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Assessing the economic and budgetary
impact of linking retirement ages and pension
benefits to increases in longevity

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Abstract

Policy makers need to ensure long-term fiscal sustainability in the face of large demographic challenges as well as significant economic uncertainty in the wake of the financial and economic crisis. In this context, especially public pension expenditures represent a challenge for public finances.

A majority of Member States have adapted pension systems so as to put them on a more sustainable footing and enable them to weather the demographic changes that are set to take hold. However, further reforms are in many cases necessary.

This paper focuses on possible public pension expenditure reductions, sustainability and also adequacy gains that can be achieved when linking retirement ages with future increases in longevity. Multiple policy scenarios, covering different degrees of linkage, show that significant sustainability and adequacy improvements can be achieved when applying this policy approach consistently in national pension legislation.

The projected increases in public pension expenditures could almost be halved when fully linking retirement ages to life expectancy gains in the future. The expected decrease in the benefit ratio due to recent pension reforms could be diminished, based on a longer contributory period and higher accrued pension rights. Overall, during the period of 2010-2060, a cumulated average pension expenditure saving of around 7.5% of GDP could be achieved for the EU.

Even higher reductions in future pension spending would materialize with a rule that links pension benefits to longevity gains without adapting statutory retirement ages. Such a rule would allow for additional cumulated savings of around 5.3% of GDP for the EU. However, if people do not extend their working lives in order to maintain the level of pension benefits, serious adequacy problems may arise.

Under the assumptions of a convergence of all Member States to the EU average lifetime spent in retirement in the year 2010, the projected pension expenditure increase due to population ageing could even be more contained over the long-run in the EU as a whole.

To fully stabilize public pension expenditures, further reform measures on top of a retirement age or pension benefit link to gains in life expectancy need to be considered in most Member States.

JEL Classification: H55, J14, J26

Keywords: Ageing, Budgetary Impact, Economic Impact, Longevity, Link, Life Expectancy, Old Age, Older Workers, Pension, Pension Benefits, Pensioners, Quit Rates, Quitting, Retirement, Retirement Age.

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1. Introduction

An ageing population raises important challenges for our societies and economies. Policy makers worry about how living standards will be affected as a shrinking number of workers has to provide for the consumption needs of a growing number of elderly dependents. Markets worry about overall fiscal sustainability and the ability of policy makers to address timely and sufficiently these challenges in several Member States. The seriousness of the challenge depends on how our economies and societies respond and adapt to these changing demographic conditions. Looking ahead, policy makers need to ensure long-term fiscal sustainability in the face of large demographic challenges as well as significant economic uncertainty. Especially public pension expenditures represent an increasing burden for public finances: the expenditure level amounts to more than 11% of GDP on average today, possibly rising to almost 13% in 2060 in the EU as a whole, however with large variations across Member States, as shown in the 2012 Ageing and Sustainability Reports.¹

In the last decade, there has been considerable progress in reforming pension arrangements. A majority of Member States has adapted pension systems so as to put them on a more sustainable footing and enable them to weather the demographic changes that are set to take hold. However, further reforms are in many cases necessary and the financial and economic crisis has made the demographic changes harder to cope with. Ensuring fiscal sustainability requires time-consistent policies, which involves addressing expected budgetary imbalances due to an increasing magnitude of the cost of ageing. For countries with high projected increases in public pension spending, adjusting the statutory retirement age should be considered. A dynamic view needs to be established on the balance of life spent working and spent in retirement, moving beyond the out-dated 'exit signal' of 65 years of age which dates back more than 100 years in some cases.² Increasing the retirement age preserves the sustainability of pension systems while allowing individuals for enhancing retirement incomes through longer working lives and the accrual of additional pension rights. This paper focuses on possible public pension expenditure reductions, pension adequacy gains and improvements in the long-term sustainability of public finances that can be achieved when linking statutory and effective³ retirement ages with future increases in life expectancy. It is

¹ European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2012, 'The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)'; European Economy, No. 2/2012.

(http://ec.europa.eu/economy_finance/publications/european_economy/2012/pdf/ee2_en.pdf)

European Commission (DG ECFIN), 2012, "Fiscal Sustainability Report 2012", European Economy, No. 8/2012

² When Bismarck introduced the old-age and invalidity pensions in Germany more than 120 years ago, in 1889, he initially set the retirement age at 70. In 1916 the retirement age was lowered to 65. See Haerendel, U., 2004, *Quellensammlung zur Geschichte der deutschen Sozialpolitik 1867 bis 1914, II. Abteilung: Von der kaiserlichen Sozialbotschaft bis zu den Februarerlassen Wilhelms II. (1881-1890), 6. Band: Die gesetzliche Invaliditäts- und Altersversicherung und die Alternativen auf gewerkschaftlicher und betrieblicher Grundlage*, Darmstadt.

³ The "average effective retirement age" for a specific year is calculated as the weighted sum of each year of retirement ages (between the minimum and the maximum age of retirement) occurring in that year. The specific weights are based on the probability that a person will withdraw from the labour force at a specific age. Henceforth in this paper, the average effective retirement age and the average effective exit age from the labour force is assumed to be the same. In practice however, it is possible to leave the labour force before retiring, although in most cases those persons would be receiving a public benefit. A description of the simulation methodology is provided in the methodological annex III. For more details on the labour force projections, see also Carone G., 2005, 'Long-term labour force projections for the EU25 Member States: a set of data for assessing the impact of ageing', DG ECFIN, European Economy, *Economic Papers*.

No. 235. Further general information about the calculation of the effective retirement age can also be found in Vogler-Ludwig, K. and Düll, N., 2008, Analysis of the average exit age from the labour force – Final report, Study for the European Commission, DG EMPL, Munich.

thus a part of the three-pronged strategy for dealing with the long-term sustainability of public finances agreed by the 2001 Stockholm European Council.⁴

Multiple policy scenarios, covering different degrees of linkage between retirement ages and longevity gains, show that significant sustainability and adequacy improvements can be achieved when applying this policy approach in national pension legislation. Depending inter alia on the degree of linkage, accompanying measures such as specific active labour market policies would obviously have to be taken at the national level to ensure that not only the statutory but also the effective retirement age rises in line with future changes in life expectancy, as assumed in this paper.

Yet, reductions in pension spending and thus sustainability gains in the view of ageing populations could also be achieved by reducing pension benefits instead of increasing retirement ages or by closing the gap between early and statutory retirement ages. The potential effects of rules that link pension benefits to gains in life expectancy and that restrict early retirement options are thus assessed as well.

The paper is organised as follows: Chapter 2 describes current demographic trends, the status quo of pension systems and respective policy recommendations that could increase their sustainability. In chapter 3, the effect of a retirement age increase in line with increasing life expectancy is analysed. Also a pension benefit link to gains in life expectancy and the effects of a restriction in early retirement are assessed. Chapter 4 summarises the main findings of the paper and discusses potential policy implications. In the annex, detailed descriptions of latest pension reforms with an impact on the statutory (early) retirement age, an overview of countries with sustainability factors or retirement age links to life expectancy as well as the underlying methodologies to quantify the effects of postponed retirement are explained in detail.

⁴ The strategy to increase the long-term sustainability of public finances consists of i) reducing debt at a fast pace; ii) raising employment rates and productivity; and iii) reforming pension, health care and long-term care systems.

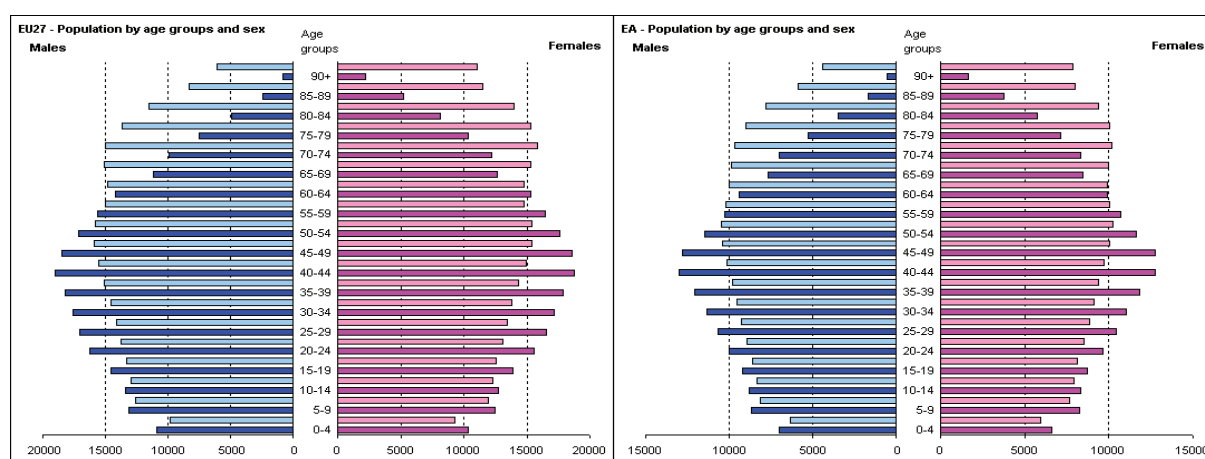
2. Demographic trends, status quo of pension systems and adjustment mechanisms

2.1. Demographic trends

Due to expected dynamics of fertility, life expectancy and migration rates, the structure of the EU population is supposed to dramatically change in the coming decades.⁵ While the overall EU population size is projected to be only slightly different in 2060 (517 million people) compared to 2010 (502 millions), there are large variances in population trends until 2060 across Member States. The strongest population growth is projected in Ireland (+46%), Luxembourg (+45%), Cyprus (+41%), the United Kingdom (+27%), Belgium (+24%) and Sweden (+23%), and the sharpest declines in Bulgaria (-27%), Latvia (-26%), Lithuania (-20%), Romania and Germany (both -19%). In 2010, the Member States with the largest population were: Germany (82 million), France (65 mn), the United Kingdom (62 mn), Italy (60 mn) and Spain (46 mn). In 2060, the United Kingdom would become the most populous EU country (79 mn), followed by France (74 mn), Germany (66 mn), Italy (65 mn) and Spain (52 mn).

The age structure of the EU population is also projected to change dramatically, with elderly people to account for an increasing share of the population. At the same time, the middle of the age pyramid becomes smaller until 2060 due to below natural replacement fertility rates. As a consequence, the shape of the population pyramid gradually changes, increasingly resembling a pillar (see Graph 1). A similar development is projected for the euro area. The proportion of young people (aged 0-14) is projected to remain fairly constant by 2060 in the EU27 and the euro area (around 15%), while those aged 15-64 will become a substantially smaller share, declining from 67% to 56%. Those aged 65 and over will become a much larger share (rising from 18% to 30% of the population), and those aged 80 and over (rising from 5% to 12%) will almost become as numerous as the young population in 2060.

Graph 1 - Population pyramids (in thousands), EU27 and EA, in 2010 and 2060



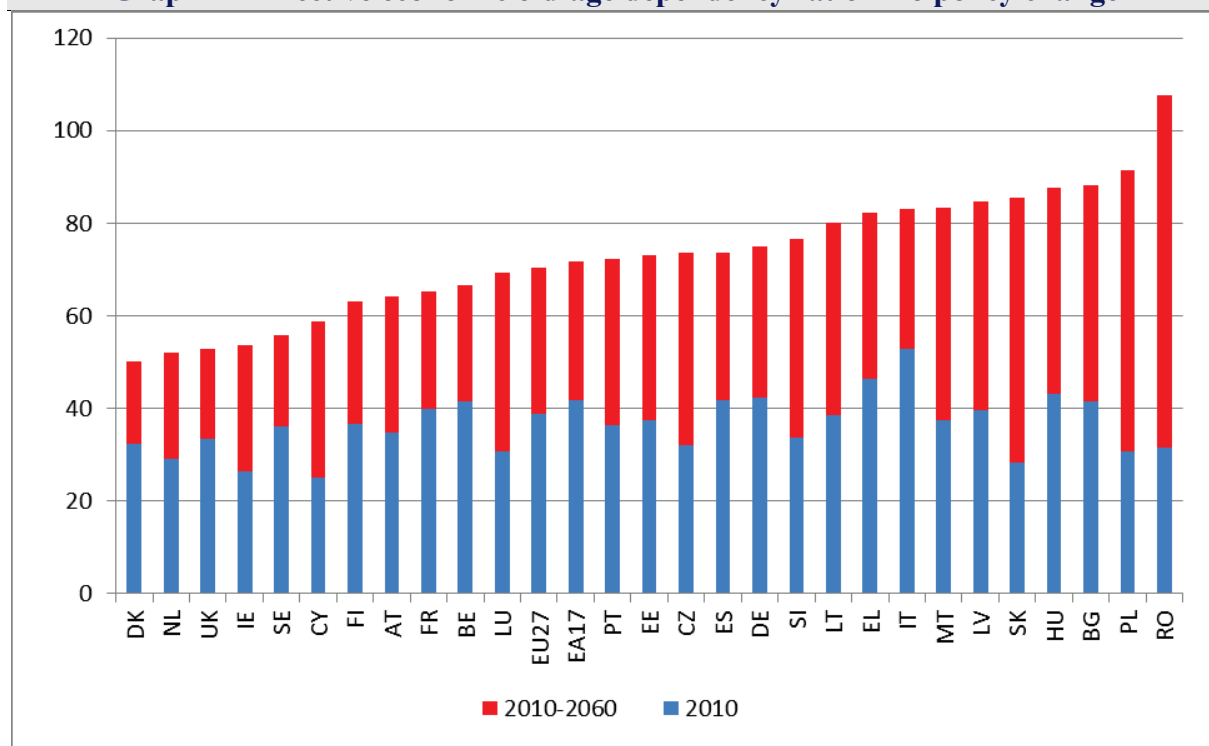
Source: Commission services, Eurostat (EUROPOP2010).

⁵ Eurostat provides population projections for the whole EU up to 2060 (EUROPOP2010): http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-023/EN/KS-SF-11-023-EN.PDF <http://europa.eu/rapid/pressReleasesAction.do?reference=STAT/11/80&type=HTML>. Figures are *inter alia* heavily depending on underlying migration assumptions, leading e.g. to the result that Germany is projected to become only the third most populous Member State, while the United Kingdom would become the most populous EU country.

As a result of these different demographic trends among age groups, the demographic old-age dependency ratio (i.e. people aged 65 or above relative to those aged 15-64) is projected to double from 26% to 52.5% in the EU as a whole up to 2060. This entails that the EU would move from having four working-age people for every person aged over 65 years to two working-age persons.

The effective economic old-age dependency ratio is another important indicator to assess the impact of ageing populations on budgetary expenditure, particularly on its pension component. This indicator is calculated as the ratio between the inactive elderly (65+) and the total employed population aged 15-64. The effective economic old-age dependency ratio is projected to rise significantly from around 39% in 2010 to 70% in 2060 in the EU (see [Graph 2](#)), assuming no policy changes in the future.⁶ In the euro area, a similar increase is projected from 42% in 2010 to 72% in 2060. Across EU Member States, the effective economic old-age dependency ratio in 2060 is projected to range from less than 55% in Denmark, the Netherlands, United Kingdom and Ireland to more than 90% in Poland and Romania. For the latter two countries, also the biggest projected increases between 2010 and 2060 are observable (+61 p.p. and +70 p.p., respectively), while the lowest increase is projected for Denmark, United Kingdom and Sweden (all below 20 p.p.).

Graph 2 - Effective economic old-age dependency ratio – no policy change



Source: Commission services, EPC.

Note: Effective economic old-age dependency ratio defined as the inactive population aged 65 and above as a percentage of the employed population aged 15 to 64.

⁶ Figures based on labour force projections in European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2011, "The 2012 Ageing Report: Underlying assumptions and projection methodologies", European Economy, No. 4/2011. In these projections, as a general rule, actual unemployment rates are assumed to converge to NAWRU rates by 2015, and thereafter gradually decline towards country-specific historical minima. The latter are capped at 7.3%, which corresponds to the EU NAWRU average (based on the spring 2011 DG ECFIN's Economic Forecast), that is, if the historical unemployment rate minimum for a country is higher than the EU27 NAWRU average, actual unemployment rates will converge to the latter.

2.2. Possible reforms to increase the sustainability of pension systems

Without any further policy reaction to the projected demographic trends, public pension expenditures would rise dramatically in the future, as more and more people will be entitled to receive pensions for an increasing period of time. In fact, the ageing problem becomes even more severe when having in mind that demographic projections have tended to consistently underestimate longevity (gains) in the past (by an average of 3 years). Hence, they might also be at risk of underestimation in the future, e.g. due to better than expected medical technical progress or efficiency in treating specific illnesses.⁷ As a consequence, an additional financial burden emerges if unexpected longevity gains force governments to pay for the public pension scheme even more than expected. These longevity risks should hence adequately be taken into account when adjusting pension legislations to cope with the ageing challenge. In that context, automatic adjustment mechanisms for specific pension system parameters – such as the retirement age – in line with gains in life expectancy would make pension systems robust to changes in longevity. The automatic mechanisms also increase the transparency of a pension system and avoid constant political discussions on the future shape of the pension system. Those discussions are in danger of rather focussing on the current political environment instead of the long-term sustainability perspective of the pension system with all potential implied risks that would need to be taken into account.

In general, two ways to reform pension systems with the aim of increasing their sustainability can be distinguished, next to labour market policies that try to increase activity and employment of all age groups but especially of older people:

Eligibility-restricting reforms: In many cases, reforms are related to the abolishment or restriction of early retirement schemes and other early-exit pathways, the increase in statutory retirement ages or the incentive to stay longer in the labour market on a voluntary basis, i.e. exiting labour markets beyond the legal (early) retirement age. All these measures are reflected in a lower level of the coverage of a pension system at a specific point in time, i.e. the number of actual pension benefit recipients as a share of the pensionable population at the statutory retirement age.

Generosity-reducing reforms: Reducing the generosity of pension benefits, e.g. by increasing eligibility criteria for certain benefits, by decreasing pension accrual rates, by changing the pensionable earnings reference taken into account when calculating pension entitlements from a selection of best years to full career earnings or by limiting indexation and valorisation rules, can have a substantial decreasing or at least stabilising impact on public pension expenditure.⁸

⁷ For further information on imprecision of population forecasts and resulting longevity risks, see IMF, 2012, Global Financial Stability Report April 2012, The Financial Impact of Longevity Risk (<http://www.imf.org/external/pubs/ft/gfsr/2012/01/pdf/c4.pdf>). The IMF shows that an unexpectedly increased longevity of three years – in line with underestimations of longevity forecasts in recent decades – would lead to additionally cumulated pension costs of 50% of GDP (2010) by 2050 in advanced economies.

⁸ In the 2012 Ageing Report, the effect of eligibility- and generosity restricting reforms on public pension expenditures was assessed by analysing the different underlying expenditure drivers for the long-term public pension expenditure projections. Projections show diminishing coverage ratio and benefit ratio effects at the EU27 level on public pension expenditure between 2010 and 2060 of 2.9 p.p. and 2.7 p.p. of GDP, respectively, due to recent pension reform. Together with a diminishing effect of 0.8 p.p. of GDP due to projected employment increases, these components can however not fully counterbalance the increasing effect of 8.5 p.p. on public pension expenditures due to population ageing at the EU27 level. Further details on the decomposed public pension expenditure projection figures can be found in chapter 2 of the 2012 Ageing Report: European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2012, 'The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)', European Economy, No. 2/2012. (http://ec.europa.eu/economy_finance/publications/european_economy/2012/pdf/ee2_en.pdf)

Without having a direct decreasing impact on pension expenditures, the financial balance of a pension system could also be improved by a change in the contribution rate. Via higher contribution rates, higher incomes can be generated and redistributed by the state to cover expenditures to current pensioners. This especially holds for defined benefit (DB) pension systems. In (notional) defined contribution ((N)DC) pension systems, higher contribution will automatically lead to higher entitlements in the future, thus offsetting the positive short-term financing effect above. The main negative effect of higher contributions is however an increase in labour costs that could have an adverse impact on employment and economic growth.

