Advice from EIOPA (the European Insurance and Occupational Pensions Authority) on how to amend the IORP Directive and in February 2012 EIOPA responded. The Groupe Consultatif has been actively involved in commenting on the proposals and in helping to develop ideas which might be used within the revised IORP Directive.
- 10.3 Many pay-as-you-go systems have seen numerous other changes implemented, from raising contribution rates through to modification of the benefit formula, e.g. to allow for averaging of salary over the whole working life instead of just part of it, and less generous indexation arrangements.
- 10.4 As mentioned earlier, another policy response may be to introduce a greater level of pre-funding through pension reserve funds or paying down national debt. Other countries have acted to shift the burden of financing social security away from taxes on employment towards general revenue, with more of a role for taxes on consumption or profits.
- 10.5 In funded schemes in the private sector there has in some countries been a widespread trend of replacing defined benefit schemes with defined contribution. Already there has been some adverse reaction to passing all the investment (and part of the longevity) risk

on to scheme members, but employers have become more and more risk averse, and concerned about the impact of volatility of pension fund results on their balance sheets, as a result of changes to accounting standards. Various possible structures intermediate between pure defined benefit and pure defined contribution have been suggested, but have not yet received widespread acceptance, often because regulatory structures and financial reporting requirements are not well-adapted to these “risk-sharing” models.

- 10.6 Another issue arises with annuitisation using annuities issued by insurance companies. As this grows in scale, insurers are increasingly concerned about the systemic risk of increasing longevity which they are taking on (and the cost of capital to support such products). Another problem, which governments could more easily address, is that asset/liability management of an annuity portfolio requires a range of maturities of bonds to span the full duration of the liabilities, i.e. at least up to 50 years. Surprisingly there is an almost complete lack of euro-denominated bonds with duration of more than 20 years. This will need to change if annuity markets and funded pension systems are to develop. Governments might also consider issuing longevity bonds, which would provide a hedge against improving mortality, in order to enable the insurance industry to take on more longevity risk.
- 10.7 Complementary pensions in the Netherlands are mostly organised on a multi-employer basis. Although historically designed as defined benefit schemes, pressures on sponsoring employers led to the formulation of defined benefits with flexibilities such as to enable the contributions to be kept constant. These flexibilities are 1) in the extent of indexation of benefits in payment and 2) in the age of retirement with unreduced benefits. However, in current economic conditions many pension funds have been unable to remain in balance using these flexibilities, so in order to keep contributions unchanged, across-the-board reductions in accrued benefit entitlements are being implemented. The effect of this is similar to the application of the automatic balance mechanism in the Swedish NDC system or the sustainability index in Germany, except that accrued rights in private occupational plans have usually been regarded as protected from retrospective reduction.
- 10.8 The desire to diversify pension systems has led to the introduction of new funded pension vehicles in France, where previously the mandatory complementary schemes were operated solely on a largely pay-as-you-go basis as a form of notional defined contribution (*répartition par points*). The new PERP (*plan d'épargne retraite populaire*) and PRP (*plan d'épargne pour la retraite collectif*), introduced in 2004 and 2006 respectively, are fully funded defined contribution voluntary savings vehicles, designed to enable individuals to make additional pension savings and employers to provide funded complementary pensions for their employees.
- 10.9 In recent years Germany also introduced new funded pension vehicles, with an individual pension savings account known as *Riesterpensions* and also a structure called *Pensionfonds* to encourage employers to implement occupational pensions with external investments, instead of the traditional book reserve (internally invested) approach.
- 10.10 In both public and private pension schemes there has been a steady trend away from defining retirement benefits based on final salary (or the average of the salary in the last year before retirement) to a career average salary approach. Since inflation has often rendered the early years irrelevant in a straight average of salary over the career, a

common approach is revalued career average (CARE), where the salary in each year over the whole career is revalued to the retirement date using an index (which could be an index of average earnings, or perhaps a price index) before being used in the benefit calculation. The effect of this is similar to an NDC scheme, where a contribution rate (rather than a benefit accrual rate) is applied to each year's earnings and then rolled up to retirement using an index. However, the philosophy is different in that a CARE defined benefit scheme does not have any implied assumption that the contributions will remain constant.