The European Commission put forward in its Annual Growth Surveys 2011, 2012 and 2013 as well as its White Paper on adequate, safe and sustainable pensions several recommendations for further pension reforms steps to increase long-term sustainability. These recommendations are broadly in line with the above mentioned policy actions to decrease benefit and coverage ratios. The European Commission encourages Member States to:⁹

- align the retirement age with increases in life expectancy;
- restrict access to early retirement schemes and other early exit pathways;
- support longer working lives by providing better access to life-long learning, adapting work places to a more diverse workforce, and developing employment opportunities for older workers;
- equalise the pensionable age between men and women; and,
- support the development of complementary private savings (2nd and 3rd pillars) to enhance retirement incomes.

Also the country-specific recommendations (CSRs) as part of the European Semester 2012 and 2013 highlight the need for pension reforms to improve the long-term fiscal sustainability for several countries¹⁰. The link of the (statutory) retirement age to increases in life expectancy was pronounced in the 2012 CSRs (Belgium, Spain, Cyprus, Lithuania, Luxembourg, Malta, the Netherlands, Austria, Slovenia, Slovakia and Finland) and also the 2013 CSRs (Belgium, Czech Republic, Spain, France, Lithuania, Luxembourg, Malta, Austria, Slovenia and Finland)¹¹. This type of pension reform involves not only the advantage of an expenditure reduction due to a lower coverage ratio and a proper recognition of longevity risks. It also forces people to work longer to become entitled for an old-age pension. As a consequence, also the effective retirement age is targeted to – at least partially – follow the increase of the statutory retirement age. This, in general, also leads to a higher accrual of individual pension entitlements. In the end, not only the sustainability of pension systems as well as of public finances in general can be improved, but also pension adequacy¹².

⁹ Annual Growth Survey 2011: http://ec.europa.eu/europe2020/pdf/en_final.pdf

Annual Growth Survey 2012: http://ec.europa.eu/europe2020/pdf/ags2012_en.pdf;

Annual Growth Survey 2013: http://ec.europa.eu/europe2020/pdf/ags2013_en.pdf

White Paper on pensions: <http://ec.europa.eu/social/BlobServlet?docId=7341&langId=en>

¹⁰ 2012 Country-specific recommendations: http://ec.europa.eu/europe2020/making-it-happen/country-specific-recommendations/index_en.htm ; 2013 CSRs: http://ec.europa.eu/europe2020/making-it-happen/country-specific-recommendations/index_en.htm.

¹¹ In the 2013 CSRs, a horizontally consistent language concerning the link of retirement ages to gains in life expectancy was adopted by the European Council for several Member States (Austria, Belgium, Czech Republic, Finland, France, Luxembourg, Malta and Spain): "Increase the effective retirement age by aligning retirement age or pension benefits to changes in life expectancy".

¹² In this paper, a positive effect on adequacy is seen to be achieved via an improvement of the benefit ratio. For a general discussion on the adequacy of pensions including a more specific definition and respective thresholds, please refer to: European Commission, 2012, Pension adequacy in the European Union 2010-2050, Brussels (<http://ec.europa.eu/social/BlobServlet?docId=7805&langId=en>).

Especially in DB (and point) systems the positive effect on sustainability should be visible, as the overall reduction in expenditures due to later retirement is generally only partly offset by higher individual pension entitlements due to longer working lives. In pure (N)DC schemes, the overall effect on the scheme's finances should theoretically be neutral as the shorter period of pension payments should be outweighed by increased individual pension entitlements.¹³

Table 1 shows the projected change in early and statutory retirement ages between 2010 and 2060 under current legislation as well as the projected change in the average effective retirement age, split by gender. As a result of recent reforms, statutory retirement ages for males and females will gradually converge for all Member States except for Bulgaria and Romania. Furthermore, statutory retirement ages will increase substantially until 2060 in almost every Member State, with major steps often taking place within the current and the next decade.¹⁴ This is either due to legislated pension reforms discretionarily setting a specific retirement age in the future, or to the fact that Member States have indeed already introduced a connection between retirement ages and life expectancy in their legislations (Denmark, Greece, Italy, Slovakia, Cyprus and the Netherlands).¹⁵ Yet, as can also be seen from Table 1, in most of the Member States, the rise in statutory retirement ages does not fully reflect the total expected increases in life expectancy at retirement.¹⁶ This especially holds for men, whereas for women a catching-up process is visible.

¹³ See also OECD, 2012, "Putting pensions on auto-pilot: automatic-adjustment mechanisms and financial sustainability, OECD pension outlook 2012, p.64, Paris.

¹⁴ Several countries have implemented pension reforms with an effect on statutory (early) retirement ages during the last couple of years. See corresponding box in Annex I. These reforms are supposed to have not only an increasing effect on the effective retirement age, but also a decreasing impact on pension expenditure and thus a positive impact on sustainability.

¹⁵ In Denmark depending on parliamentary decision. See also box on sustainability factors and retirement age links in pension systems in Annex II.

¹⁶ Age 65 for comparability reasons taken as an approximation to measure life expectancy at retirement in Table 1. In the scenario calculations in chapter 3, the change in life expectancy at the real statutory retirement age in 2010 (base year for 2012 Ageing Report) is taken as a reference (which obviously might diverge from the age of 65).

Table 1 - Average effective retirement age, life expectancy and early/statutory retirement age

	Effective retirement age - males**			Effective retirement age - females**			Statutory retirement age - males			Statutory retirement age - females			Early retirement age - males			Early retirement age - females			Life expectancy at age 65 - males			Life expectancy at age 65 - females		
	2011	2030	2060	2011	2030	2060	2010	2030	2060	2010	2030	2060	2010	2030	2060	2010	2030	2060	2011	2030	2060	2011	2030	2060
	61.5	62.1	62.1	61.6	62.3	62.3	65	65	65	65	65	65	60	62	62	60	62	62	17.5	19.4	22.3	17.5	19.4	22.3
BE	63.2	64.7	64.7	61.5	62.5	62.5	63	65	65	63	63	63	63	65	65	60	63	63	14.0	16.6	20.6	14.0	16.6	20.6
BG	62.9	64.3	65.6	60.1	62.6	65.1	62y2m	65y	69y4m	65y8m	64y8m	69y4m	60	60	64y4m	55y8m	60	60	15.0	17.7	21.2	15.0	17.7	21.2
CZ	64.2	67.0	67.2	62.3	65.5	66.3	68	68	72.5	68	68	72.5	60	65	69.5	60	65	69.5	16.9	19.0	22.0	16.9	19.0	22.0
DK	64.3	65.7	65.7	63.5	65.3	65.3	65	67	67	65	67	67	63	63	63	60	63	63	17.5	19.5	22.4	17.5	19.5	22.4
DE	63.8	65.4	65.4	64.5	65.0	65.0	63	65	65	61	65	65	60	62	62	58	62	62	14.2	16.9	20.9	14.2	16.9	20.9
EE	65.1	65.1	65.1	66.7	66.5	66.6	66	67	68	66	67	68	65	65	65	65	65	65	17.0	19.1	22.2	17.0	19.1	22.2
EL	62.5	63.1	64.0	62.4	62.9	63.8	65	68	70.7	60	68	70.7	60	64	66.7	55	64	66.7	18.0	19.9	22.6	18.0	19.9	22.6
ES	62.6	65.3	65.3	63.9	65.9	65.9	65	67	67	65	67	67	61	63	63	61	63	63	18.3	20.2	22.9	18.3	20.2	22.9
FR	60.1	62.8	62.8	60.2	62.8	62.8	60-65	62-67	62-67	60-65	62-67	62-67	60	62	62	60	62	62	18.6	20.4	23.0	18.6	20.4	23.0
IT	61.7	66.1	67.3	61.4	65.4	67.5	65y4m	67y9m	70y3m	60y4m	67y9m	70y3m	60	62	62	60	62	62	18.2	20.1	22.8	18.2	20.1	22.8
CY	65.4	65.4	65.4	63.8	63.8	63.8	65	65*	65*	65	65*	65*	63	63	63	63	63	63	17.9	19.8	22.5	17.9	19.8	22.5
LV	64.3	65.4	65.4	63.8	65.3	65.3	62	65	65	62	65	65	60	63	63	60	63	63	13.6	16.5	20.6	13.6	16.5	20.6
LT	63.5	64.3	64.3	61.7	63.8	63.8	62.5	65	65	60	65	65	57.5	60	60	55	60	60	13.7	16.4	20.4	13.7	16.4	20.4
LU	59.6	59.6	59.6	60.6	60.5	60.5	65	65	65	65	65	65	57	57	57	57	57	57	17.5	19.5	22.4	17.5	19.5	22.4
HU	61.2	65.3	65.3	60.3	64.8	64.8	62	65	65	62	65	65	60	65	65	59	65	65	14.2	16.9	20.9	14.2	16.9	20.9
MT	61.3	64.0	64.0	60.3	62.6	62.6	61	65	65	60	65	65	61	61	61	61	61	61	17.1	19.2	22.2	17.1	19.2	22.2
NL	64.6	67.2	68.1	62.5	65.2	66.2	65	67y9m	69y9m	65	67y9m	69y9m	65	62	62	65	62	62	17.6	19.5	22.3	17.6	19.5	22.3
AT	61.8	63.0	63.1	60.6	62.5	62.8	65	65	65	60	63.5	65	62	62	62	60	62	62	17.7	19.6	22.4	17.7	19.6	22.4
PL	62.2	66.0	66.0	58.8	64.0	65.8	65	67	67	60	64.8	67	-	65	65	55	62	62	15.0	17.5	21.2	15.0	17.5	21.2
PT	64.5	65.8	65.8	64.7	65.7	65.7	65	65	65	65	65	65	55	55	55	55	55	55	17.2	19.2	22.1	17.2	19.2	22.1
RO	63.1	64.0	64.0	61.2	62.6	62.6	64	65	65	59	63	63	59	60	60	54	58	58	14.2	16.9	20.8	14.2	16.9	20.8
SI	62.1	63.8	63.8	59.7	63.5	63.5	63	65	65	61	65	65	58	60	60	60	60	60	16.5	18.7	21.9	16.5	18.7	21.9
SK	61.4	62.6	66.2	58.7	62.4	65.9	62	64	68	57.9	64	68	60	61.9	65.7	55.9	61.9	65.7	14.3	16.9	20.8	14.3	16.9	20.8
FI	63.4	64.1	64.1	62.6	63.9	63.9	63-68	63-68	63-68	63-68	63-68	63-68	62	62	62	62	62	62	17.4	19.4	22.3	17.4	19.4	22.3
SE	65.1	65.6	65.6	64.0	64.4	64.4	61-67	61-67	61-67	61-67	61-67	61-67	61	61	61	61	61	61	18.3	20.1	22.7	18.3	20.1	22.7
UK	64.7	64.9	65.8	63.3	65.2	65.8	65	66	68	60	66	68	65	66	68	60	66	68	18.1	20.0	22.8	18.1	20.0	22.8
EA***	62.5	64.8	65.1	62.2	64.6	65.1	64.5	66.4	67.1	63.2	66.4	67.1	61.8	63.1	63.8	60.7	63.0	63.8	17.9	19.8	22.6	17.9	19.8	22.6
EU27***	62.9	64.9	65.3	62.0	64.5	65.1	64.4	66.2	67.1	62.2	65.9	67.0	62.2	63.4	64.4	60.2	63.1	64.1	17.3	19.4	22.4	17.3	19.4	22.4

Source: Commission services, Eurostat (EUROPOP2010).

Note: * Recently legislated automatic link of retirement ages to life expectancy for Cyprus still to be quantified in terms of future retirement ages.

** Figures for effective retirement ages are proxied by projections for effective exit ages from the labour market based on Commission services (DG ECFIN) Cohort Simulation Model (CSM) (reference age group 50-74) and EUROPOP2010. Figures are slightly diverging from the 2012 Ageing Report due to a different reference age group (50-70 in the 2012 Ageing Report). Data not updated for non-peer reviewed countries (e.g. Spain and Cyprus) with recently legislated increases in statutory retirement ages and/or reforms with effects on effective retirement ages (Status May 2013).

***: Population-weighted averages. For countries with statutory retirement age corridors, the median of the corridor has been taken into account.

Moreover, almost all countries, average effective retirement ages are lower than the respective statutory retirement ages and a gap is projected to remain in the long-run.¹⁷ This is often related to existing early retirement schemes, alternative early-exit pathways such as disability schemes or other government measures that provide pension income before reaching the statutory retirement age threshold. As shown in Table 1, the gap between early retirement ages and statutory retirement ages is in several cases quite substantial (e.g. in Belgium, France, Luxembourg or Austria).

One way to increase the effective retirement age would hence be to reduce incentives to leave the labour market early. This could be done e.g. by increasing early retirement ages or by higher early retirement penalties as well by increasing employment opportunities for older workers or by giving bonuses for late retirement. Such incentives can also be created by introducing flexible retirement ages in a retirement age corridor (in place in France, Finland and Sweden), with higher pension linked to later retirement. However, evidence suggests that a huge share of persons will choose for the earliest possible retirement option also under flexible retirement arrangements, especially if pension entitlements are felt to be sufficient enough by potential retirees.¹⁸ As can be observed in Table 1, the average effective retirement age for France and Finland is close to the lower end of the retirement age corridor, even though later retirement would be more favourable in terms of pension entitlements.

In general, this might also be related to the general attitude among European citizens with respect to the individual retirement decision. A recent Eurobarometer survey shows that the majority (70%) of European working citizens expect to be capable of doing the work they do currently at least until they are aged 60 years.¹⁹ However, only 42% expect that they could go on to 65 years. Moreover, almost 1/5 of the respondents think that they will not be capable of continuing past the age of 59 years. The average age up to which people expect that they can do their current job is at a rather low level of 61.7 years. Moreover, six out of ten respondents believe that the retirement age does not need to be increased in the future. Only a third of the asked people believe that the retirement age needs to increase by 2030.

Many Member States (e.g. Czech Republic, Germany, France, Finland, Italy, Portugal and Sweden) have thus introduced automatic adjustment mechanisms to pension benefit levels related to changes in life expectancy, in order to offset the fiscal impact of ageing populations on pension systems (see Table 2).²⁰

These “sustainability factors” or “adjustment coefficients” are taken into account in the calculation mechanism that determines either the exact amount of pension entitlements or the specific contribution period required to be entitled for a full pension. The factors change the

¹⁷ Due to a lack of availability of actual and projected national administrative data on effective retirement ages, figures are proxied by projections for the average exit ages from the labour market as a product of the Commission services (DG ECFIN) Cohort Simulation Model (CSM) using country-specific exit probabilities from the labour market (see Table 1). Figures are slightly diverging from the ones published in the 2012 Ageing Report due to a different reference age group (50-74 in this paper vs. 50-70 in the 2012 Ageing Report). A description of the simulation methodology is provided in the methodological annex III. For more general details, see also Carone G., 2005, ‘Long-term labour force projections for the EU25 Member States: a set of data for assessing the impact of ageing’, DG ECFIN, European Economy, Economic Papers No. 235.

¹⁸ See also OECD, 2011, “Linking pensions to life expectancy”, Pensions at a Glance 2011: Retirement-Income Systems in OECD and G20 Countries, p.99, Paris and Barr, Nicolas, 2013, “The pension system in Finland: Adequacy, sustainability and system design”, Evaluation of the Finnish Pension System / Part 1, p.74f. Finish Centre for Pensions, Eläketurvakeskus, Finland.

¹⁹ See TNS Opinion & Social (2012), Active ageing, Special Eurobarometer 378, European Commission, Brussels. http://ec.europa.eu/public_opinion/archives/ebs/ebs_378_en.pdf

²⁰ See also OECD, 2012, “Putting pensions on auto-pilot: automatic-adjustment mechanisms and financial sustainability, OECD pension outlook 2012, Chapter 2, Paris.

size of the pension benefit, e.g. depending on expected demographic changes such as life expectancy at the time of retirement or changes in the ratio between contributions and pensions.²¹ Also the introduction of a closer link between pension contributions and the resulting pension benefits, as expressed in a shift from DB or point systems to NDC systems (done in Italy, Latvia, Poland, Sweden and Greece for the supplementary pension scheme) can be seen as a sustainability enhancing factor.

Table 2 – Legislated sustainability factors in EU Member States

Country	Sustainability factor	Retirement age linked to life expectancy
Germany	X	
Finland	X	
Spain	X	
Italy	X	X
France	X	
Latvia	X	
Poland	X	
Portugal	X	
Sweden	X	
Norway	X	
Czech Republic	X	
Denmark		X*
Greece	X	X
Netherlands		X
Slovakia		X
Cyprus		X

*: Depending on parliamentary decision.

Source: Commission services.

Though adjusting pension benefit would certainly contribute strongly to the sustainability of a pension system, this could lead to potential risks for pension adequacy in a long-term perspective. People do not necessarily show the willingness to work longer than required even though this might be intended by policy makers and would result in substantially higher pension entitlements. As said above, there rather seems to be a tendency for people to leave the labour market as soon as possible when given the choice.²² Hence, in case individual retirement decisions are not changed, a sustainability factor that adjusts pension benefits can result in severe reductions of individual pension entitlements. In turn, this might threaten the viability of reforms aiming at reducing pension entitlement.

Pension expenditure reductions as well as employment and pension adequacy gains might thus potentially be better achieved when longer working lives are required for a pension. By linking early and statutory retirement ages to increases in life expectancy, the age threshold to be legally entitled to an early or full pension is postponed. This would require that the conditions for accumulating pension rights are adapted too. People thus can enhance retirement incomes through longer working lives and the accrual of additional pension rights. Moreover, such a retirement age link to life expectancy respects the fact that a more dynamic view on the balance of life spent working and spent in retirement must be established due to increased longevity.

It is obviously always possible to increase retirement ages discretionarily over time. Yet, countries generally face considerable political difficulties and resistance when they are implementing changes to their pension systems to prepare them for the challenges of an ageing population. Moreover, politicians might not adequately respond to the high longevity

²¹ See also box on sustainability factors and retirement age links in pension systems in Annex II.

²² See footnote 18.

risks – based on past underestimations of gains in life expectancy²³ – comprised in pension systems and their underlying expenditure effects. Instead, they would rather take into account the current political environment and the connected political risks when debating pension reform options.

It is thus important to introduce automatic links of the statutory retirement age to the anticipated – but possibly underestimated – changes in longevity over the medium- and long-term in the national pension legislation (or an automatic adjustment of pension benefits, if preferred). This would avoid recurrent 'hard' negotiations at different points in time, when the longevity gains have materialized (and potentially turned out to be higher than expected)²⁴. An automatic adjustment mechanism also helps to increase the transparency and credibility of a pension system as well as the trust of the population in it. Even if the finally legislated variant of an automatic retirement age adjustment rule only leads to small increases of the retirement age, this can turn out to be the better policy approach to longevity risks in pension systems instead of the rather unpredictable expectation of a political decision to discretionarily increase the retirement age in the future.

The following section provides an in-depth analysis of the policy measure of an automatic retirement age link to longevity gains as well as its economic and budgetary effects. Also a pension benefit link to gains in life expectancy and the effects of a restriction in early retirement are assessed.

²³ See footnote 7.

²⁴ See also Barr, Nicholas and Diamond, Peter, 2008, *Reforming pensions, Principles and policy choices*, Chapter 5, Oxford University Press and OECD, 2012, "Putting pensions on auto-pilot: automatic-adjustment mechanisms and financial sustainability", *OECD Pension Outlook 2012*, Chapter 2, Paris.

3. Economic and budgetary impact of linking retirement ages and pension benefits to increases in longevity

3.1. Scenarios and methodology

3.1.1. Scenarios for linking early and statutory retirement ages to longevity gains

To assess the potential impact of an EU-wide retirement age link to gains in life expectancy on the sustainability of pension systems and the adequacy of pension provision, several policy scenarios are applied in a uniform manner for all EU Member States. Current early and statutory retirement ages (2010 as a base year²⁵) are increased up to 2060 (fully/partially) in line with country-specific increases in life expectancy and then compared to the 2012 Ageing Report projection results used as a reference scenario (referred to as "2012 Ageing Report baseline scenario")²⁶. The following alternative scenarios are investigated:

- A shift of the current early/statutory retirement age fully (100%) in line with the increase in life expectancy at retirement (referred to as "100% shift scenario").
- A shift of the current early/statutory retirement age 66% in line with the increase in life expectancy at retirement (referred to as "66% shift scenario").

Under the "shift" scenarios, the current country-specific gaps between early and statutory retirement ages (2010 as a base year) remain unchanged. For some Member States there is hence an important extra lever to potentially increase even further the average effective retirement age by restricting early retirement schemes (as recently legislated e.g. in Belgium, Hungary and Spain).

It may be a strong assumption for retirement ages to increase in (partial of full) proportion to life expectancy gains across all Member States in the same way. One could rather expect retirement ages to converge, that is, to increase more in countries that currently have lower retirement ages or rather low shares of lifetime spent in retirement. Conversely, retirement ages are likely to increase less in countries with already relatively high statutory or effective retirement ages (see again [Table 1](#)) and/or a rather low share of (adult) lifetime spent in retirement.²⁷ Moreover, one could think of a situation in which the country-specific share of (adult) lifetime currently spent in retirement would stay constant over time. This is why two additional scenarios are simulated for which the effective retirement age instead of the statutory one is considered:

²⁵ For the scenarios with a (partial) shift of the early/statutory retirement age, the change in life expectancy at the statutory retirement age in 2010 (base year for 2012 Ageing Report) is taken as a reference. The link to the resulting gains in life expectancy is applied both to 2010 statutory and 2010 early retirement ages whose existing gap at that point in time is kept constant over the whole projection horizon. More details are provided in the methodological annex III.

²⁶ After the publication of the Ageing Report, figures for Belgium, Bulgaria, Czech Republic, Denmark, Hungary, Latvia, Netherlands, Poland and Slovakia have been updated, to be taken into account in the budgetary surveillance exercise during the 2013 European Semester. EU averages have changed accordingly. Aside from these modifications, the demographic and macroeconomic scenarios in this paper are the same as in the 2012 Ageing Report and outturns since then have not been taken into account.

²⁷ The share of lifetime spent in retirement is determined by dividing life expectancy at retirement (effective retirement age at specific point in time) by the sum of life expectancy at retirement and the effective retirement age.

- An increase in the effective retirement age to keep the current share of lifetime spent in retirement constant over the period 2010-2060 (referred to as "constant time in retirement scenario").
- An increase in the effective retirement age to converge gradually towards the 2010 average EU27 share of lifetime spent in retirement (referred to as "EU convergence scenario") by 2060.

3.1.2. Methodology

Several facts and assumptions as well as caveats are taken into account and thus highlighted for the simulated policy scenarios:

- *Legislated reforms explicitly taken into account:* The link of current statutory and early retirement ages (2010 as a base year) with changes in life expectancy is in a first step strictly applied (referred to as "strict shift" results) irrespective of already legislated future increases in early/statutory retirement ages that are part of the 2012 Ageing Report projections. Especially in the short- and medium-run, legal retirement ages might thus be increasing faster under current legislation than under the simulated scenarios. As a consequence, also the projected year-over-year impact on the labour force – and especially on the effective retirement age – might in some cases be higher in the 2012 Ageing Report projections than under the simulated scenarios during that time. Thus, in a second step, a combination of the higher effective retirement age outcome between the 2012 Ageing Report projection and the respective simulation scenario is assumed at every point in time over the projection horizon (referred to as "combined" results). Under this approach, already legislated reforms are explicitly taken into account in the analysis. The combined projection is then later on applied for the pension expenditure projections (for a more detailed description, see box 1 below).
- *Effect of retirement age increases on the labour market:* The extension of working lives due to an increase in the retirement age²⁸ increases total labour supply in a proportional manner, thus increasing employment (whereas the structural unemployment remains unchanged in comparison to the 2012 Ageing Report) as well as GDP²⁹ and reducing the number of pensioners.³⁰ Under the projection methodology, the effective retirement age is supposed to follow very closely the changes in the statutory retirement age under the shift scenarios. This is because the exit probabilities distribution is progressively shifted to higher ages so that the exit probabilities at each single age are moved (partially) in line with gains in life

²⁸ The extension of working lives is done by either a parallel shift of current labour market exit probabilities by single year and sex to higher ages ("shift" scenarios) or by adjusting the exit probabilities distribution to achieve a target effective retirement age ("constant time spent in retirement" and "EU convergence" scenarios).

²⁹ Total factor productivity, the NAWRU and the capital stock remain unchanged in comparison to the 2012 Ageing Report. GDP increases thus solely due to an increased labour supply component. A potential increase in labour productivity in the long-run is nevertheless at least partially captured by the country-specific benefit ratio elasticity due to prolonged working lives. See methodological annex III for more details.

³⁰ Labour force calculations are based on the Cohort Simulation Model (CSM) of the European Commission services (DG ECFIN). For a detailed presentation of the simulation methodology, see the methodological annex III. For a general description of long-term labour force projections with the CSM, see also Carone G., 2005, 'Long-term labour force projections for the EU25 Member States: a set of data for assessing the impact of ageing', DG ECFIN, European Economy, *Economic Papers No. 235*. The underlying assumptions for the 2012 Ageing Report can be found in European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2011, "The 2012 Ageing Report: Underlying assumptions and projection methodologies", European Economy, No. 4/2011.

expectancy. Consequently, the country specific gaps between early and statutory retirement ages as observed in the base year 2010 remain unchanged. Needless to say, this is a strong assumption since it implicitly assumes that all legal and institutional settings (e.g. contributory period) will move in line with changes in life expectancy. This also includes that changes in life expectancy are spent in good health since exit probabilities are not adjusted to incorporate higher exits due to disability. The simulated reform measures would need to be underpinned by proper active ageing and labour market measures to ensure there are sufficient opportunities as well as incentives to work longer. Potential increases in expenditures for alternative early exit pathways from the labour market (such as higher disability pension expenditures) are not explicitly modelled.³¹

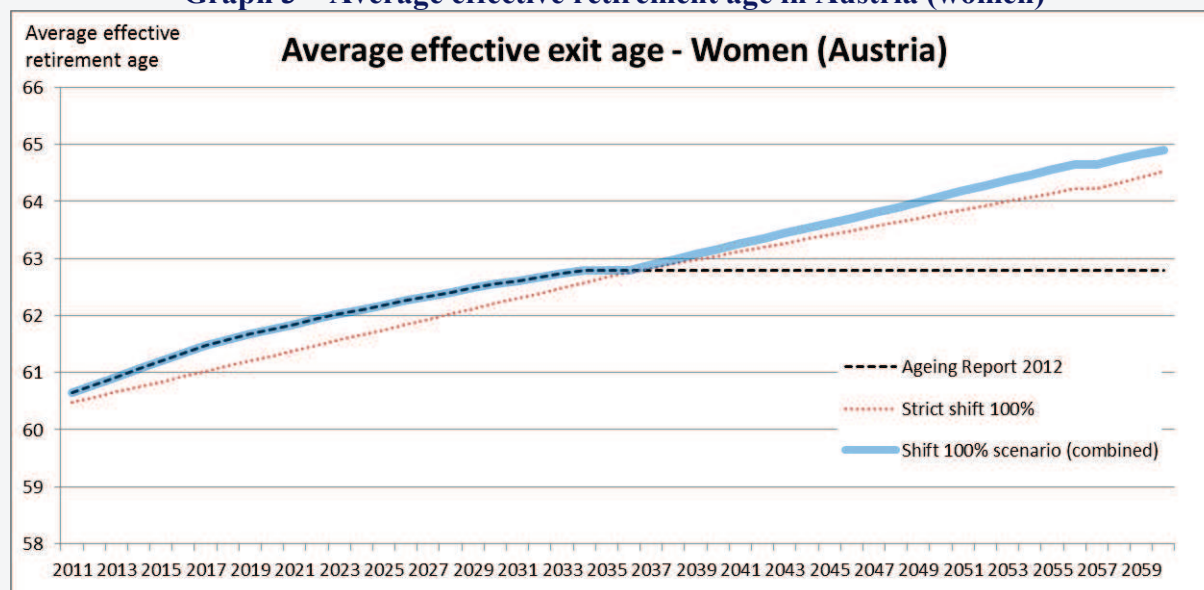
Box 1: Effective retirement age projections under the simulation scenarios

An example of the applied assumptions for the effective retirement age projections in the simulation scenarios is presented in Graph 3. The average effective retirement age projections for women in Austria under the 2012 Ageing Report baseline scenario as well as under the "100% shift scenario" are displayed for the period 2010-2060. Up to 2036, the effective retirement age is projected to increase stronger under current legislation as covered by the 2012 Ageing Report (black dashed line) in comparison to the simulation results when the 2010 female statutory retirement age in Austria (60) is 100% linked to gains in life expectancy ("strict shift 100%", red dotted line). This is due to the fact that the female statutory retirement age in Austria is legislated to increase from 60 to 65 up to 2033. Afterwards, no further increase in the statutory retirement age for women is legislated. Consequently, the continuing shift of the female retirement age under the simulated scenario leads to a higher effective retirement age in comparison to the 2012 Ageing Report results from 2036 onwards until the end of the projection horizon.

In the "100% shift scenario" simulation (and also the other simulations), a combination of the highest effective retirement age outcome between the 2012 Ageing Report scenario and the strict application of the 100% shift of current legal retirement ages is assumed at every point in time over the projection horizon (combined shift scenario, blue line). The combined projections are later on taken as a basis for the simulated pension expenditure projections.

³¹ It is thus assumed that the probability of entry into disability pensions as present in the base year stays constant. If the probability was rising with higher ages when linking statutory retirement ages with gains in life expectancy, disability pension expenditures would probably increase in case pension accrual for disability pensions was linked to income and pension contributions. A counterbalancing effect would however be achieved due to a lower number for (potentially higher) old-age pensions. Even though not explicitly modelled, the disability pension effect should nevertheless at least partially be captured by the country-specific benefit ratio elasticity due to prolonged working lives. See methodological annex III for more details.

Graph 3 – Average effective retirement age in Austria (women)



Source: Commission services.

Note: Figures for effective retirement ages are proxied by projections for effective exit ages from the labour market based on Commission services (DG ECFIN) Cohort Simulation Model (CSM) (reference age group 50-74) and EUROPOP2010. Figures are slightly diverging from the ones published in the 2012 Ageing Report due to a different reference age group (50-70 in the 2012 Ageing Report).

In the example of Austria, this means that from 2036 onwards, the exit probabilities distribution as projected in the 2012 Ageing Report for that year (representing the expected steady state of the pension system at that point in time) is progressively shifted fully in line with gains in life expectancy (as described in Annex 3, section 5.1). The combined simulation (blue line) results in a slightly higher average effective retirement age by 2060 compared to the strict continuous shift of the 2010 exit probability distribution in line with life expectancy gains (red line), as it takes already into account a higher labour market participation of older women up to 2036 due to the female retirement age increase to 65 in the medium-run. This change in the exit probabilities distribution between 2010 and 2036 is however not incorporated in the strict shift which keeps the 2010 exit probabilities distribution unchanged.

- **Benefit ratio effect:** The benefit ratio (calculated as the average pension divided by the economy-wide average wage) is increased due to higher pension contributions based on longer working lives. The average pension itself is also increasing in line with increased GDP growth. To measure how average pension benefits are affected by a prolonged working life due to a link of retirement ages to longevity gains in each Member States, the 2012 Ageing Report baseline scenario is compared with the 2012 Ageing Report alternative scenario in which the participation rate (and also the employment rate) of older workers (55-64) is higher ("higher older workers employment scenario"). This scenario is used because an increase in the retirement age as simulated in the modelled scenarios of this paper indirectly leads to an increase in employment of older workers. Hence, the resulting benefit ratio effect can be taken as a good modelling approximation to calculate the benefit ratio effect of a retirement

age link to life expectancy.³² It is assumed that increases in the benefit ratio due to longer working lives are not restricted e.g. by a cap based on e.g. a full contribution period. The 100% shift scenario is however also run separately with constant benefit ratios to show pure sustainability effects (see also section 1).

- *Effect on public pension expenditures and NDC systems:* The basis for public pension expenditures are the projections as reported in the 2012 Ageing Report.³³ Total public pension expenditures in the simulation scenarios are calculated according to the changed average pension per projection year multiplied by the decreased number of pensioners due to postponed retirement. For countries that are mainly based on NDC pension systems (Italy, Latvia, Poland and Sweden), the overall effect on the scheme's finances should theoretically be neutral as the shorter period of pension payments is fully offset by increased individual pension entitlements due to longer working lives.³⁴ For simplicity reasons, the change in pension expenditures in comparison to the 2012 Ageing Report is thus set to be 0 when including potential benefit ratio increases due to longer working lives under the rules linking retirement ages to longevity gains.
- *Macro- vs. micro-level:* A uniformly applied macro-level approach with fixed assumptions for all Member States does obviously not provide sufficient possibilities of capturing all country-specific micro-level details in individual pension when modelling a retirement age increase in line with longevity gains systems (e.g. increasing disability pension expenditures or full contributory periods). Consequently, individual specificities such as increased accrual rates beyond a certain contributory period are not explicitly considered in the scenarios. They are nevertheless at least partially captured by the country-specific benefit ratio elasticity due to prolonged working lives³⁵.
- *Expenditures effects on other age-related items:* Expenditures on other age-related items (health care, long-term care, education and unemployment benefits) are supposed to evolve in line with the 2012 Ageing Report. For simplicity reasons, it is thus assumed that the simulated increases in retirement ages have no impact on other expenditures (neither directly or via the GDP effect), such as health care expenditures or unemployment benefits that potentially could occur.³⁶ Overall sustainability figures are thus calculated according to the total cost of ageing under the different scenarios, thereby purely taking into account updated pension expenditure figures although the expected resulting higher GDP growth and higher unemployment could result in

³² In the 2012 Ageing Report, benefit ratio increases are modelled by Member States in their national models and partially take into account changes in wage profiles, disability prevalence or average job tenure (see methodological annex III for more details).

³³ European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2012, 'The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)', European Economy, No. 2/2012.

(http://ec.europa.eu/economy_finance/publications/european_economy/2012/pdf/ee2_en.pdf)

After the publication of the 2012 Ageing Report, updated pension projection figures have been peer-reviewed and endorsed for several countries (Belgium, Bulgaria, Czech Republic, Denmark, Latvia, Hungary, the Netherlands, Poland and Slovakia) by the EPC. Updated figures are thus taken into account (cut-off date: April 2013).

³⁴ See OECD, 2012, "Putting pensions on auto-pilot: automatic-adjustment mechanisms and financial sustainability, OECD pension outlook 2012, p.64, Paris.

³⁵ See methodological annex III for more details.

³⁶ Next to the pure increase in the statutory retirement age, the major challenge for the EU Member States is obviously to create the conditions for older workers to live and work longer, healthy, active and prosper to successfully seize the opportunity to make the EU economies sustainable in the long-term. Retirement age increases thus have to be underpinned by adequate active ageing strategies.

slightly higher health care (through the income elasticity effect) and unemployment benefits expenditures.

3.1.3. Scenario for a pension benefit link to gains in life expectancy

Another scenario tries to assess the budgetary impact of a rule that links pension benefits (downward) to longevity gains (100%) without adapting early and statutory retirement ages. Technically, this scenario is run as the "100% shift scenario", but under the assumption that the benefit ratios as projected in the 2012 Ageing Report for the years 2010-2060 are kept constant. This "100% shift in pension benefits scenario" therefore illustrates the reform option of reducing the pension benefit, which is in part offset by an 'incentive response' of persons to work longer. A scenario where the pension benefit is reduced, but without dynamic 'incentive effects' on labour force participation, would in all likelihood show an even larger decline in pension spending vs. the baseline (2012 Ageing Report). Moreover, it would not entail an improvement in the pension benefit ratio compared with the baseline.

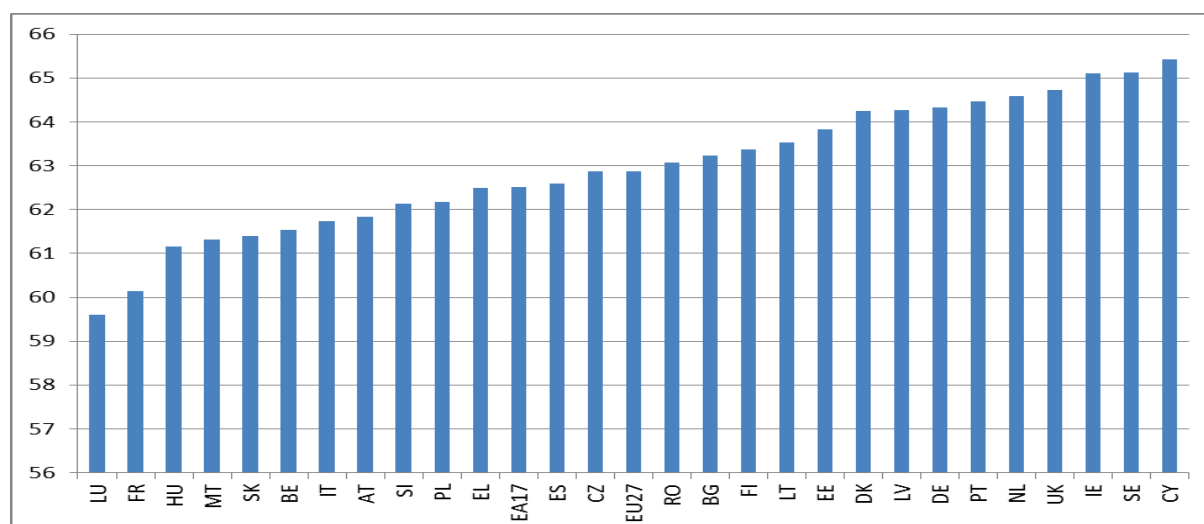
For example, in a DB system, pension benefits (PB) are the result of a product between the contributory period (C) and an average yearly accrual rate (a): $PB = C \times a$. Linking retirement ages to gains in life expectancy has an increasing effect on the contributory period (C) and thus also on the overall pension benefits (PB). Linking the accrual rate (a) to life expectancy reduces (a) over time. Thus, an equivalent increase in the contributory period (C) is needed, in order to keep pension benefits at least constant. There is hence a financial incentive to stay longer on the labour market and thus to retire later (whereas under a retirement age link to life expectancy, incentives are very strong to work longer).

3.2. Labour force effect

3.2.1. Current legislation

Current effective retirement ages vary significantly between EU Member States. Thus, they are generally in differing positions to address their sustainability challenges through reforms that would postpone retirement: in 2011, Luxembourg and France showed the lowest effective retirement ages, while the highest exit ages were observable in Ireland, Sweden and Cyprus (see Graph 4).

Graph 4 - Average effective retirement age in 2011



Source: Commission services.

Note: Projections for effective retirement ages based on Cohort simulation model (CSM) projections for the average exit age from the labour market (reference age group 50-74) and EUROPOP2010 (Figures are slightly diverging from the 2012 Ageing Report due to a different reference age group (50-70 in the 2012 Ageing Report)).

In the absence of additional policy measures aimed at postponing retirement³⁷ – like a change in the statutory retirement age or other encouragements for older workers to remain longer in the labour market – only a moderate increase in effective retirement ages (measured by the average exit age from the labour market) over the next 50 years is projected (see Table 5 below and Table 1 above).