11. Actuaries in social security and pensions

- 11.1 It is not the purpose of this paper to provide a comprehensive analysis of social security and pension systems across Europe. The Groupe Consultatif has previously published reviews of different aspects of complementary pension schemes in the EU (for example Collinson et al, 2001; Brown et al, 2004; Hammer et al, 2004). Actuaries are typically involved in the financial management of all types of occupational defined benefit plans and also in many types of defined contribution plan, especially where there are embedded guarantees, and decumulation products. Many countries have a statutory role for actuaries in complementary pension plans.
- 11.2 A number of countries also have a statutory requirement for regular actuarial reporting on the finances of social security and this can be an important factor in ensuring sustainability of social security pension promises, as it helps to place the political pressures for more generous social security into a firm financial monitoring environment. From the very earliest days of the International Social Security Association (ISSA) nearly a century ago there has been a strong strand of thinking internationally that actuarial reporting should form a key element of good social security governance and this is underlined by social security guidelines issued by the ISSA.
- 11.3 Actuarial modelling approaches and methodologies should be used to project future cash flows and assess the short, medium and long term impact of pension policies and reforms on adequacy and sustainability of pension system provision in an integrated way. This does not appear to be being done consistently across the EU at present and the Groupe Consultatif may be able to assist in the development of a more consistent framework which would meet international standards for social security actuaries, which have been developed by the International Actuarial Association (IAA) in cooperation with the International Labour Office (ILO) and the ISSA.
- 11.4 It should be noted that in the Commission's Call for Advice for revision of the IORP Directive the question is raised as to whether IORPs should be required to have an actuarial function, as is the case for insurance companies under the Solvency 2 Directive 2009/138/EC. The Groupe Consultatif would very much support such a requirement, which would be consistent with the extensive use made of actuaries by IORPs in existing regulatory structures. Not all countries have an automatic requirement for an actuary in DC plans where there are no guarantees or biometric risks, although even for these there may be a need for actuarially calculated technical provisions, especially in relation to future expenses. Asset/liability management and general risk management are actuarial issues, as is the monitoring of adequacy of resulting benefits and any drawdown or annuitisation provisions. In Spain there is a requirement for all DC occupational plans to have regular actuarial reporting and this might be a good model for the revised IORP Directive.

12. Conclusion

- 12.1 Following a meeting of the Employment and Social Affairs Council on 21 June 2012, EU ministers issued a statement on the May 2012 Ageing report (or, as it is more officially known, "Pension Adequacy in the EU2010-2050"). Ministers noted that the main messages in the report were "a very useful complement to the conclusions adopted by the ECOFIN on 15 May on the sustainability of public finances in the light of the ageing populations. In particular, they stressed that tackling the pension adequacy challenge will require determined efforts to promote longer and healthier working lives through employment and industrial relations policies. The aim of the pension report is to strengthen the capacity of the EU to assess the current and future adequacy of pension systems and to identify policy strategies that can lead to the most cost-effective delivery of adequate pensions and social benefits in ageing societies".
- 12.2 The Groupe Consultatif fully agrees that the issue of demographic ageing is an extremely important one for our societies and, in particular, for the financing of retirement income (and, of course, health and long term care, which, although an area of great interest to actuaries, is beyond the scope of this paper). The Groupe welcomes the increased attention being devoted to sustainability and adequacy of pension systems in the EU and will be glad to contribute to the debate. The issues are complex and only partly technical, but actuaries have a unique level of expertise relating to understanding future risk and uncertainty, taking a long-term perspective on financing issues, analysing and projecting mortality trends and designing retirement income systems which will meet the objectives of the stakeholders. The actuarial profession in Europe, represented by the Groupe Consultatif Actuariel Européen, looks forward to contributing further to analysis and discussion of these issues.