The average EU effective retirement age as projected in the 2012 Ageing Report would increase from 62.9 in 2011 to 65.3 years in 2060 for men (+2.4) and from 62.0 to 65.1 for women (+3.1). In the euro area, comparable increases are observable (men: 62.5 in 2011, 65.1 in 2060 (+2.6); women: 62.2 in 2011, 65.1 in 2060 (+2.8)). A large part of effective retirement age increase is projected to be achieved in the next two decades (EU: 64.9 for men and 64.5 for women in 2030; euro area: 64.8 for men and 64.6 for women), due to implemented pension reforms that inter alia lead to a gradual increase of statutory retirement ages or restrictions in early retirement. The EU average statutory retirement age reflecting current national legislation is increasing for men from 64.4 in 2011 via 66.2 in 2030 to 67.1 in 2060 (+2.7) (see Table 4). For women, the increase is even more remarkable: from 62.2 in 2010 via 65.9 in 2030 to 67.0 in 2060 (+4.8) (see Table 1 for country-specific details). In the

³⁷ On top of already legislated changes of early and statutory retirement ages to be phased in over time. See Annex I for an overview of respective reforms in recent years.

euro area, the average statutory retirement age increases from 64.5 in 2011 to 67.1 in 2060 for men (+2.6) and from 63.2 in 2011 to 67.1 in 2060 for women (+3.9). The generally larger increase of statutory retirement ages for women is mainly due to a gradual harmonisation of retirement ages for women with those for men in the future. The consequently projected higher labour market participation of older women thus also leads to a generally larger increase of effective retirement ages for women in comparison with men.

At the same time, it should be noted that, according to the EUROPOP2010 demographic projections, the remaining life expectancy at age 65 is expected to increase in the EU from 17.3 years in 2011 to 22.4 in 2060 for men (+5.1) and from 20.8 in 2011 to 25.6 years in 2060 for women (+4.8). In the euro area, life expectancy at age 65 increases from 17.9 years in 2011 to 22.6 years in 2011 for men (+4.7) and from 21.5 years in 2011 to 25.9 years in 2060 for women (+4.4). Hence, only about half of the projected increase in life expectancy at age 65 over the next 50 years is currently also reflected in the effective retirement age increases as projected in the 2012 Ageing Report. For statutory retirement ages, the share is slightly larger. This especially holds for female retirement ages due to the catching-up process to male retirement ages.³⁸

As a consequence of the partial reflection of gains in life expectancy in the effective retirement age increases, the average share of (adult) lifetime spent in retirement is projected to be increasing in every country up to 2060, except for Italy (men and women) as well as the Czech Republic, Poland and Slovakia (women) (see Table 3).

³⁸ Given that especially female statutory retirement ages are in most Member States currently still below 65, a comparison of statutory retirement age developments with life expectancy gains at age 65 (here used for simplicity reasons to show overall EU developments) slightly underestimates the individual potential for further statutory (and effective) retirement age increases given the increases in life expectancy in each Member State. In the scenario calculations, the change in life expectancy at the 2010 statutory retirement age (base year for 2012 Ageing Report) is thus taken as a reference. The simulation results for the statutory retirement age increase under the 100% shift scenario is accordingly slightly higher for women than the projected increase in life expectancy at age 65, as can also be seen in Table 5.

Table 3 - Average (adult) lifetime spent in retirement (2012 Ageing Report projections)

	Average lifetime spent in retirement (2012 Ageing Report baseline projections)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
BE	24%	25%	26%	29%	4%	28%	28%	29%	31%	4%
BG	19%	19%	20%	24%	5%	25%	24%	26%	29%	4%
CZ	21%	21%	22%	24%	3%	28%	28%	27%	27%	0%
DK	22%	21%	21%	23%	2%	26%	24%	24%	27%	1%
DE	22%	22%	22%	25%	3%	26%	25%	26%	28%	2%
EE	19%	19%	21%	24%	5%	24%	24%	25%	28%	4%
IE	21%	22%	23%	25%	5%	22%	23%	24%	26%	5%
EL	25%	25%	25%	27%	2%	27%	27%	28%	29%	2%
ES	24%	24%	24%	26%	2%	27%	26%	26%	28%	1%
FR	27%	26%	26%	28%	1%	31%	30%	29%	31%	0%
IT	25%	22%	23%	24%	-1%	29%	26%	26%	26%	-4%
CY	21%	22%	23%	26%	4%	25%	26%	27%	29%	4%
LV	18%	19%	20%	24%	6%	23%	23%	24%	27%	4%
LT	18%	20%	21%	25%	7%	25%	25%	25%	28%	3%
LU	26%	27%	28%	31%	5%	29%	31%	31%	34%	5%
HU	21%	19%	21%	24%	3%	27%	24%	24%	27%	1%
MT	25%	24%	24%	27%	2%	29%	28%	28%	30%	1%
NL	21%	20%	21%	22%	1%	27%	25%	26%	27%	1%
AT	24%	24%	25%	28%	3%	29%	28%	28%	30%	2%
PL	21%	19%	20%	24%	2%	29%	27%	26%	27%	-2%
PT	22%	22%	22%	24%	3%	24%	25%	25%	27%	3%
RO	20%	20%	22%	25%	6%	25%	25%	26%	29%	4%
SI	23%	22%	23%	26%	3%	29%	28%	28%	30%	1%
SK	21%	22%	23%	23%	2%	28%	26%	27%	26%	-2%
FI	23%	23%	24%	27%	4%	27%	27%	27%	30%	3%
SE	22%	22%	23%	25%	3%	26%	26%	27%	29%	4%
UK	22%	23%	24%	25%	3%	26%	26%	26%	27%	1%
EA 17	23%	23%	23%	25%	2%	27%	26%	26%	28%	1%
EU27	23%	22%	23%	25%	3%	27%	26%	26%	28%	1%

	Average adult lifetime spent in retirement (2012 Ageing Report baseline projections)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
BE	31%	32%	33%	36%	5%	35%	36%	37%	39%	4%
BG	25%	25%	26%	31%	5%	32%	31%	33%	36%	4%
CZ	27%	27%	29%	30%	3%	35%	35%	34%	34%	-1%
DK	28%	26%	26%	29%	2%	33%	31%	31%	33%	0%
DE	28%	28%	28%	31%	3%	33%	32%	32%	35%	2%
EE	24%	25%	26%	31%	6%	30%	30%	31%	35%	4%
IE	26%	28%	29%	32%	6%	28%	29%	30%	33%	5%
EL	31%	31%	32%	34%	2%	34%	34%	35%	36%	2%
ES	31%	30%	30%	33%	2%	33%	33%	32%	35%	1%
FR	35%	33%	33%	36%	1%	39%	37%	37%	39%	0%
IT	32%	28%	29%	30%	-2%	37%	32%	33%	32%	-5%
CY	27%	28%	29%	32%	5%	31%	32%	34%	36%	5%
LV	23%	24%	26%	30%	7%	29%	29%	31%	34%	5%
LT	24%	25%	27%	31%	8%	32%	32%	32%	35%	3%
LU	34%	35%	36%	39%	5%	37%	38%	39%	42%	5%
HU	28%	25%	26%	31%	3%	34%	30%	31%	34%	0%
MT	32%	31%	30%	33%	1%	37%	35%	35%	38%	1%
NL	27%	26%	27%	28%	1%	34%	32%	33%	34%	0%
AT	31%	31%	32%	35%	4%	36%	36%	36%	38%	2%
PL	28%	24%	26%	30%	2%	37%	34%	33%	33%	-4%
PT	28%	28%	28%	31%	3%	31%	31%	31%	34%	3%
RO	26%	26%	28%	32%	6%	32%	32%	33%	36%	4%
SI	30%	29%	30%	33%	3%	37%	35%	35%	37%	0%
SK	28%	29%	29%	29%	1%	36%	33%	34%	33%	-3%
FI	29%	29%	30%	33%	4%	34%	34%	34%	37%	3%
SE	28%	28%	29%	31%	3%	32%	33%	34%	36%	4%
UK	28%	29%	30%	31%	3%	33%	33%	33%	34%	1%
EA 17	30%	29%	29%	32%	2%	34%	33%	33%	35%	1%
EU27	29%	28%	29%	32%	3%	34%	33%	33%	35%	1%

Source: Commission services, EPC.

Note: The share of lifetime spent in retirement is determined by dividing life expectancy at retirement (effective retirement age at specific point in time) by the sum of life expectancy at retirement and the effective retirement age. The share of adult lifetime is determined by taking into account all years above the age of 18.

This is due to the fact that Italy and Slovakia have already implemented strong links between retirement ages and life expectancy in their pension system legislation and the Czech Republic and Poland will increase the retirement age for women drastically in the near future. On average, and assuming no policy changes, the average share of lifetime spent in retirement in the EU is (in the 2012 Ageing Report baseline scenario) projected to rise from 23% in 2011 to 25% in 2060 for men and from 27% in 2010 to 28% in 2060 for women (see Table 3, upper picture). The average share of adult lifetime spent in retirement in the EU is projected to increase from 29% in 2011 to 32% in 2060 for men and from 34% in 2010 to 35% in 2060 for women (see Table 3, lower picture).

3.2.2. "100% shift scenario"

Under the assumption that 2010 statutory retirement ages are increased fully in line with gains in life expectancy, the average EU statutory retirement age would increase by 5.1 years to 69.6 years in 2060 for men (+2.4 years in comparison to current legislation, as reflected in the 2012 Ageing Report) and by 5.0 years to 67.2 years for women (+0.2 years) (see Table 4). As intended by this scenario, the increase in the average statutory retirement age is almost exactly in line with the projected increase in life expectancy at age 65 up to 2060.

Table 4 – EU average statutory retirement age development by gender: 2012 Ageing Report vs. (strict) postponed retirement scenarios

	Life expectancy at age 65									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	17.9	18.8	19.8	22.6	4.7	21.5	22.4	23.3	25.9	4.4
EU27	17.3	18.3	19.4	22.4	5.1	20.8	21.8	22.8	25.6	4.8
	Average statutory retirement age (current legislation reflected in 2012 Ageing Report)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	64.5	65.6	66.4	67.1	2.6	63.2	65.5	66.4	67.1	3.9
EU27	64.4	65.6	66.2	67.1	2.7	62.2	64.8	65.9	67.0	4.8
	Average statutory retirement age (66% shift scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	64.5	65.2	65.9	67.7	3.2	63.2	63.9	64.4	66.2	3.0
EU27	64.4	65.2	65.9	67.8	3.4	62.2	63.0	63.6	65.5	3.3
	Average statutory retirement age (100% shift scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	64.5	65.6	66.6	69.3	4.8	63.2	64.2	65.1	67.7	4.5
EU27	64.4	65.6	66.6	69.6	5.1	62.2	63.3	64.3	67.2	5.0
	Average statutory retirement age (constant time in retirement scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	64.5	65.3	66.2	68.7	4.2	63.2	63.8	64.5	66.5	3.3
EU27	64.4	65.3	66.3	69.1	4.6	62.2	62.9	63.6	65.8	3.6
	Average statutory retirement age (EU convergence scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	64.5	65.7	66.9	70.8	6.3	63.2	64.0	65.0	67.8	4.6
EU27	64.4	65.5	66.6	70.0	5.5	62.2	63.1	64.0	66.8	4.6

Source: Commission services, Eurostat (EUROPOP2010).

Note: Statutory retirement age results show the projection outcome of the strict application of the different postponed retirement scenarios and thus not the combined projections results as assumed for the effective retirement ages in Table 5. As intended, the statutory retirement result for the (partial) shift scenario is thus in line with the (partial share of the) overall expected increase in life expectancy at retirement.

The rather small difference for women between the "100% shift scenario" and the 2012 Ageing Report figures reflects the catching-up process of female to male statutory retirement ages that is already observable under current legislation, often based on recently legislated pension reforms. This leads to an increase in the average female statutory retirement age up to 2060 that is almost as strong as the modelled increase of the (2010) female statutory retirement ages under the "100% shift scenario".

When comparing effective retirement age developments between the 2012 Ageing Report projections and the "100% shift scenario" (Table 5), the difference becomes more noticeable. This is mainly due to the fact that in the simulations a combination of the higher effective retirement age outcome between the 2012 Ageing Report scenario and the strict application of the shift scenario is assumed (see also Graph 3 and Box 1 above on "Effective retirement age projections under the simulation scenarios"). Based on these assumptions, the average EU effective retirement age would rise by 4.2 years to 67.1 years in 2060 for men (+1.8 years in comparison to 2012 Ageing Report projections) and by 4.6 years to 66.6 years for women (+1.5 years) (see Table 5, country-specific values in Annex Table 15). The resulting shift in the effective retirement ages is not fully in line with the change in life expectancy. This is due to an unchanged disability and morbidity prevalence as well as diverse early exit pathways that are assumed to remain in place over the projection horizon. Nevertheless, the increase in the effective retirement age is quite remarkable. Accompanying measures such as specific active labour market policies would obviously have to be taken at the national level to ensure that not only the statutory but also the effective retirement age rises in line with future changes in life expectancy, as simulated in this paper.³⁹

A closer look at country-specific values shows the diverging effect of a retirement age link to gains in life expectancy on effective retirement ages across Member States. Table 6 below presents firstly the effective retirement age as projected in the 2012 Ageing Report, thus representing current legislation. Secondly, the average effective retirement outcomes under the strict application of a full shift of the 2010 retirement ages in line with life expectancy, thus neglecting already legislated retirement age increases, is displayed. Thirdly, the combination of the higher effective retirement age outcome between the 2012 Ageing Report scenario and the strict application of the 100% shift scenario is shown. The latter projections are the basis for the simulation of public pension spending later on. And finally, the years from/for which onwards the 100% shift scenario results in higher effective retirement ages than under the 2012 Ageing Report scenario, separated by gender, is displayed.

Several interesting results are worth mentioning: within the first two decades of the projection period, current national pension legislations foresee already substantial increases in early and/or statutory retirement age increases. As a consequence, effective retirement ages are rising faster up to 2030 than under the strict link of 2010 early/statutory retirement ages to gains in life expectancy in several Member States (Denmark, Germany, Greece, Spain, France, Italy, Malta, the Netherlands, Poland, Slovenia and Slovakia). For those countries the 2012 Ageing Report projections are thus mainly taken into account during that period for the (combined) "100% shift scenario", which is used later on to estimate pension spending (see Table 6, last column, which of the two projections is taken into account over the projection horizon). However, it must be borne in mind that in France, Italy, Malta, Poland, Slovenia and

³⁹ Lassila *et al.* (2013) also assess the impacts of linking retirement ages to life expectancy gains in the Finnish pension system. In a scenario where the retirement age is linked to life expectancy by 2/3 and early pension age limits are changed accordingly, the effective retirement age increases by 1.5 years while the statutory age rises by 4 years. The large discrepancy between the statutory and effective retirement ages is mainly due to i) higher disability risks by age and ii) higher risks of unemployment in older age groups that are both considered as affecting working career decisions substantially.

Slovakia, the stronger rise in the effective retirement age under current legislation in comparison to the full link to life expectancy scenario is also largely influenced by the comparably low level of the effective and statutory retirement age at the beginning of the projection horizon (all clearly below EU average effective retirement age of 62.4 years in 2011). In those countries a catching up process towards the other Member States with already higher statutory (and effective) retirement ages at the beginning of the projection horizon is expected to take place over the short- and medium run. Moreover, although the increase in the effective retirement age under current legislation (as reported in the 2012 Ageing Report) up to 2030 is higher than under the "100% shift scenario", the effective retirement age level in France, Malta, Slovenia and Slovakia in 2030 is still supposed to be clearly below the projected EU average effective retirement age (64.7 years). This shows that additional efforts in terms of retirement age increases beyond the full link of 2010 retirement ages in line with gains in life expectancy would be necessary to approach the EU average.

Table 5 – EU average effective retirement age development by gender: 2012 Ageing Report vs. (combined) postponed retirement scenarios

	Life expectancy at age 65									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	17.9	18.8	19.8	22.6	4.7	21.5	22.4	23.3	25.9	4.4
EJ27	17.3	18.3	19.4	22.4	5.1	20.8	21.8	22.8	25.6	4.8
	Average effective retirement age (2012 Ageing Report baseline projections)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	62.5	64.4	64.8	65.1	2.6	62.2	64.2	64.6	65.1	2.8
EJ27	62.9	64.6	64.9	65.3	2.4	62.0	63.8	64.5	65.1	3.1
	Average effective retirement age (66% shift scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	62.5	64.4	64.9	65.4	2.9	62.2	64.2	64.6	65.3	3.1
EJ27	62.9	64.7	65.1	66.1	3.2	62.0	63.9	64.6	65.5	3.5
	Average effective retirement age (100% shift scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	62.5	64.4	64.9	66.6	4.0	62.3	64.2	64.6	66.3	4.1
EJ27	62.9	64.7	65.3	67.1	4.2	62.0	63.8	64.6	66.6	4.6
	Average effective retirement age (constant time in retirement scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	62.5	64.5	64.9	66.5	3.9	62.2	64.2	64.6	65.8	3.5
EJ27	62.9	64.7	65.3	67.3	4.4	62.0	63.8	64.5	66.0	4.0
	Average effective retirement age (EU convergence scenario)									
	Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
EA17	62.5	64.5	65.1	67.8	5.2	62.2	64.2	64.6	66.7	4.5
EJ27	62.9	64.7	65.2	67.7	4.8	62.0	63.8	64.5	66.5	4.5

Source: Commission services, Eurostat (EUROPOP2010).

Note: Projections for effective retirement ages based on Cohort simulation model (CSM) projections for the average exit age from the labour market (reference age group 50-74) and EUROPOP2010. Baseline figures are slightly diverging from the ones published in the 2012 Ageing Report due to a different reference age group (50-74 in this paper vs. 50-70 in the 2012 Ageing Report). Effective retirement age projections in the simulated scenarios are based on a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the strict application of the respective simulation scenario at every point in time over the projection horizon (see also Graph 3). The combined projections are later on taken as a basis for the simulated pension expenditure projections. More details on the projection methodology are presented in the methodological annex III.

Table 6 – Total average effective retirement age 2012 Ageing Report vs. 100% shift scenario

	Average effective retirement age (total)															Period(s) for which an automatic link to life expectancy is applied on top of current legislation	
	2012 Ageing Report					Strict 100% shift					(Combined) 100% shift scenario						
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	Women	Men
BE	61.5	62.2	62.2	62.2	0.7	61.5	61.3	62.3	64.7	3.2	61.5	62.2	62.5	64.9	3.4	[2032]	[2025]
BG	62.3	63.6	63.6	63.6	1.3	62.5	63.6	64.8	68.0	5.5	62.5	63.6	64.8	68.0	5.5	[2010]	[2010-2011];[2021]
CZ	61.5	62.3	63.4	65.3	3.9	61.5	62.4	63.6	66.6	5.2	61.5	62.5	63.8	66.7	5.2	[2057]	[2011]
DK	63.3	65.7	66.3	66.8	3.5	63.3	64.2	65.2	67.7	4.4	63.3	65.7	66.3	67.7	4.4	[2010-2012];[2046]	[2011-2012];[2044]
DE	63.9	65.1	65.5	65.5	1.6	63.9	63.7	64.5	66.9	3.0	63.9	65.1	65.5	67.1	3.2	[2043]	[2039]
EE	64.2	64.6	65.2	65.2	1.0	64.4	65.1	65.7	68.5	4.2	64.3	65.1	65.7	68.5	4.2	[2010]	[2010-2013];[2018]
IE	65.9	65.9	65.8	65.9	-0.1	66.0	66.6	67.4	69.4	3.3	66.0	66.6	67.4	69.4	3.3	[2010]	[2010]
EL	62.4	64.7	65.0	66.3	3.9	62.4	63.1	63.9	66.2	3.8	62.4	64.7	65.0	66.3	3.9	#N/A	#N/A
ES	63.2	64.9	65.6	65.6	2.3	63.2	63.9	64.7	66.9	3.7	63.2	64.9	65.6	67.0	3.7	[2038]	[2044]
FR	60.2	62.2	62.8	62.8	2.6	60.2	60.9	61.7	63.9	3.7	60.2	62.2	62.8	64.0	3.9	[2045]	[2042]
IT	61.5	65.7	65.8	67.4	5.8	61.5	62.0	62.9	65.2	3.6	61.5	65.7	65.8	67.4	5.8	#N/A	#N/A
CY	64.6	65.3	65.6	66.9	2.3	64.7	64.7	65.6	67.9	3.2	64.7	65.3	65.7	68.2	3.5	[2031]	[2010]
LV	64.0	64.9	65.4	65.4	1.3	64.3	65.0	66.1	68.8	4.5	64.3	65.0	66.1	68.8	4.5	[2010-2012];[2029]	[2010]
LT	62.5	63.4	64.0	64.0	1.5	62.7	63.5	64.6	67.9	5.2	62.6	63.6	64.6	68.0	5.3	[2029]	[2010-2013];[2018]
LU	60.1	60.0	60.0	60.0	0.0	60.2	60.9	61.8	64.5	4.3	60.2	60.9	61.8	64.5	4.3	[2010]	[2010]
HU	60.7	64.5	65.1	65.1	4.4	60.7	64.5	65.1	66.4	5.7	60.7	64.5	65.1	66.6	5.9	[2052]	[2041]
MT	60.8	62.4	63.3	63.3	2.5	60.8	61.3	62.5	65.0	4.2	60.8	62.4	63.3	65.5	4.7	[2034]	[2041]
NL	63.5	65.6	66.2	67.2	3.6	63.6	64.6	65.5	67.7	4.1	63.8	65.6	66.2	67.7	3.9	[2010-2012];[2045]	[2010-2012];[2046]
AT	61.2	62.3	62.8	62.9	1.7	61.2	61.8	62.8	65.0	3.8	61.2	62.3	62.9	65.3	4.1	[2036]	[2027]
PL	60.4	63.8	65.0	65.9	5.5	60.4	61.3	62.4	65.4	5.0	60.4	63.8	65.0	66.6	6.1	#N/A	[2048]
PT	64.6	65.4	65.7	65.7	1.2	64.6	65.3	66.1	68.0	3.4	64.6	65.6	66.6	68.6	4.0	[2015]	[2026]
RO	62.1	62.9	63.3	63.3	1.2	62.2	63.1	64.2	67.3	5.1	62.1	63.1	64.3	67.4	5.3	[2010]	[2021]
SI	60.9	63.1	63.6	63.6	2.7	60.9	61.5	62.4	64.9	4.0	60.9	63.1	63.6	65.1	4.2	[2057]	[2030]
SK	60.0	61.8	62.5	66.0	6.0	60.1	61.0	62.3	65.8	5.8	60.0	62.1	63.1	66.7	6.7	#N/A	[2010]
FI	63.0	64.0	64.0	64.0	1.0	63.0	63.6	64.4	66.7	3.7	63.0	64.0	64.5	66.8	3.8	[2029]	[2020]
SE	64.6	65.0	65.0	65.0	0.5	64.6	65.3	66.2	68.3	3.8	64.5	65.3	66.2	68.3	3.8	[2011]	[2012]
UK	64.0	64.5	65.1	65.8	1.8	64.0	64.9	65.8	68.1	4.1	64.0	64.9	65.8	68.4	4.4	[2017-2018];[2033]	[2010]
EA17	62.4	64.3	64.7	65.1	2.7	62.4	62.8	63.6	65.9	3.5	62.4	64.3	64.8	66.4	4.0		
EU27	62.4	64.2	64.7	65.2	2.8	62.4	63.0	63.9	66.4	3.9	62.4	64.2	64.9	66.9	4.4		

Source: Commission services.

Note: Figures based on population-weighted averages. Projections for effective retirement ages based on Cohort simulation model (CSM) projections for the average exit age from the labour market (reference age group 50-74) and EUROPOP2010. Baseline figures are slightly diverging from the ones published in the 2012 Ageing Report due to a different reference age group (50-74 in this paper vs. 50-70 in the 2012 Ageing Report). Effective retirement age projections in the combined scenario is based on a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report baseline scenario and the strict application of the respective simulation scenario at every point in time over the projection horizon (see also Graph 3). The combined projections are later on taken as a basis for the simulated pension expenditure projections. More details on the projection methodology are presented in the methodological annex III.

In countries with rather constant retirement ages even in the long-run under current legislation, a large difference between the effective retirement age projections in the 2012 Ageing Report and the ones under the strict 100% shift rule is already observable in the early stages of the projection horizon (up to 2030 especially visible for Bulgaria, Ireland, Luxembourg, Romania and Sweden⁴⁰). For those countries, the latter projections are therefore relevant throughout the whole projection horizon in the (combined) "100% shift scenario". For most of the countries, the main effect of the full link of retirement ages to gains in life expectancy becomes visible after 2030, when already adopted future increases in retirement ages become fully implemented in the Member States' pension systems. At the same time, potential further adjustments based on increases in life expectancy are reflected in the 100%

⁴⁰ Even though statutory retirement ages are under current legislation expected to stay rather stable in Ireland and Sweden, the effective retirement ages in 2010 as well as in 2030 are nevertheless clearly higher than the EU average (by more than 3 and 2 years, respectively). As a consequence of the applied 100% shift, the effective retirement age in those two countries will also remain clearly above the EU average in 2060.

shift simulation. In almost every country (except for Greece and Italy⁴¹), the effective retirement age under the strict application of the 100% shift is thus higher in 2060 than projected under current legislation. Accordingly, the strict shift projections are mainly taken into account for the final (combined) "100% shift scenario".⁴²

A catching-up process of female to male statutory retirement ages is already observable under current legislation. This leads to higher female effective retirement ages under the 2012 Ageing Report projections in comparison to the strict shift of 2010 retirement ages fully in line with longevity gains, at least for the beginning of the projection horizon. Thus, the strict shift projections for women starts to be taken into account for the final (combined) "100% shift scenario" on average slightly later during the projection horizon than for men.

The country-specific average effective retirement age increase as simulated under the "100% shift scenario" is also reflected in the projected figures for the participation rates of older workers aged 55-74 (see Table 7). These figures are projected to increase substantially in the EU by almost 6 p.p. for the "100% shift scenario" on top of the increase already projected in the 2012 Ageing Report baseline scenario. The highest increase of more than 10 p.p. in comparison to the 2012 Ageing Report is observable for 11 countries (Bulgaria, Estonia, Ireland, Cyprus, Latvia, Lithuania, Luxembourg, Portugal, Romania, Finland and Sweden) which are supposed to keep their retirement age under current legislation rather constant in the future.

⁴¹ Also for Poland and Slovakia the 2012 Ageing Report outcome seems to be higher when looking at total effective retirement ages. Yet, diverging results are observable for men and women, leading to a more favourable labour force projection under the 100% shift scenario than under the 2012 Ageing Report scenario. Moreover, in several other countries with legislated retirement age links to longevity gains (e.g. Czech Republic, Denmark and the Netherlands), the statutory retirement age is supposed to increase stronger between 2010 and 2060 than the increase in life expectancy at retirement over that horizon (see also Table 1). Hence, one could expect that the 100% shift scenario would not lead to an additional increase in the effective retirement age on top of the 2012 Ageing Report results. Yet, in the latter projections – as endorsed by the EPC –, the expected increase in the statutory retirement age is only partially reflected in the effective retirement age increase. In the "100% shift scenario", the link between the statutory and effective retirement age is assumed to be stronger. As a consequence, it is assumed that additional increases in the effective retirement age in comparison to the 2012 Ageing Report can be achieved, when simulating a 100% link of retirement ages to gains in life expectancy.

⁴² The combined simulation generally results in a slightly higher average effective retirement age by 2060 compared to the strict continuous shift of the 2010 retirement ages as the shift in the combined scenario is applied on top of the current legislation, once the strict shift scenario results in higher effective retirement ages than projected in the 2012 Ageing Report (detailed explanations in Box 1 and the methodological annex III).

Table 7 – Participation rates of older workers (55-74) development under different scenarios

	Participation rates 55-74 (total)															
	2012 Ageing Report					100% shift scenario					EU convergence scenario					
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	
BE	25.3	31.8	30.6	29.8	4.5	25.3	31.8	31.1	39.6	14.3	25.3	31.8	35.1	48.3	23.0	BE
BG	31.5	34.8	37.8	34.2	2.8	31.6	34.5	40.3	49.7	18.1	31.5	34.8	37.9	41.0	9.5	BG
CZ	33.4	32.7	41.1	43.9	10.5	33.3	32.9	42.4	48.6	15.2	33.4	32.2	41.8	49.1	15.8	CZ
DK	39.2	46.8	51.3	51.8	12.6	39.3	42.3	45.3	54.9	15.6	39.2	47.2	51.3	52.5	13.3	DK
DE	36.4	48.4	45.2	45.5	9.1	36.4	48.4	45.2	51.4	15.0	36.4	48.4	45.2	53.1	16.7	DE
EE	43.2	45.1	46.7	41.6	-1.6	43.4	46.9	48.6	54.3	10.9	43.3	45.9	46.3	46.7	3.4	EE
IE	39.2	44.2	45.9	44.9	5.8	39.2	46.2	50.7	56.8	17.6	39.2	45.4	48.0	49.0	9.8	IE
EL	28.6	33.6	39.0	48.4	19.8	28.6	33.6	39.0	48.4	19.8	28.2	34.3	40.1	49.4	21.1	EL
ES	31.4	42.1	48.9	47.5	16.1	31.4	42.1	48.9	52.5	21.1	31.4	42.1	48.9	54.7	23.3	ES
FR	27.1	30.9	36.4	36.0	8.9	27.1	31.0	36.4	40.4	13.3	27.1	30.9	37.7	53.0	25.9	FR
IT	23.7	35.6	43.5	46.8	23.1	23.7	35.6	43.5	46.8	23.1	23.7	35.6	43.5	50.8	27.0	IT
CY	41.5	43.7	44.1	42.5	1.0	42.0	44.4	46.9	56.3	14.2	41.5	44.3	46.2	53.1	11.6	CY
LV	36.7	45.7	46.7	41.9	5.2	36.8	46.2	48.0	56.0	19.3	36.7	45.8	46.6	43.9	7.2	LV
LT	35.0	40.9	38.7	33.7	-1.4	35.1	40.9	39.8	48.8	13.7	35.0	40.7	39.2	41.4	6.4	LT
LU	25.4	26.0	23.5	22.3	-3.1	25.5	29.2	30.3	40.0	14.5	25.5	28.9	33.5	46.1	20.6	LU
HU	24.2	32.0	42.4	36.5	12.3	24.2	32.0	42.4	44.6	20.4	24.2	32.0	42.4	44.9	20.7	HU
MT	21.8	22.7	29.4	29.6	7.8	21.8	22.7	29.4	36.5	14.8	21.8	22.8	29.4	42.1	20.4	MT
NL	37.9	44.9	49.4	54.3	16.4	38.1	43.0	45.7	55.6	17.5	38.1	45.1	49.5	55.7	17.6	NL
AT	27.3	34.8	33.6	35.5	8.2	27.3	34.8	33.7	43.7	16.3	27.3	34.8	35.4	54.0	26.7	AT
PL	26.9	29.2	36.6	38.0	11.1	26.9	29.2	36.6	39.7	12.8	26.9	29.2	36.6	42.5	15.6	PL
PT	39.6	44.5	48.6	49.0	9.4	39.6	44.8	50.6	59.6	20.0	39.6	44.5	48.6	54.3	14.7	PT
RO	33.1	30.1	34.5	28.4	-4.6	33.1	30.4	36.3	39.9	6.8	33.1	30.1	35.3	37.4	4.3	RO
SI	26.4	32.6	38.1	35.9	9.6	26.4	32.6	38.1	40.9	14.5	26.4	32.6	38.5	50.1	23.8	SI
SK	29.8	30.9	35.7	41.6	11.8	29.7	31.7	37.8	44.5	14.8	29.8	31.5	37.0	42.9	13.2	SK
FI	39.8	39.2	38.8	38.8	-1.0	39.8	39.2	39.9	49.8	10.0	39.8	39.2	40.4	51.2	11.4	FI
SE	46.5	46.6	48.8	45.4	-1.1	46.5	47.1	52.7	59.5	13.1	46.5	46.6	50.9	56.2	9.8	SE
UK	40.5	42.5	43.2	45.3	4.9	40.5	43.8	46.1	54.9	14.4	40.5	43.5	45.7	51.6	11.1	UK
EA17	30.9	39.5	42.8	43.4	12.5	30.9	39.5	42.9	48.0	17.1	30.9	39.6	43.4	52.4	21.5	EA17
EU27	32.2	38.6	42.2	42.6	10.4	32.2	38.7	42.7	48.4	16.2	32.2	38.8	43.0	50.7	18.5	EU27

Source: Commission services.

3.2.3. "66% shift scenario", "constant time in retirement scenario" and "EU convergence scenario"

Under the 66% shift scenario, the increase in the average EU effective retirement age up to 2060 is less pronounced than under the full shift scenario, (+0.8 years for men and +0.4 years for women in comparison to the 2012 Ageing Report baseline projections) (see also [Table 5](#), country-specific values in [Annex Table 14](#) and [Annex Table 15](#)). For the average EU statutory retirement ages, the increase is fully in line with the partial share (66%) of the expected increase in life expectancy at retirement. In comparison to current legislation, this leads to a lower EU average statutory retirement age for women, while the outcome for men is higher ([Table 4](#)). This result hints to two facts: First, already nationally legislated increases of statutory retirement ages in the upcoming decades result in a higher average EU statutory retirement age in 2060 (at least for women) than in the scenario of a partial link of current statutory retirement ages to life expectancy gains (66%). Second, the nevertheless observable increase in the EU effective retirement age also for the partial shift scenario for both genders in comparison to the 2012 Ageing Report projections is mainly based on the applied simulation methodology. As explained, the latter one takes into account a combination of the higher effective retirement age outcome between the 2012 Ageing Report scenario and the strict application of the respective simulation scenario (see also [Graph 3](#)).

To keep the relative share of lifetime spent in retirement constant individually in each Member State, effective retirement ages would on average need to increase by 4.4 years to a level of 67.3 years up to 2060 for men (+2.0 years in comparison to the 2012 Ageing Report)

and by 4.0 years to 66.0 years for women (+0.9 years) (see [Table 5](#), country-specific values in [Annex Table 16](#)). This would result in an average EU statutory retirement age increase to 69.1 years for men (+2.0 years in comparison to current legislation, as reflected in the 2012 Ageing Report) and 65.8 years for women in 2060 (1.2 years lower than under current legislation) (see [Table 4](#)).

The increase in the EU average effective retirement age is slightly lower for women than for men. Firstly, under the 2012 Ageing Report baseline scenario the increase in the share of lifetime spent in retirement up to 2060 is less pronounced for women than for men. Secondly, the current gender imbalance (higher share of lifetime spent in retirement by women) is maintained. Hence, the necessary counterbalancing effect by an increasing retirement age to keep the initial share constant is lower. The reason why the statutory retirement age for women is lower in comparison to the 2012 Ageing Report, while the effective retirement age is higher, is again due to the combination of the higher effective retirement age outcome between the 2012 Ageing Report scenario and the strict application of the simulation scenario ([Graph 3](#)).

Besides, for countries in which the current life expectancy at retirement is relatively low in comparison to the EU average – this is generally more pronounced in EU12 than in EU15 countries (although having a slightly similar average effective retirement age, life expectancy in the EU12 is lower by 2.9 and 1.2 years respectively for men and women compared to the EU15) – the share of lifetime spent in retirement in 2010 was also relatively low. By keeping this share constant, the necessary underlying effective retirement age increase is accordingly higher.

Under the assumption of a convergence of Member States towards the 2010 EU-wide average share of lifetime spent in retirement, the highest increase in the EU average statutory and effective retirement age of all alternative scenarios in comparison to the 2012 Ageing Report is observable for men (see [Table 4](#) and [Table 5](#), country-specific values in [Annex Table 16](#)). The average male EU effective retirement age would increase by 4.8 years to 67.7 years (+2.4 years in comparison to the 2012 Ageing Report), whereas the statutory retirement age would even increase by 5.5 years to 70.0 years (+2.8 years in comparison to current legislation as reflected in the 2012 Ageing Report). For women, the effective retirement age would increase by 4.5 years (+1.3 in years in comparison to the baseline), thus slightly lower than the highest increase observable in the "100% shift scenario". The female statutory retirement age in 2060 would be almost the same as reflected in the 2012 Ageing Report figures.

The relatively large effect on effective retirement ages under this "EU convergence scenario" especially for men can easily be explained by the strong underlying assumptions. For most of the Member States, an increase of the average share of lifetime spent in retirement is observable in the 2012 Ageing Report scenario, with individual values for men in 2060 that are in all countries (except for the Netherlands) above the EU average of 2010 (see again [Table 3](#)). By keeping the initial 2010 EU-wide average share of lifetime spent in retirement constant and letting Member States converge gradually to that value over the whole projection period, this is consequently translated into an increase in the effective retirement age, given the projected increase in life expectancy over time. For countries with an initial share of lifetime spent in retirement above the EU average, the effect on the effective retirement age is the largest, as even a decrease of the 2010 share of time in retirement is assumed up to 2060 (in comparison to a reduced increase for initial below-average countries).

The highest increase in the EU average effective retirement age of all alternative scenarios is also reflected in the participation rate projections for the EU convergence scenario. Labour market participation rates for the age group 55-74 are projected to increase visibly in the EU

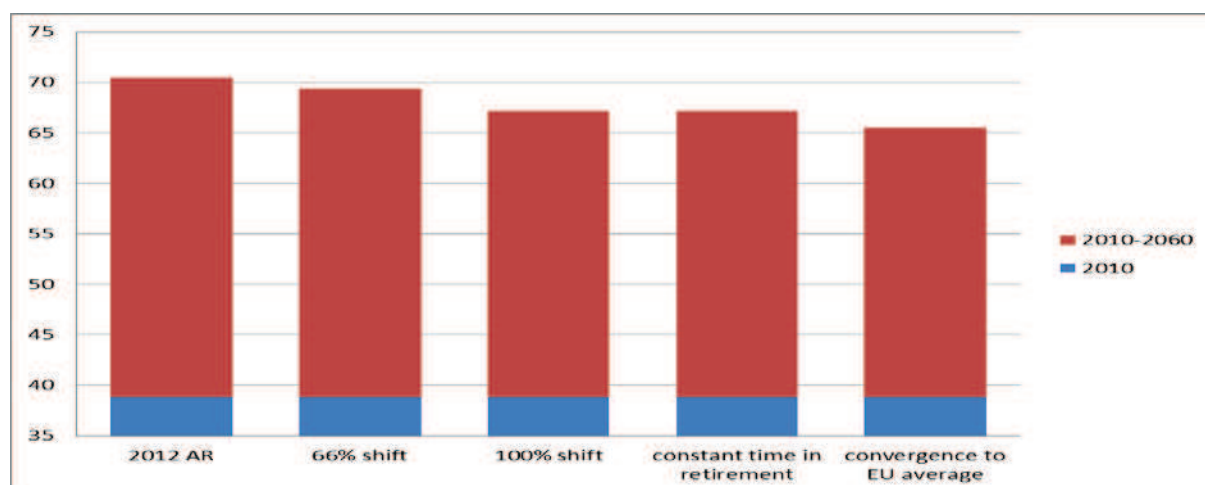
by more than 8 p.p. on top of the increase already projected in the 2012 Ageing Report baseline scenario. 9 countries register an extra increase higher than 10 p.p. (Belgium, France, Cyprus, Malta, Austria, Slovenia, Finland and Sweden) or even 20 p.p. (Luxembourg) (see Table 7).

3.2.4. Old-age dependency ratios

As a consequence of the stronger increase in the average EU effective retirement age between 2010 and 2060 under the different modelled scenarios in comparison to the 2012 Ageing Report projections, also the EU average effective economic old-age dependency ratio would be affected. The ratio could be decreased by 3.3 p.p. under the "100% shift scenario", comparable to the effect under the "constant time in retirement scenario" (Graph 5). Under the 66% shift scenario, the effect would be less pronounced. The largest drop in the EU average effective economic old-age dependency ratio compared to the 2012 Ageing Report is visible under the "EU convergence scenario" (-4.9 p.p.).