Groupe Consultatif Actuariel Européen
Brussels, 2 July 2012

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Appendix 1 Old-age dependency ratios 2010-2060

	2010	2020	2030	2040	2050	2060
EU (27 countries)	25.9	31.4	38.3	45.5	50.2	52.6
Austria	26.1	29.8	38.8	46.8	48.6	50.7
Belgium	26.0	30.2	36.7	41.0	42.5	43.8
Bulgaria	25.4	32.5	38.7	46.9	56.1	60.3
Cyprus	18.6	24.9	30.8	33.3	39.8	47.6
Czech Republic	21.6	30.4	34.3	40.1	50.1	55.0
Denmark	24.9	31.4	37.0	41.9	41.8	43.5
Estonia	25.2	30.1	35.8	40.5	48.3	55.5
Finland	25.6	36.2	42.7	43.5	44.9	47.4
France	25.7	32.7	39.1	44.4	45.5	46.6
Germany	31.3	35.8	47.2	56.4	58.1	59.9
Greece	28.4	32.6	37.7	47.8	57.4	56.6
Hungary	24.2	30.0	33.6	39.5	50.2	57.8
Iceland	17.9	25.1	32.2	34.4	33.5	33.5
Ireland	16.8	22.8	27.6	33.1	39.7	36.6
Italy	30.8	34.8	41.1	51.7	56.3	56.6
Latvia	25.2	28.8	36.2	43.3	54.2	68.0
Lithuania	23.3	26.6	35.2	41.8	47.2	56.6
Luxembourg	20.4	23.1	30.0	37.1	41.9	45.0
Malta	21.3	31.8	39.2	40.2	46.5	55.6
Netherlands	22.8	30.8	40.2	47.3	46.5	47.5
Norway	22.5	27.4	33.0	38.5	40.3	43.0
Poland	19.0	26.9	35.2	39.9	53.0	64.6
Portugal	26.7	31.3	37.8	46.7	55.6	57.2
Romania	21.4	25.7	30.2	40.6	53.8	64.8
Slovenia	23.8	30.4	38.8	46.1	55.0	57.6
Slovakia	16.9	23.6	31.4	38.0	51.4	61.8
Spain	24.7	28.9	35.5	46.7	56.9	56.4
Sweden	27.7	33.5	37.2	40.4	41.7	46.2
Switzerland	24.7	29.5	38.0	45.7	50.5	54.4
United Kingdom	24.9	29.6	34.8	38.9	39.4	42.1

Source: Eurostat

Notes: The old-age dependency ratio is defined here as the ratio of the numbers of people in the population aged 65 and over to the number of people in the population aged between 15 and 65. This takes no account of labour market participation or of eligibility to pension benefits.

Appendix 2 Actual and projected total fertility rates for EU countries, 1950 to 2090

	1950	1970	1990	2010	2030	2050	2070	2090
Austria	2.08	2.04	1.47	1.35	1.58	1.79	1.92	1.99
Belgium	2.34	2.02	1.61	1.84	1.95	2.02	2.05	2.07
Bulgaria	2.48	2.17	1.51	1.55	1.79	1.93	2.00	2.05
Cyprus	3.71	2.49	2.33	1.46	1.59	1.78	1.91	1.99
Czech Republic	2.68	2.19	1.66	1.50	1.77	1.91	2.00	2.04
Denmark	2.55	1.96	1.75	1.89	1.98	2.03	2.06	2.08
Estonia	2.06	2.15	1.63	1.70	1.88	1.98	2.03	2.06
Finland	3.00	1.62	1.82	1.88	1.98	2.03	2.06	2.08
France	2.76	2.31	1.71	1.99	2.04	2.07	2.08	2.09
Germany	2.16	1.64	1.30	1.46	1.74	1.90	1.99	2.04
Greece	2.29	2.32	1.37	1.54	1.77	1.91	1.99	2.04
Hungary	2.73	2.09	1.73	1.43	1.71	1.88	1.97	2.03
Ireland	3.42	3.82	1.91	2.10	2.10	2.10	2.10	2.10
Italy	2.36	2.35	1.28	1.48	1.75	1.91	1.99	2.04
Latvia	2.00	2.00	1.63	1.51	1.77	1.91	2.00	2.04
Lithuania	2.71	2.32	1.81	1.50	1.75	1.90	1.98	2.03
Luxembourg	1.98	1.72	1.66	1.68	1.87	1.97	2.03	2.06
Malta	4.14	2.01	2.01	1.28	1.52	1.76	1.90	1.99
Netherlands	3.05	2.06	1.58	1.79	1.93	2.01	2.05	2.07
Portugal	3.10	2.83	1.51	1.31	1.51	1.74	1.89	1.98
Poland	3.62	2.25	1.89	1.42	1.70	1.87	1.97	2.02
Romania	2.87	2.62	1.50	1.43	1.71	1.88	1.97	2.03
Slovakia	3.50	2.51	1.87	1.37	1.68	1.86	1.96	2.02
Slovenia	2.80	2.19	1.36	1.48	1.74	1.89	1.98	2.03
Spain	2.53	2.85	1.28	1.50	1.77	1.92	2.00	2.04
Sweden	2.21	1.89	2.01	1.93	2.00	2.05	2.07	2.08
United Kingdom	2.18	2.01	1.78	1.87	1.97	2.03	2.05	2.07