Individual impacts differ largely across Member States (see Graph 6). In the "100% shift scenario", the largest absolute reduction in the average effective economic old-age dependency ratio in comparison to the 2012 Ageing Report projections would be visible for Bulgaria, Latvia and Romania (all above 10 p.p.). In all three countries, statutory retirement ages are under current legislation supposed to stay stable at a rather low level in the long-run (65 for men, even 63 for women in Bulgaria and Romania). Moreover, life expectancy is supposed to increase above EU average. No decreasing effect is observable for Italy and Greece, as those countries have already implemented retirement age links to life expectancy in their pension legislation. These links lead to even higher effective retirement ages in 2060 than in the modelled "100% shift scenario" scenario.

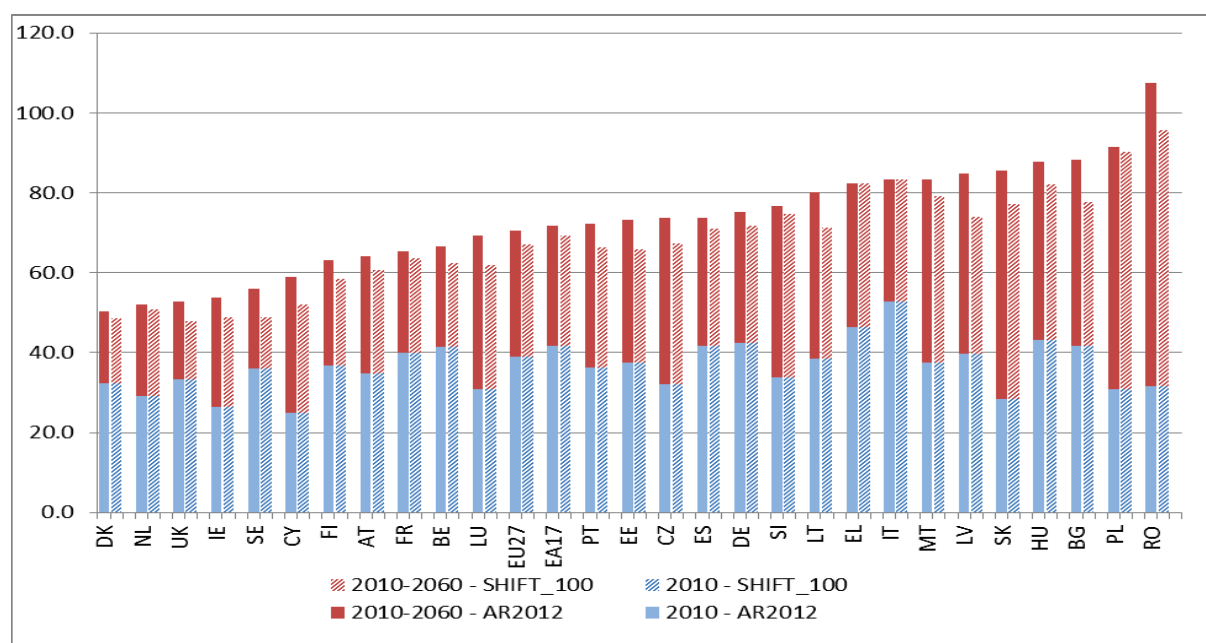
Graph 5 - Average effective economic old-age dependency ratio in the EU under different scenarios



Source: Commission services, EPC.

Note: Effective economic old-age dependency ratio defined as the inactive population aged 65 and above as a percentage of the employed population aged 15 to 64.

Graph 6 - Effective economic old-age dependency ratio in EU Member States – 2012 Ageing Report vs. 100% shift scenario



Source: Commission services, EPC.

Note: Effective economic old-age dependency ratio defined as the inactive population aged 65 and above as a percentage of the employed population aged 15 to 64.

3.3. GDP effect

Given the increase in labour supply⁴³ due to longer working lives under the assumption of postponed retirement, annual average EU potential GDP growth increases from 1.58 p.p. in the 2012 Ageing Report to 1.59 p.p. under the "100% shift scenario" for the period 2011-2030 (stable at 1.49 p.p. for the euro area) (see Table 8). Between 2031 and 2060, average annual EU potential GDP growth increases from 1.33 p.p. to 1.42 p.p. (from 1.28 p.p. to 1.36 p.p. in the euro area). The larger change is observable only in the medium- and long-run, as many Member States have already legislated retirement age increases in the upcoming 20 years which are already incorporated in the 2012 Ageing Report figures. Hence, the difference to the simulated scenarios in the short-run is rather marginal. Under the 66% shift scenario, the increase in GDP in comparison to the 2012 Ageing Report is even less pronounced. Assuming a constant individual share of lifetime spent in retirement in each Member State over the whole projection horizon, comparable results to the "100% shift scenario" are observable (2011-2030: EU 1.60 p.p., euro area 1.49 p.p.; 2031-2060: EU 1.41 p.p., euro area 1.35 p.p.). The largest effect on potential GDP growth is projected for the "EU convergence scenario" which is in line with the highest effect observable for the change in the average EU effective retirement age. Annual average EU potential GDP growth increases to 1.60 p.p. for the period 2011-2030 (to 1.50 p.p. for the euro area). Between 2031 and 2060, average annual EU potential GDP growth increases from 1.33 p.p. to 1.46 p.p. (to 1.43 p.p. in the euro area).

⁴³ Labour input component of a production function framework to project long-term potential GDP growth as described in European Commission (DG ECFIN) and Economic Policy Committee (Ageing Working Group), 2011, "The 2012 Ageing Report: Underlying assumptions and projection methodologies", European Economy, No. 4/2011. (http://ec.europa.eu/economy_finance/publications/european_economy/2011/ee4_en.htm).

Table 8 – Potential GDP growth (average annual change)

	AR2012*		66% shift scenario		100% shift scenario		Constant time in retirement scenario		EU convergence scenario	
	AVG 2011-2030	AVG 2031-2060	AVG 2011-2030	AVG 2031-2060	AVG 2011-2030	AVG 2031-2060	AVG 2011-2030	AVG 2031-2060	AVG 2011-2030	AVG 2031-2060
EU27	1.58	1.33	1.59	1.36	1.59	1.42	1.60	1.41	1.60	1.46
EA17	1.49	1.28	1.49	1.30	1.49	1.36	1.49	1.35	1.50	1.43

Source: Commission services.

Note: * = Updated 2012 Ageing Report figures.

3.4. Pension expenditure effect

The basis for the assessment of the public pension spending effect of a rule linking retirement ages to life expectancy are the pension expenditure projections as presented in the 2012 Ageing Report. Those projections reflect a no-policy change status taking into account current legislation. Public pension expenditure in the simulated scenarios is projected according to two different methods: under the first method, it is assumed that a prolonged working life due to an increase in the statutory retirement age leads to increased individual pension entitlements based on a longer pension accrual period. The exact quantification of the pension benefit increase is estimated by using the implicit benefit ratio elasticity obtained by comparing the 2012 Ageing Report baseline scenario with the 2012 Ageing Report alternative scenario, in which the participation rate (and also the employment rate) of older workers (55-64) is higher. Pension spending is in the end calculated according to increasing average pension entitlements and decreased number of pensioners due to postponed retirement⁴⁴.

Under the second method – simulated as an alternative to the 100% shift scenario – , it is assumed that benefit ratios as projected in the 2012 Ageing Report baseline scenario for the years 2010-2060 are kept constant. Hence, the accrual of the same overall pension entitlements is just spread over a longer career span and no positive effect on adequacy due to longer working lives is taken into account. This so-called "100% shift in pension benefits scenario" helps to show the sustainability effect of a pension benefit link to life expectancy without taking into account adequacy aspects. Expenditure reductions in comparison to the baseline are thus expected to be higher. The underlying effects on the labour force both for the "100% shift scenario" simulations as well as for the "100% shift in pension benefits scenario" are supposed to be the same.

⁴⁴ As described in detail in Annex III on the projection methodology.

3.4.1. EU pension expenditure effect when linking retirement ages to gains in life expectancy

Under the 100% shift scenario, public pension expenditure would on average fall by 0.6 p.p. of GDP in comparison to the 2012 Ageing Report baseline scenario (+0.8 p.p. of GDP against +1.4 p.p. of GDP for the 2012 Ageing Report between 2010 and 2060) mainly because of the lower number of pensioners, though there is an increase in average individual pension entitlements (see [Graph 7](#)).⁴⁵ Hence, the expected public pension expenditure increase up to 2060 could almost be halved when fully linking retirement ages to life expectancy, showing thus the effectiveness of such a policy measure to increase the sustainability of national pension systems. In the euro area, the expenditure increase would be reduced from +1.8 p.p. of GDP in the 2012 Ageing Report baseline scenario to +1.2 p.p. of GDP in the "100% shift scenario". Particularly high savings (of more than 1 p.p. of GDP; see [Table 10](#)) would be realised in Belgium, Bulgaria, Luxembourg, Cyprus⁴⁶, Lithuania, Hungary, Austria, Romania and Finland, all countries where the retirement age is not legislated to increase significantly in the future.

In the 66% shift scenario, the reduction in the EU pension expenditure increase in comparison to the 2012 Ageing Report is slightly less pronounced (-0.2 p.p. of GDP; -0.1 p.p. of GDP in the euro area). Only in those countries with just marginal or no legislated retirement age increases in the future, the partial shift of current retirement ages in line with gains in life expectancy leads to more favourable results than the 2012 Ageing Report projections in terms of effective retirement ages and consequently in terms of pension spending. For all other countries, the latter projections are – at least for some parts of the projection period – taken into account as the more sustainable option when calculating public pension expenditures (see again [Graph 3](#)).

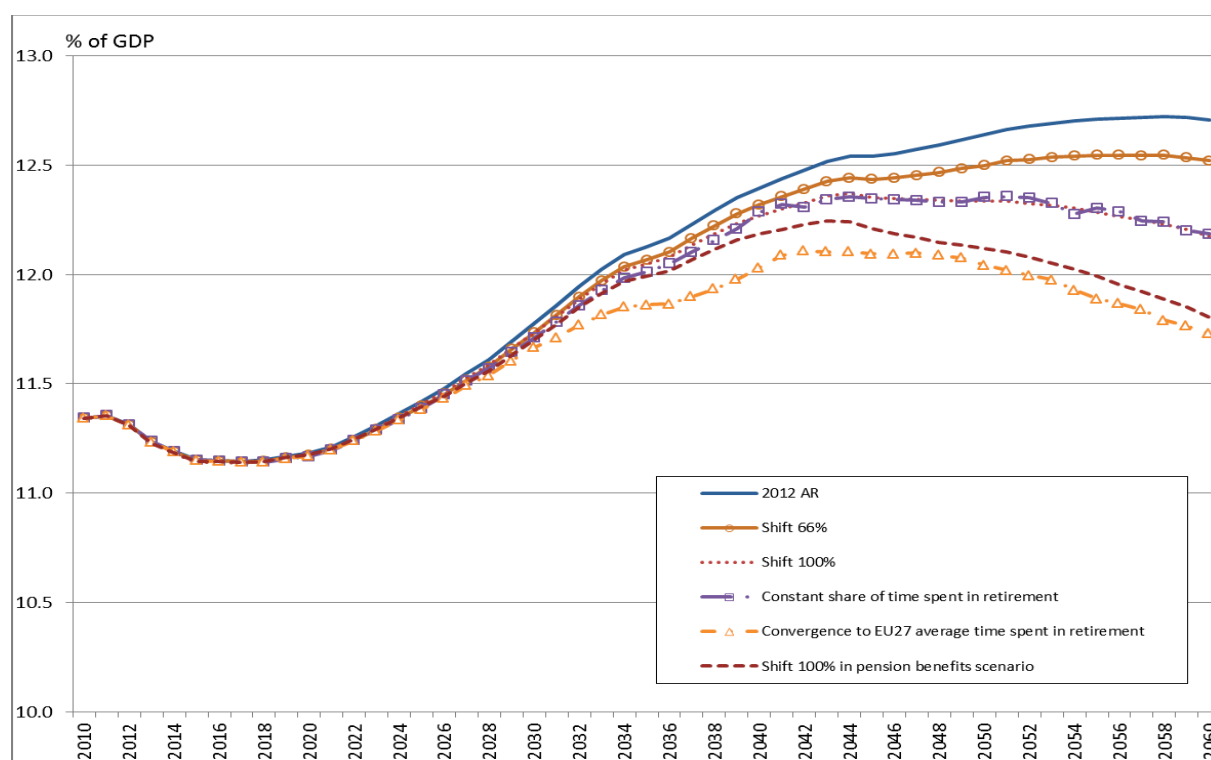
When keeping the individual Member States' average time spent in retirement constant over time, the projected expenditure increase in the 2012 Ageing Report up to 2060 would on average in the EU and euro area be reduced by 0.5 p.p. of GDP. As the highest increase in the effective retirement age is projected in the "EU convergence scenario", also the largest fall in the projected pension expenditure increase over time is observable for this scenario. Under the assumptions that individual Member States' average lifetime spent in retirement is converging to the 2010 EU average value over the projection horizon (23 % for men and 27% for women), the pension spending increase up to 2060 as projected in the 2012 Ageing Report is reduced by 1.0 p.p. of GDP (even 1.3 p.p. of GDP for the euro area). Biggest savings (above 2 p.p. of GDP) in comparison to the 2012 Ageing Report would be generated in Belgium, France, Luxembourg and Finland (see [Table 10](#)). In all those countries, the average share of lifetime spent in retirement is above the EU average in 2010 and is supposed to stay above the average until the end of the projection horizon under current legislation (see again [Table 3](#)).

In general, in all scenarios, the main effect is only visible after 2030, when already legislated future increases in retirement ages become fully implemented in the Member States' pension systems. Potential further adjustments based on increases in life expectancy are thus not legislated under current policies in most of the EU countries whereas they are reflected in the simulated scenarios.

⁴⁵ For countries that are mainly based on NDC pension systems (Italy, Latvia, Poland and Sweden), no change in pension expenditures in comparison to the baseline figures is assumed when including benefit ratio increases. In theory the pension system's finances should be unchanged as the decreasing effect on expenditures due to a lower coverage is outweighed by higher personal pension entitlements due to longer working lives

⁴⁶ The latest pension reform in Cyprus that increases retirement ages in line with gains in life expectancy is not yet taken into account in the pension projections.

Graph 7 - Public pension expenditure 2010-2060 in the EU under different scenarios (as % of GDP)



Source: Commission services.

Note: After the publication of the 2012 Ageing Report, figures for Belgium, Bulgaria, Czech Republic, Denmark, Hungary, Latvia, Netherlands, Poland and Slovakia have been updated, to be taken into account in the budgetary surveillance exercise during the 2013 European Semester. EU averages have changed accordingly ("2012 AR" baseline scenario).

3.4.2. EU pension expenditure effect when linking pension benefits to gains in life expectancy

In order to assess the budgetary impact of a rule that links pension benefits to increases in life expectancy, the simulation model is reformulated. The modelled "100% shift in pension benefits scenario" illustrates the reform option of reducing the pension benefit, which is in part offset by an 'incentive response' of persons to work longer in order to avoid severe reductions in pension entitlements. As can be seen in Graph 7, the expected increase in public pension spending in the EU as reported in the 2012 Ageing Report could be counterbalanced even further under the "100% shift in pension benefits scenario" in comparison to the retirement age link to longevity gains under the "100% shift scenario". In fact, expenditure reductions might even be more drastic under a rule linking only pension benefits to longevity gains in case individual retirement decisions are not changed in a way that individual entitlements at least stay constant.

Under the "100% shift in pension benefits scenario", public pension expenditures would up to 2060 only increase by 0.5 p.p. of GDP (-0.9 p.p. in comparison to the 2012 Ageing Report baseline projections). In the euro area, the expenditure increase would shrink down to +1.0 p.p. of GDP (-0.8 p.p. in comparison to the 2012 Ageing Report).

3.4.3. Pension expenditure effect in individual Member States

3.4.3.1. Full retirement age link to longevity gains (100% shift scenario)

Country-specific pension expenditure projections however vary widely under a rule linking retirement ages fully in line with longevity gains, i.e. under the "100% shift scenario".⁴⁷ The largest change in pension spending with a reduction of about or even more than 2 p.p. of GDP in comparison to the 2012 Ageing Report baseline projections would be recorded for Cyprus, Romania, Luxembourg and Finland (see Table 10). In the latter 3 countries, under current legislation, retirement ages are supposed to stay constant at a relatively low level over the whole projection horizon. Under the partial retirement age link to life expectancy in the 66% shift scenario, the reducing effect on projected pension expenditures for individual Member States is less pronounced, if at all visible (country-specific values in Annex Table 17⁴⁸). Overall, public pension spending would decrease over the projection horizon in 9 Member States in the "100% shift scenario" (Bulgaria, Denmark, Estonia, France, Italy, Latvia, Hungary, Poland, Portugal). In Bulgaria, Denmark and Estonia, the projected decrease in public pension expenditures visible already in the 2012 Ageing Report projections is now even stronger. For Italy, Latvia, Poland and Sweden, no change in comparison to 2012 Ageing Report figures is assumed due to the actuarial neutrality assumption for their NDC systems in this paper. Pension spending developments over time turn from positive to negative in Portugal, Hungary and France, purely based on the full retirement age link to life expectancy. In those three countries, effective retirement ages would thus on average need to increase by 4 (France, Portugal) to 6 (Hungary) years in the next 50 years – *ceteris paribus* – to keep pension spending more or less constant in the long-run (see Annex Table 17). Also in the EU12 countries, pension spending developments over time would on average turn to almost zero (+0.2 p.p.) whereas the increase in EU15 countries would still remain positive (+0.9 p.p.). This is firstly due to an already existing difference in spending increases under the 2012 Ageing Report scenario (+0.7 for EU12 vs. +1.4 p.p. for EU15), but secondly also to a slightly similar decrease for the EU12 than for the EU15 under the "100% shift scenario" in comparison to the 2012 Ageing Report projections (-0.5 p.p.). Life expectancy increases in EU12 countries are generally projected to be higher than in EU15 countries and thus the impact on effective retirement ages under the "100% shift scenario" is larger.

⁴⁷ For countries that are mainly based on NDC pension systems (Italy, Latvia, Poland and Sweden), the change in pension expenditures in comparison to the 2012 Ageing Report is set to be 0 when including benefit ratio increases, as in principle the decreasing effect on expenditures due to a lower coverage is exactly offset by higher personal pension entitlements due to longer working lives.

⁴⁸ Especially in the short- and medium-run, retirement ages might thus be increasing faster under current legislation than under the modelled scenarios. As a consequence, also the projected year-over-year impact on the labour force – and especially on the effective retirement age – might in some cases be higher in the 2012 Ageing Report projections than the projected year-over-year outcome under the simulated scenarios. In the simulations, a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the strict application of the simulation scenario is assumed at every point in time over the projection horizon. This combined projection is then later on applied for the pension expenditure projections. In case the 2012 Ageing Report projections lead to a financially more sustainable pension expenditure outcome in 2060 than under the (partial) shift scenario, the former ones are displayed (see e.g. Greece, Spain or Germany for the partial shift scenario in Annex Table 15).

In the "100% shift scenario", the largest overall increase in pension spending between 2010 and 2060 (more than 6 p.p. of GDP) is projected for Cyprus, Slovenia and Luxembourg⁴⁹. Also for Ireland, Belgium and Malta, an increase of more than 3 p.p. of GDP is projected. To fully stabilize public pension expenditures, further reform measures on top of a full early and statutory retirement age link to gains in life expectancy would thus need to be taken. This could be done by restricting early retirement possibilities to increase effective retirement ages. Statutory retirement ages could also be increased even beyond the gains in life expectancy (see also section 3.4.3.5 below), to align the share of (adult) lifetime spent in retirement with the EU average. Another option would be a restriction in the generosity of their systems, e.g. via a reduction of indexation or lower accrual rates.