Source: UN Population Projections, 2010 Revision

Appendix 3 Brief summary of pension systems in some European countries which are considered to be relatively sustainable

Denmark

The basic social security pension does not depend on earnings and is non-contributory, being financed out of general tax revenues. Entitlement is based on a residency requirement and the pension is payable from age 65. There is also a DC social security scheme for employed workers (ATP). The benefits depend on accumulated contributions with investment returns, but there are certain investment guarantees provided. In addition, most employed workers are covered by an occupational plan, made compulsory under collective agreements (through the 1987 Common Declaration). These plans are also DC but are operated as with-profits deferred annuity contracts, either with insurance companies or with specialised pension companies. Capital invested and some level of return is guaranteed. The impact of complementary pensions is increasing, with 45% of new pensioners in 2010 receiving only the basic pension and the ATP pension, compared with 56% ten years earlier.

Finland

The statutory (1st pillar) pension provision consists of a defined benefit earnings-related pension which aims to maintain the pre-retirement income level to a reasonable degree, and a guarantee pension which ensures minimum security. Employed and self-employed persons are all members of one of a small number of earnings-related pension schemes, all of which have fairly similar benefits, which are based on revalued career average earnings. Due to the comprehensive coverage of the statutory schemes and the absence of a pension ceiling (neither income nor pension), the significance of supplementary pension, i.e. 2nd pillar occupational pensions or 3rd pillar individual pension insurance, is small.

For the earnings-related pension scheme the retirement age is flexible between 63 and 68. The accrual rate is 1.5% a year up to age 52, but rises to 1.9% a year from 53 to 62 and 4.5% a year from 63 to 68. The benefit formula includes a life expectancy coefficient that reduces the monthly value of the pension benefit in line with the increases in longevity. There is full portability for those changing employment and moving from one scheme to another. The financing design, which combines pay-as-you-go and prefunding, is based on pension contributions from both employers and employees. Approximately four fifths of the earnings-related pensions are financed through PAYG, with the rest covered from the pre-funded part of the scheme.

The basic national pension used to be self-standing and additional to the earnings-related pension but is now operated as a minimum pension guarantee and used to top up to a guaranteed level any earnings-related pensions coming into payment which are below a certain level. To determine this level the earnings-related pension and the basic national pension are integrated into one total pension. Every euro of earnings-related pension reduces the full national pension by 50 cents, until the earnings-related pension reaches such a level that entitlement to a national pension is depleted. Approximately 50% of all old-age pensioners receive a basic national pension but under 10% a full basic national pension. The basic national pension is financed solely out of general tax revenues.

Netherlands

The basic pension does not depend on earnings and is paid for partly from contributions of employees and partly out of general tax revenues. There is no earnings-related social security but most employed workers are members of an occupational scheme, which are set up under collective agreements and have mandatory effect. There are now fewer than 500 pension funds and this number is decreasing. Of these about 80 are multi employer schemes, but the multi-employer schemes are in general much larger and account for the majority of the assets under management.

Most of the schemes are multi-employer and, although originally designed as DB schemes, with employer contributions recommended from time to time by the scheme actuary, they now operate with capped employer contributions. Flexibility to ensure that the scheme remains in financial balance is achieved by modifying the level of post-award pension increase, raising retirement age and applying an overall reduction factor to accrued benefits if it becomes necessary (according to the financial situation in each fund).