⁴⁹ Latest pension reforms in Cyprus and Slovenia are not yet taken into account in the pension projections.

Box 2: Putting recommendations into practice: recently legislated retirement age link to life expectancy in the Netherlands

Several EU Member States have already introduced a connection between retirement ages and life expectancy in their legislations (Denmark⁵⁰, Greece, Italy, Slovakia, Cyprus and the Netherlands). Among those countries, the Netherlands legislated such a policy measure in 2012. The statutory retirement age for the state pension AOW will be increased from 65 to 67 in 2023 and linked to life expectancy afterwards.⁵¹ In 2060, the statutory retirement age is projected to be almost 70 years for both men and women.

Pension expenditure projections for the Netherlands have accordingly been updated after the publication of the 2012 Ageing Report, which still had included the legal status of the pension systems without a retirement age link to life expectancy. It is thus possible to show the exact projected economic and budgetary impact of this policy measure as a real life example before analysing the (accuracy of) theoretical scenario results of a uniformly applied retirement age link to life expectancy in all EU Member States through a common methodology.

In general, the introduction of a retirement age link to gains in longevity in the Netherlands reduces the eligibility of the public pension scheme and is supposed to have an increasing effect on labour supply of older people. The effective retirement age is projected to follow closely the changes in the statutory retirement age, from 64.6 years for men and 62.5 years for women in 2011 to 68.1 years for men and 66.2 years for women in 2060.⁵²

The modelled pension reform reduces gross public pension expenditure in the Netherlands by 1.8 p.p. of GDP in 2060 in comparison to the 2012 Ageing Report projections. Between 2010 and 2060, public pension expenditure are projected to increase by 1.8 p.p. from 6.8% to 8.6% of GDP (see Table 9). The introduction of a retirement age link to life expectancy thus halves the projected increase in public pension expenditure up to 2060.

Table 9 - Projected gross public pension expenditures in the Netherlands (% of GDP)

	2005	2010	2020	2030	2040	2050	2060
Before reform	6.8	6.8	7.4	9.1	10.4	10.4	10.4
After reform	6.8	6.8	7.0	7.9	9.1	9.0	8.6

Source: Commission services, EPC.

3.4.3.2. Linking pension benefits fully to gains in longevity (100% shift in pension benefits scenario)

The latter aspect is indirectly reflected in the results of the "100% shift in pension benefits scenario". As said, this scenario produces results similar to those expected from a rule that links pension benefit fully to gains in life expectancy, which is in part offset by an 'incentive response' of persons to work longer in order to avoid severe reductions in pension entitlements. In most of the Member States, pension expenditures could even further be

⁵⁰ Depending on parliamentary decision.

⁵¹ The new Dutch government foresees in its coalition agreement an acceleration of the retirement age increase to 67 from 2023 to 2021.

⁵² Figures are proxied by projections for the average exit ages from the labour market as a product of the Commission services (DG ECFIN) Cohort Simulation Model (CSM). Reference age group 50-74.

reduced in comparison to the 2012 Ageing Report projections (see Table 10). Biggest reductions in comparison to the 2012 Ageing Report are projected for Cyprus, Lithuania, Luxembourg, Romania and Finland (all above 2 p.p. of GDP). In the latter 4 countries, under current legislation, retirement ages are supposed to stay constant at a relatively low level over the whole projection horizon. In Italy and Greece, no change in public pension spending is reported as their legislated retirement age links to life expectancy are more favourable in terms of effective retirement age increases – and consequently in terms of pension spending – than under the modelled "100% shift in pension benefits scenario".

Table 10 - Change in public pension expenditure under postponed retirement assumption vs. 2012 Ageing Report

	Change 2010-2060 in public pension expenditure (p.p. of GDP)			
	AR 2012	100% shift scenario	100% shift in pension benefits scenario	EU convergence scenario
BE	5.1	3.4	3.4	2.1
BG	-0.7	-2.2	-2.3	-1.3
CZ	2.6	2.0	1.9	2.0
DK	-1.1	-1.3	-1.6	-1.2
DE	2.6	2.4	1.6	2.1
EE	-1.1	-1.4	-2.2	-1.3
IE	4.1	3.3	2.6	3.9
EL	1.0	1.0	1.0	-0.6
ES	3.6	2.8	2.8	2.5
FR	0.5	-0.1	-0.3	-1.7
IT	-0.9	-0.9	-0.9	-0.9
CY	8.7	6.5	6.5	7.0
LV	-3.7	-3.7	-4.7	-3.7
LT	3.5	2.4	1.4	2.9
LU	9.4	7.3	6.7	6.9
HU	0.5	-0.5	-0.9	-0.6
MT	5.5	4.7	4.1	4.0
NL	1.7	1.7	1.6	1.6
AT	2.0	0.8	0.5	-0.6
PL	-2.0	-2.0	-2.2	-2.0
PT	0.2	-0.6	-1.4	-0.3
RO	3.7	1.6	1.6	2.2
SI	7.1	6.5	6.2	5.2
SK	2.7	2.6	2.4	2.7
FI	3.2	1.2	1.2	1.1
SE	0.6	0.6	-0.9	0.6
UK	1.5	1.1	0.4	1.3
EA17	1.8	1.2	1.0	0.5
EU27	1.4	0.8	0.5	0.4
EU15	1.4	0.9	0.5	0.4
EU12	0.7	0.2	-0.1	0.0

Source: Commission services.

Note: After the publication of the 2012 Ageing Report, figures for Belgium, Bulgaria, Czech Republic, Denmark, Hungary, Latvia, Netherlands, Poland and Slovakia have been updated, to be taken into account in the budgetary surveillance exercise during the 2013 European Semester. EU averages have changed accordingly ("AR2012" baseline scenario). Latest pension reforms in Cyprus and Slovenia that increase retirement ages in both countries are not yet taken into account in the pension projections.

3.4.3.3. Convergence to EU average share of time spent in retirement (EU convergence scenario)

When assuming a country convergence to the 2010 EU average share of time spent in retirement (23% of life for men and 27% for women) ("EU convergence scenario"), stronger reductions in pension spending increases are on average observable for EU15 countries (-1.0 p.p. in comparison to the 2012 Ageing Report projections) than for EU 12 countries (-0.7 p.p. in the "EU in comparison to the 2012 Ageing Report) (see [Table 10](#)). Also for the whole EU, a reduction of the expected public pension spending increase of 1 p.p. of GDP is projected. The average share of lifetime spent in retirement is in EU12 countries relatively lower than in the EU15 and EU27. Hence, when assuming a convergence to the EU average, the change in effective retirement ages and thus also the reduction in pension spending is lower than in the EU15 and the EU27.

The biggest reduction in expenditures in comparison to the 2012 Ageing Report projections is projected for Belgium, Austria, Luxembourg, France and Finland (all more than -2 p.p.), due to a rather high share of lifetime spent in retirement in the base year (2010) as well as an even higher value at the end of the projection period under the 2012 Ageing Report baseline scenario (consistently above EU average, see again [Table 3](#)).

3.4.3.4. Cumulative savings

When expressing the reducing pension expenditure effect of a full retirement age link to longevity gains in terms of cumulative savings over the projection horizon, the positive impact on the sustainability of pension systems and public finances in the EU becomes even more evident. Under the "100% shift scenario" including potential positive benefit ratio effects, the cumulated savings by 2060 compared to the 2012 Ageing Report account for about 7.5% of GDP by 2060 for the whole EU. The amount rises even to 12.8% of GDP under the "100% shift in pension benefits scenario" when no increase in the benefit ratio due to longer working lives is assumed, i.e. in a situation similar to a rule linking pension benefits fully to life expectancy gains (see [Table 11](#)).

The generally rather low savings effect registered up to 2030 is based on the fact that current pension legislations in many individual Member State foresee already substantial statutory retirement age increases. The latter are leading to higher effective retirement ages – and thus financially more sustainable pension spending results – over that horizon than the strict link of 2010 retirement ages to gains in life expectancy.

However, there are again large variations across countries. Countries with a less strong link of pension contributions and pension benefits (defined benefit or point systems) or with rather constant retirement ages even in the long run would record the highest cumulated savings under the "100% shift scenario", ranging between around 30 and 50% of GDP by 2060 (Belgium, Finland, Bulgaria, Cyprus, Luxembourg, Romania). On the contrary, in countries like Denmark, Germany, France, the Netherlands and Slovakia, almost no cumulative savings in comparison to the 2012 Ageing Report projections are generated (less than 5% of GDP up to 2060).⁵³

⁵³ No cumulative savings are projected for Greece, Italy (in both countries higher increase in effective retirement ages under current legislation over the whole projection period in comparison to the 100% shift scenario), Latvia, Poland and Sweden (the latter 3 countries due to the NDC neutrality assumptions in this paper; also applied to Italy).

Table 11 - Cumulated savings as % of GDP under different postponed retirement scenarios compared to the 2012 Ageing Report projections

	Cumulated savings as % of GDP under the 100% shift scenario compared to the AR 2012 baseline scenario														
	100% shift scenario					100% shift in pension benefits scenario					Convergence to EU27 average time spent in retirement				
	2020	2030	2040	2050	2060	2020	2030	2040	2050	2060	2020	2030	2040	2050	2060
BE	0.0	0.3	3.9	13.4	28.9	0.0	0.3	3.9	13.6	29.3	0.0	3.7	15.6	35.5	62.0
BG	0.0	1.0	6.8	18.8	34.1	0.0	1.1	7.5	20.4	36.9	0.0	0.0	1.6	6.4	13.4
CZ	0.1	0.9	3.1	5.8	10.6	0.1	1.1	3.4	6.3	11.6	0.0	0.0	0.6	1.1	4.5
DK	0.0	0.4	0.5	0.5	1.4	0.3	0.8	0.9	1.2	4.8	0.0	0.1	0.0	0.0	0.0
DE	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.2	9.7	0.0	0.0	0.2	1.5	4.1
EE	0.2	1.4	1.4	2.3	5.4	0.8	2.2	4.5	10.3	20.2	0.0	0.0	0.0	0.0	2.2
IE	0.2	2.3	7.3	16.0	23.9	0.9	4.9	13.3	26.8	41.3	0.3	1.4	3.5	6.4	8.1
EL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.6	14.2	30.1	46.4
ES	0.0	0.0	0.0	2.0	8.3	0.0	0.0	0.0	2.1	8.4	0.0	0.0	1.3	9.0	18.9
FR	0.0	0.0	0.0	0.5	4.6	0.0	0.0	0.0	0.9	6.4	0.0	0.4	9.0	20.0	39.1
IT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CY	0.5	2.9	9.4	22.5	43.0	0.5	2.9	9.4	22.5	43.0	0.3	1.8	5.6	14.1	29.0
LV	0.0	0.0	0.0	0.0	0.0	0.2	0.7	3.1	9.3	19.2	0.0	0.0	0.0	0.0	0.0
LT	0.2	0.4	1.7	6.6	17.0	0.0	0.4	4.3	14.4	33.1	0.0	0.0	0.0	1.7	7.1
LU	0.8	5.5	15.3	30.5	50.1	1.2	7.6	20.6	40.7	66.7	0.4	5.5	20.7	43.9	72.0
HU	0.0	0.0	0.2	3.3	11.3	0.0	0.0	0.2	3.4	13.5	1.4	2.9	4.4	8.5	19.5
MT	0.0	0.0	0.0	1.7	8.0	0.0	0.0	0.3	4.1	15.6	0.2	0.4	2.2	8.4	19.7
NL	0.2	0.5	0.7	0.8	1.2	0.2	0.1	0.1	0.1	1.8	0.4	0.7	1.0	1.4	1.8
AT	0.0	0.0	1.2	6.2	16.3	0.0	0.1	1.9	8.5	21.3	0.0	1.2	8.4	19.0	39.0
PL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PT	0.0	0.3	3.2	8.9	16.4	0.2	2.3	9.0	20.5	35.1	0.0	0.0	0.6	2.3	5.5
RO	0.2	1.9	8.3	21.8	40.9	0.2	1.9	8.3	21.9	40.9	0.0	0.1	4.3	13.4	26.9
SI	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	1.4	9.0	0.0	0.0	0.0	7.2	27.4
SK	0.0	0.0	0.6	2.1	3.0	0.0	1.2	3.9	7.4	10.3	0.0	0.0	0.0	0.0	0.0
FI	0.0	1.1	6.2	17.5	34.9	0.0	1.1	6.4	18.0	35.9	0.0	1.4	6.8	18.0	36.6
SE	0.0	0.0	0.0	0.0	0.0	0.3	2.9	9.5	19.5	33.6	0.0	0.0	0.0	0.0	0.0
UK	0.0	0.7	1.9	3.3	6.4	0.5	2.8	6.6	12.0	21.3	0.0	0.6	1.8	2.6	4.6
EA17	0.1	0.1	0.7	2.5	6.9	0.0	0.0	0.7	3.5	10.1	0.0	0.5	3.9	10.0	20.5
EU27	0.1	0.3	1.1	3.2	7.5	0.1	0.4	1.8	5.4	12.8	0.0	0.5	3.3	7.9	16.1
EU15	0.1	0.2	1.0	3.0	7.3	0.1	0.4	1.8	5.3	12.7	0.0	0.5	3.4	8.2	16.5
EU12	0.0	0.4	2.0	5.3	10.2	0.0	0.5	2.4	6.4	13.3	0.1	0.6	2.3	5.5	11.9

Source: Commission services.

In Germany, statutory retirement ages are legislated to increase to the age of 67 up to the end of the next decade. In Denmark⁵⁴, the Netherlands and Slovakia, retirement age links to gains in life expectancy have already been legislated. Accordingly, differences between the 2012 Ageing Report projections and the "100% shift scenario" projections are marginal. For France, the rather low cumulative savings are highly related to the very low effective retirement age at the beginning of the projection horizon (60.2 years vs. 62.4 years for the EU average; see Table 6). This figure is projected to increase stronger than under the 100% shift scenario especially in the first 20 of the projection horizon due to an increase in the statutory retirement age corridor from 60-65 to 62-67 (see again Table 1).

In the second half of the projection period, the "100% shift scenario" leads to more favourable effective retirement age and pension spending outcomes than under the 2012 Ageing Report, hence cumulative savings become visible. Nevertheless, effective retirement ages in France still remain clearly below the EU average in 2060, even when linking current retirement ages

⁵⁴ In several countries with legislated retirement age links to longevity gains (e.g. Czech Republic, Denmark and the Netherlands), the statutory retirement age is supposed to increase stronger between 2010 and 2060 than the increase in life expectancy at retirement over that horizon (see also Table 1). Hence, one could expect that the 100% shift scenario would not lead to an additional increase in the effective retirement age on top of the 2012 Ageing Report results. Yet, in the latter projections – as endorsed by the EPC –, the expected increase in the statutory retirement age is only partially reflected in the effective retirement age increase. In the "100% shift scenario", the link between the statutory and effective retirement age is assumed to be stronger. As a consequence, it is assumed that additional increases in the effective retirement age in comparison to the 2012 Ageing Report can be achieved, when simulating a 100% link of retirement ages to gains in life expectancy.

fully in line with gains in life expectancy (63.9 years vs. 66.4 years for the EU average) reflecting the current low average effective retirement age observed.

Large variations across countries are also reflected in the cumulative savings projections under a rule linking fully pension benefits to life expectancy gains ("100% shift in pension benefits scenario"). Similar to the "100% shift scenario", very high cumulated savings of about or even more than 30% are recorded for Belgium, Finland, Bulgaria, Cyprus, Luxembourg, Romania (see [Table 11](#)). But also for Ireland, Lithuania, Portugal and Sweden, the cumulative savings amount to more than 30% of GDP in 2060. In most of these countries, a rather low retirement age over time in combination with the assumption of a constant benefit ratio for the "100% shift in pension benefits scenario" leads to remarkable savings. On the contrary, in Denmark and the Netherlands, almost no cumulative savings in comparison to the 2012 Ageing Report projections are generated (less than 5% of GDP up to 2060) as the modelled 'incentive response' of persons to work longer due to the pension benefit link to longevity gains is low (i.e. the effective retirement age increase is comparable to the one for the 2012 Ageing Report).⁵⁵

When assuming a country convergence to the 2010 EU average share of time spent in retirement (23% of life for men and 27% for women), stronger cumulative savings are on average observable for EU15 countries (on average 16.5 % GDP in 2060 in comparison to the 2012 Ageing Report baseline projections) compared to EU 12 countries (11.9% of GDP) (see [Table 11](#)). For the EU as a whole, cumulated savings of 16.1% of GDP in 2060 are projected under the "EU convergence scenario". The average share of lifetime spent in retirement is in EU12 countries relatively lower than in the EU15 and EU27. Hence, when assuming a convergence to the EU average, the change in effective retirement ages and thus also the reduction in pension spending is lower than in the EU15 and the EU27 as a whole. Largest cumulative savings are visible for Belgium, Greece, France, Luxembourg, Austria and Finland (all with cumulative savings of more than 35% of GDP in 2060). In all those countries, the average share of lifetime spent in retirement is above the EU average in 2010 and is supposed to stay above the average until the end of the projection horizon under current legislation (see again [Table 3](#))

3.4.3.5. Additional savings potential when restricting early retirement and harmonising retirement ages

To restrict pension spending growth further or to fully stabilize public pension expenditures in the long-run, further reform measures on top of a full early and statutory retirement age link to gains in life expectancy would need to be taken in several Member States. This holds especially in those countries for which public pension spending is still projected to increase substantially in the "100% shift scenario". One way would be to tackle the existing gap between early and statutory retirement ages, while increasing retirement ages in line with life expectancy at the same time. Therefore, a specific scenario has been simulated with several objectives: to reduce over a short run the sizeable gap between early and statutory retirement ages and to diminish the initial country disparities in term of average effective retirement age by harmonising them at a common level.

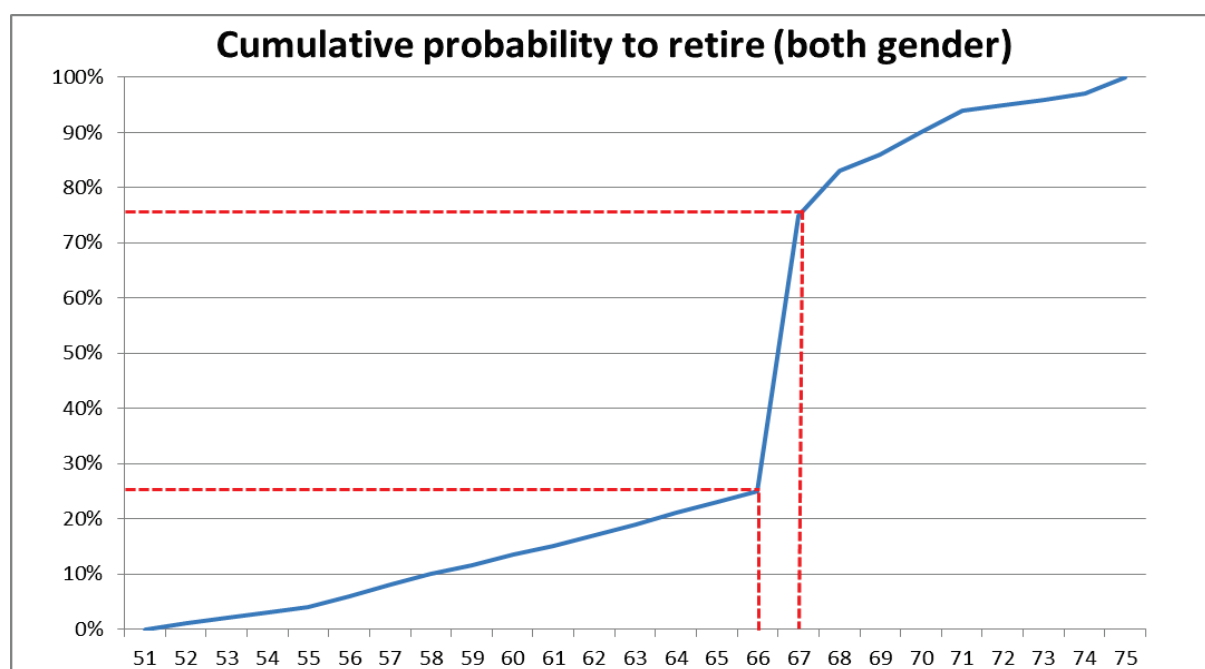
⁵⁵ No cumulative savings are projected for Greece, Italy (as in both countries the increase in effective retirement ages under current legislation over the whole projection period is higher than under the "100% shift in pension benefits scenario").