Norway

Norway has a form of NDC which involves the accumulation of contributions of 18.1% of earnings in a notional account. At retirement this is converted into a pension using a current life expectancy factor. Retirement is possible between 62 and 75, with annuitization factors dependent on the age. There is a minimum guaranteed level of pension.

It is compulsory for all employees to be a member of an occupational pension plan. Pensions are acquired at the age of 67, but the retirement age can be different from this.

Poland

Poland has a mix of a notional defined contribution (NDC) scheme and a funded DC scheme. A total contribution of 19.52% of earnings was subdivided into 12.22% going to the NDC part and 7.3% to Open Pension Funds (OPFs). The contributions going to the OPFs was reduced in 2011 to 2.3%, to be increased gradually in the period 2013 – 2017 to reach 3.5% at the end of this period. Both parts of the contributions are credited to members' individual accounts. Accounts in OPFs are backed by assets and accumulate according to the returns on investments. By contrast, contributions to the NCD part are used to pay current benefit outgo, and there are no assets backing the individual accounts.

The accrued balance of individual accounts is accumulated each year by the rate of growth of the contribution base, i.e. the wage mass. In addition to this general rule, there is a guarantee that the revaluation rate will never fall below the rate of increase of the Consumer Price Index (CPI). Since the introduction of the new system in 1999 this guarantee has been triggered only once (wage mass growth was lower than the inflation rate in 2002 by a fraction of a percentage point). The guarantee could undermine the sustainability of the system in the coming decades, as due to the decreasing workforce it could happen more frequently that the annual growth of the wage mass is smaller than CPI growth.

The balance of each account is converted into a life annuity at retirement on the basis of age-specific and gender-averaged annuity factors.

This means that the system is almost fully sustainable in the long run, with some doubt in respect of the inflation guarantee concerning the revaluation rate of individual accounts in the NCD part.

However, due to unfavourable demographic prospects (longevity improvements no less rapid and fertility much lower than in most EU countries, and emigration higher than immigration), sustainability is likely to be attained at the cost of dramatic deterioration in adequacy. This in turn raises the question whether the system which is sustainable on paper will really survive socio-political tensions. Despite incentives for deferring retirement embodied in the DC rule, the need for increasing the retirement age is acknowledged by the majority of experts and also by political forces in government. The change in this respect has been passed recently by parliament and signed by the President on 1 June 2012. The current retirement age of 60 for females and 65 for males will increase each quarter by one month to reach 67, which will happen in 2020 for males and in 2040 for females. Each worker could retire 2 years earlier, but will then get half of a final pension until 67. Withdrawals before 67 are subtracted from the accumulated amount used to calculate the final pension at 67. Also the entitlement to top-up benefits for members whose accumulated contributions do not cover the minimum pension is restricted to those reaching 67.

Sweden

Sweden has a notional defined contribution scheme. An individual account is maintained for each member in terms of real monetary amounts. All contributions by the member, or by the employer on the member's behalf, are credited to the member's individual account. This is purely a book-keeping exercise, since no assets are physically held to back these accounts. The amounts in the account are accumulated each year by the percentage change in the index of average income in the Swedish economy. Contribution income is used to pay benefit outgo, as under a defined benefit social security scheme operating on a pay-as-you-go basis.

However, a demographic buffer fund is maintained, in order to ensure that the system can be kept in balance as the population ages. Annual valuations take place of the accrued pension liabilities, as compared to the value of the future contributions, together with the assets held in the demographic buffer fund. The contribution asset is valued as the current amount of the contributions multiplied by a factor called the expected turnover duration, which is an average of the periods for which contributions are held in the individual accounts between being paid in and being used to pay benefits.

The pension liabilities at a point of time consist of the total balances of the individual accounts of those who have not yet started to draw their pension, together with the present value of the future pension payments for those who are already drawing pension. The ratio of the assets (the contribution asset plus the assets in the buffer fund) to the pension liabilities is called the *balance ratio*. If this factor is less than 1, the system is in a state of financial imbalance and so the automatic balance mechanism is activated. This implies that the individual accounts are revalued, not by the index of average income, as is the case when the balance ratio is more than 1, but by the index multiplied by the balance ratio, in other words the extent of revaluation is reduced in order to restore the system to financial balance (Settergren, 2001).

Given that the benefit entitlements in a defined contribution scheme build up inexorably from the accumulated amount of contributions paid in, some such mechanism is needed to keep the system in financial balance. Future contributions cannot just be adjusted to meet the benefit expenditure, as under the normal pay-as-you-go financing system for a defined benefit scheme, since a change in the contributions will affect the accruing future benefits.

There is no formal pension age, and pensions can in general be drawn from the age of 61 upwards, with no upper age limit. The accumulated amount in the individual account at the chosen pension age has to be used to purchase a pension, just as in a funded money purchase scheme. This arrangement allows some of the risk of improving longevity to be passed on to the individual

members, rather than simply being transferred to the next generation. The annuity conversion rate is set from time to time to reflect the latest estimate of longevity (on a unisex basis). A rate of interest of 1.6% is used to calculate the annuity, reflecting the fact that the internal rate of return of the system, net of average income growth, is zero and pensions in payment are indexed in line with the growth in average income less 1.6%.

In addition to contributing 16% of income to the notional defined contribution scheme, employees in Sweden must also now contribute 2½% of their earnings to a funded pension arrangement. These contributions are collected with the social security contributions and passed to the Premium Pension Authority (PPM), which in turn passes them on to the private investment fund manager chosen by the individual member (with a default arrangement for the contributions to go into an additional fund managed by the National Pension Fund – the AP Fund 7 - if the member does not nominate a manager).

Other forms of complementary pension arrangement are also common in Sweden. In fact almost all wage-earners are entitled to some sort of complementary pension. Blue collar workers now have a defined contribution pension arrangement and most white collar workers have access to a defined benefit scheme, often taking the form of industry-wide schemes, with contributions from the employers alone, since the benefit is regarded as part of the remuneration package. Complementary pension rights play a particularly important role for higher earners, because the earnings ceilings in the State pension are relatively low.

Switzerland

The basic pension does not depend on earnings and is financed by social security contributions from employers and employees through a segregated social security fund. Employers are required to provide occupational pensions for employees at least sufficient to meet some specified requirements. These are defined so that they can be met either by DB or DC occupational plans. DC plans are increasingly common, although many DB schemes are still in operation, with employers meeting the balance of cost over and above a specified employee contribution rate.

United Kingdom

The basic pension does not depend on earnings and is financed by contributions of employers, employees and self-employed workers through a segregated National Insurance Fund. The pension is increased each year at the highest of 1) the increase of CPI over the last year, 2) the increase in the general level of earnings over the last year and 3) 2.5%. Pension age is going up to 66 for both men and women from 2021 and is scheduled to go up to 67 in 2034-36 and 68 in 2044-46. However, the government has announced that these dates will be brought forward and that state pension age will be indexed having regard to the expectation of life at the state pension age. There is currently also an earnings-related social security pension (State Second Pension) but this is being phased out and there are plans to replace the current basic pension and the State Second Pension with a single flat-rate pension at a higher level.

Many employers operate occupational pension plans for their employees, although there is no requirement to do so. Many of these were DB schemes, although most of these have now closed to new entrants (other than public sector schemes) and relatively few are still accruing benefits. In the private sector open schemes are nearly all DC. From October 2012 a new requirement is being phased in for all employers to auto-enrol employees (aged over 22 and earning over a fairly low threshold of earnings) into a compliant pension plan, with 3% contribution from the employer and 4% from the employee (a further 1% comes from tax relief). It will be possible for people to opt

out but they will automatically be re-enrolled again after three years and if they change jobs. The pension plan can be an existing occupational plan (DB or DC) which meets the criteria, or an employer can opt to use one of a variety of pension plans on offer from insurance companies and master trusts, or from NEST (National Employment Savings Trust), which is a DC provider owned by the government to ensure that low paid and highly mobile employees, who may not be attractive to commercial providers, are able to be auto-enrolled.