In this scenario, the current (2010) exit probabilities linearly converge to a homogenous set of single age probabilities by 2025 in each Member State so that the statutory retirement age is virtually set at the age 67⁵⁶ for both men and women and early retirement possibilities are restricted, so that:

- only 25% of the working population can still retire before the statutory retirement age 67;
- 2/3 of the remaining active working population retire at the statutory retirement age 67; and thus 75% of the people will retire before or at the age 67 (see Graph 8).

Beyond 2025, the retirement age is increased in line with country-specific increases in life expectancy as in the "100% shift scenario".

Graph 8 – Cumulative probability to retire uniformly applied for men and women in 2025 in all EU Member States



Source: Commission services.

By reforming the pension system in such way, not only statutory retirement ages are increasing beyond the currently legislated level for most of the Member States (generally around 65 for men and women) to a level of 67 in 2025 (which is slightly higher than the increase that would be seen under the "100% shift scenario"). Also the existing gap between the early and the statutory retirement ages (see again Table 1) would more or less shrink to about 1 year up to 2025. Compared to the "100% shift scenario", this scenario thus tends to reduce the country specific disparities in retirement ages by homogenising the early/statutory retirement age rules and commitments by 2025. Moreover, beyond 2025, retirement ages are increasing fully in line with gains in life expectancy.

This policy approach would allow for an additional reduction in the projected increase in public expenditure as published in the 2012 Ageing Report and also in comparison to the simulation results under the "100% shift scenario". For the whole EU, public pension

⁵⁶ To reflect the expected increase in life expectancy at retirement by 2025 (about 2 years) and given that 65 is the current statutory retirement age in most of the Member States, the statutory retirement age of 67 has been chosen.

spending would increase between 2010 and 2060 only by 0.5 p.p. when including positive impacts on the benefit ratio due to prolonged working lives. This is a reduction of 0.9 p.p. of GDP in comparison to the 2012 Ageing Report and also 0.3 p.p. lower than in the "100% shift scenario" (see Table 12Table 10).

Table 12 - Change in public pension expenditure under restricted early retirement and postponed retirement assumption vs. 2012 Ageing Report and 100% shift scenario

	Change 2010-2060 in public pension expenditure		
	AR 2012*	100% shift scenario	Increase statutory retirement to 67 & restrict early retirement by 2025 then 100% shift in line with change in life expectancy
BE	5.1	3.4	2.2
BG	-0.7	-2.2	-2.5
CZ	2.6	2.0	1.4
DK	-1.1	-1.3	-1.4
DE	2.6	2.4	2.2
EE	-1.1	-1.4	-1.5
IE	4.1	3.3	3.4
EL	1.0	1.0	1.0
ES	3.6	2.8	2.4
FR	0.5	-0.1	-1.2
IT	-0.9	-0.9	-0.9
CY	8.7	6.5	6.2
LV	-3.7	-3.7	-3.7
LT	3.5	2.4	2.1
LU	9.4	7.3	6.6
HU	0.5	-0.5	-1.1
MT	5.5	4.7	3.9
NL	1.7	1.7	1.5
AT	2.0	0.8	-0.3
PL	-2.0	-2.0	-2.0
PT	0.2	-0.6	-0.6
RO	3.7	1.6	1.0
SI	7.1	6.5	5.4
SK	2.7	2.6	2.4
FI	3.2	1.2	0.6
SE	0.6	0.6	0.6
UK	1.5	1.1	1.1
EA17	1.8	1.2	0.7
EU27	1.4	0.8	0.5
EU15	1.4	0.9	0.5
EU12	0.7	0.2	-0.1

Source: Commission services.

There are however wide variations across countries. The impact on top of the 100% shift scenario is only marginal (if at all existing) for the countries where current statutory and effective retirement ages are relatively high and the gap between those two figures is rather close (e.g. Denmark, Germany, Estonia, Ireland, Netherlands, Portugal and United Kingdom).

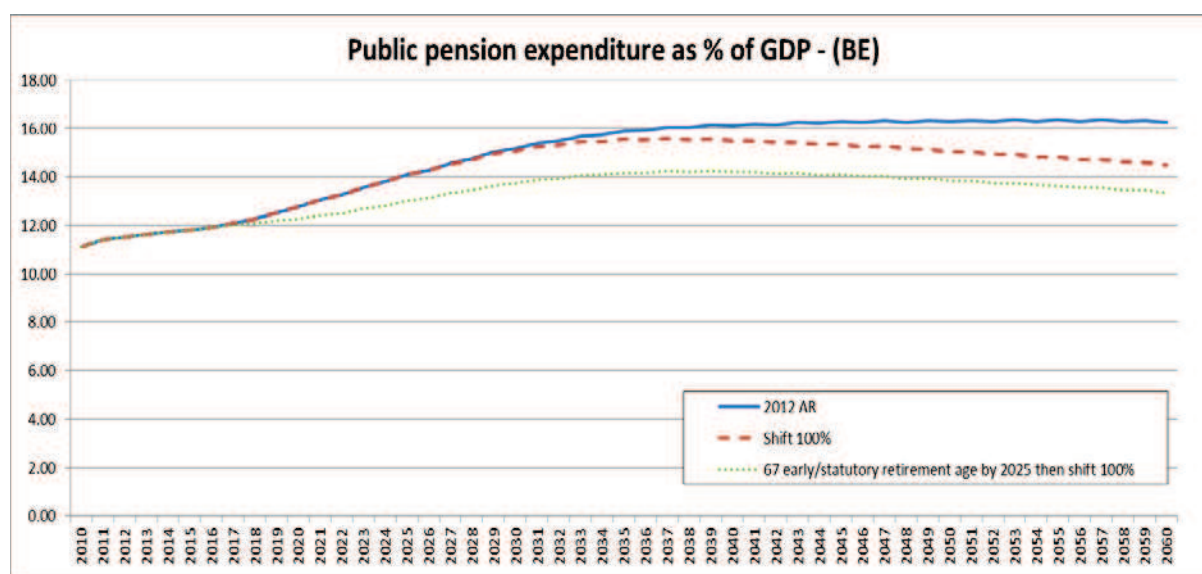
For the countries where under current legislation the gap between early and statutory retirement age would remain substantial over the long run, the impact is bigger with significant reduction in public expenditures already in the short- and medium-run in comparison to the "100% shift scenario", accounting for about 1 p.p. (Belgium, France, Luxembourg, Malta, Austria and Slovenia).

For example, public expenditure on pensions is already lower by 1.1 p.p., 0.8 p.p., and 1.0 p.p. of GDP in 2025, respectively for Belgium, Luxembourg and Austria (see Graph 9 to Graph 11) compared to the "100% shift scenario". In the long-run, the reduction in the public

pension spending level would remain more or less unchanged. Compared to the 2012 Ageing Report projections, the reduction would even be between 2 and 3 p.p. of GDP in 2060.

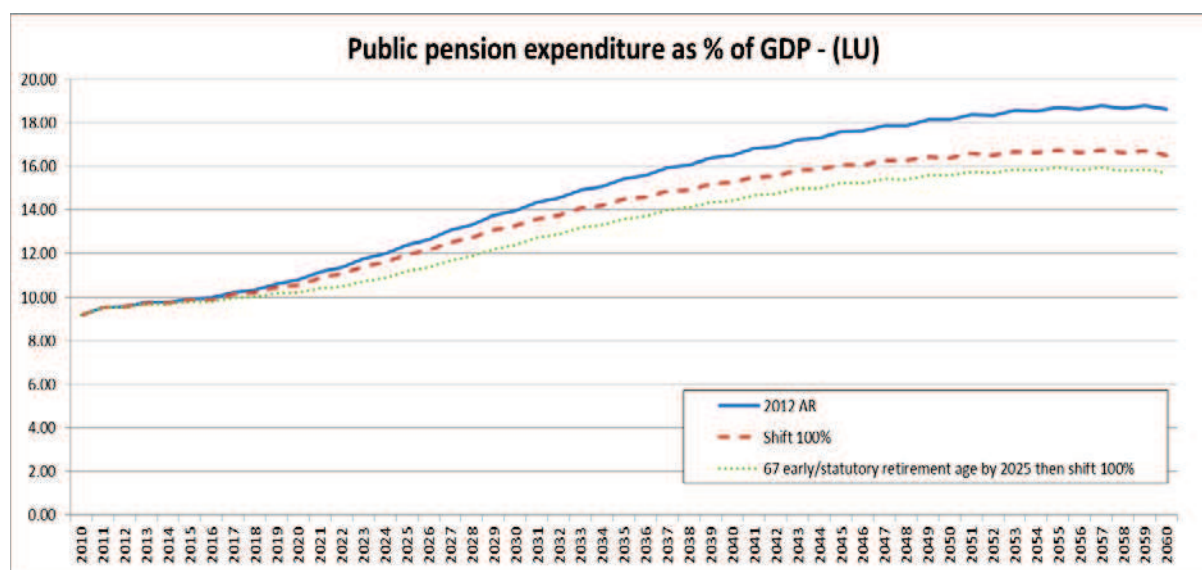
By 2030 and compared to the "100% shift scenario", additionally cumulated savings of about 12%, 9% and 12% of GDP would be registered for Belgium, Luxembourg and Austria respectively. By 2060, the extra cumulated savings would amount to more than 40% for Belgium and Austria (49% and 44% of GDP respectively) and to more than 30% for Luxembourg (and also France).

Graph 9 – Public pension expenditure 2010-2060 in Belgium under different scenarios (as % of GDP)



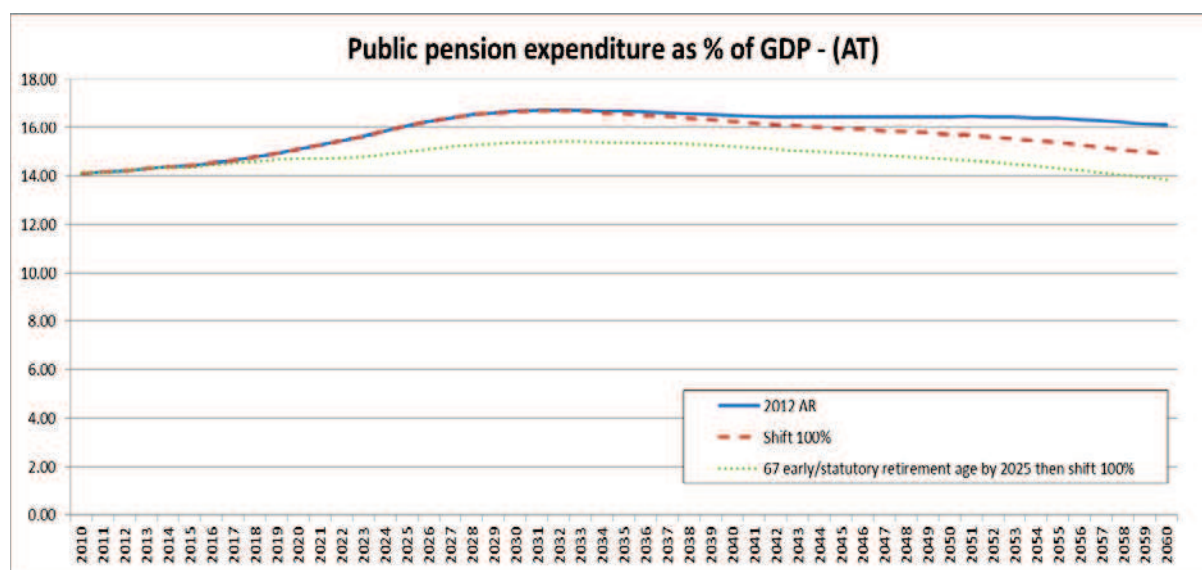
Source: Commission services.

Graph 10 – Public pension expenditure 2010-2060 in Luxembourg under different scenarios (as % of GDP)



Source: Commission services.

Graph 11 – Public pension expenditure 2010-2060 in Austria under different scenarios (as % of GDP)



Source: Commission services.

3.5. Public finance sustainability effect

Reductions in public pension expenditures as a consequence of a postponed retirement are also reflected in the long-term fiscal sustainability indicator estimations as regularly projected by the European Commission for budgetary surveillance purposes⁵⁷. The long-term sustainability gap indicator (S2) illustrates the upfront adjustment to the current structural primary balance (kept then constant at the adjusted value) required to stabilise the debt-to-GDP ratio over an infinite horizon (which is obtained by imposing the fulfilment of the government's infinite-horizon inter-temporal budget constraint). It explicitly takes into account the future costs of ageing populations, as projected in the 2012 Ageing Report.

The calculation of the S2 indicators as presented in this paper are based on the DG ECFIN spring 2013 forecasts (up to 2014) and on the macro-economic scenario of the 2012 Ageing Report. However, updated pension expenditure figures based on the results of the different simulated scenarios are taken into account. For simplicity reasons, it is assumed that the simulated increases in retirement ages have then no impact on other expenditures (neither directly or via the GDP effect), such as health care expenditures or unemployment benefits that potentially could occur.⁵⁸ Expenditures on other items covering the costs of ageing (health care, long-term care, education and unemployment benefits) are thus supposed to evolve in line with the 2012 Ageing Report.

The "100% shift scenario" representing a rule linking retirement ages fully to longevity gains yields a sustainability gap (S2) for the EU of 2.7 per cent of GDP (2.0 for the euro area), which is 0.3 points lower than in the 2012 Ageing Report baseline scenario (same reduction for the euro area). The S2 indicator would amount to a value of 2.4 if pension benefits are linked to longevity gains ("100% shift in pension benefits scenario") (1.8 for the euro area) (see [Graph 12](#) and [Table 13](#)). Therefore, when linking early/statutory retirement ages 100% in line with gains in longevity, the overall long-term sustainability risks could be reduced by about 1/8 and even by about 1/5 when pension benefits are linked to longevity. This is a remarkable result considering that this change is based purely on the improvement in public pension expenditures as part of the future costs of ageing (*ceteris paribus*).

Biggest reductions are observable for Cyprus, Luxembourg and Romania, both under a retirement age link and a pension benefit link to life expectancy (all more than 1.5), based on the fact that retirement ages are supposed to stay rather low in the long-run under current legislation in the latter two countries.⁵⁹ The large reductions moreover hint to the fact that in those countries the pension expenditure component not only represents a large part of the overall costs of ageing, but also of the overall fiscal sustainability risks.

⁵⁷ A detailed description can be found in European Commission (DG ECFIN), 2012, "Fiscal Sustainability Report 2012", European Economy, No. 8/2012 (http://ec.europa.eu/economy_finance/publications/european_economy/2012/fiscal-sustainability-report_en.htm). Figures presented in this paper are based on the DG ECFIN 2013 Spring Forecast.

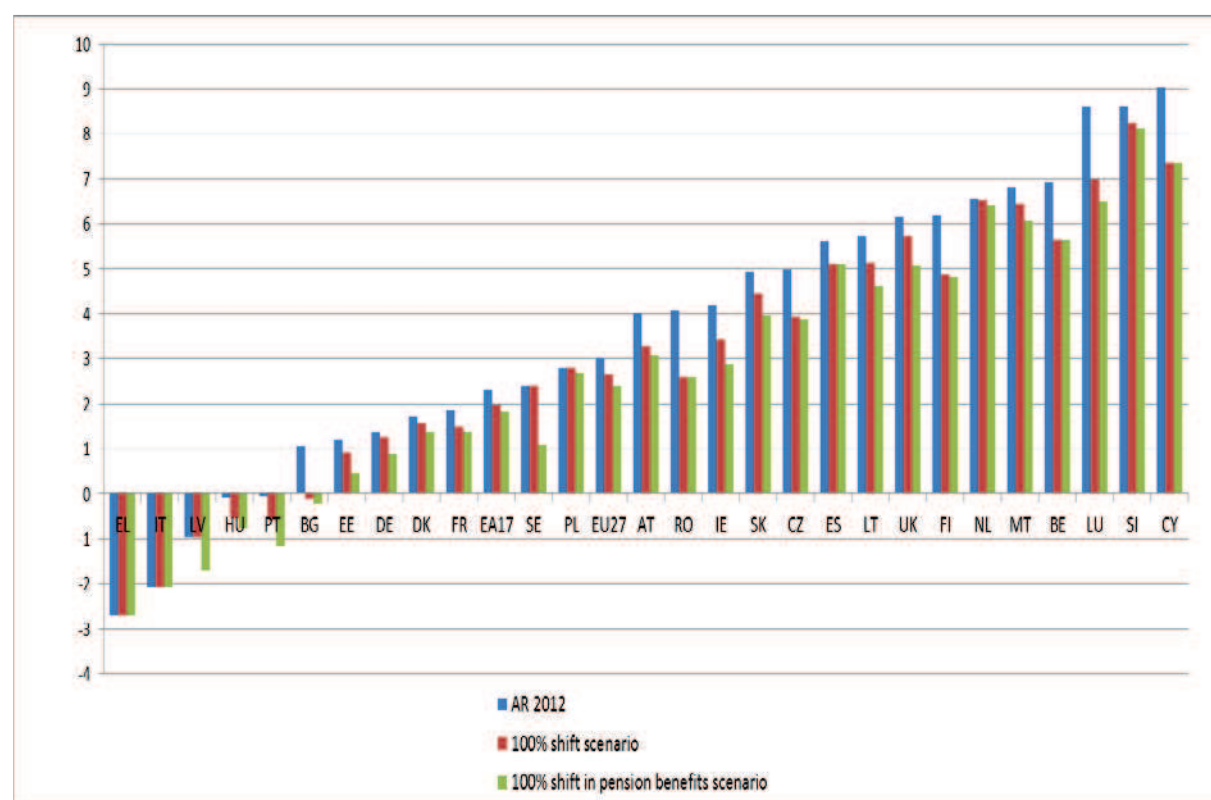
⁵⁸ Next to the pure increase in the statutory retirement age, the major challenge for the EU Member States is obviously to create the conditions for older workers to live and work longer, healthy, active and prosper to successfully seize the opportunity to make the EU economies sustainable in the long-term. Retirement age increases thus have to be underpinned by adequate active ageing strategies.

⁵⁹ Latest reform in Cyprus that introduces a retirement age link to life expectancy not yet included in the calculations.

However, as can also be seen, for several countries (Slovakia, Czech Republic, Spain, Lithuania, the UK, Finland, the Netherlands, Malta, Belgium, Luxembourg, Slovenia and Cyprus), overall long-term fiscal sustainability risks would still remain clearly above the average even after the implementation of a retirement age link to gains in life expectancy. This hints to the fact that long-term sustainability risks are mainly stemming from other sources, such as the other age-related costs (mainly health and long-term care costs) and especially the initial budgetary position. The latter parameter is the most volatile of all components of the sustainability indicators.

Under the 66% shift scenario, the reduction in S2 is slightly less pronounced (up to 0.1 for the EU and euro area) (see Table 13, country-specific results in Annex Table 18). If a constant share of lifetime spent in retirement is assumed, the S2 reduces to 2.7 for the EU (2.0 for the euro area). The largest effect on the S2 indicator is projected for the "EU convergence scenario". For the EU, a sustainability gap value of 2.4 would remain (1.5 for the euro area).

Graph 12 – Change in long-term sustainability (S2 indicator): Ageing Report 2012 vs. 100% shift scenario vs. 100% shift in pension benefits scenario



Source: Commission services.

Table 13 - Long-term sustainability indicator - S2

	AR2012*	66% shift scenario	100% shift scenario	100% shift in pension benefits scenario	Constant time in retirement scenario	EU convergence scenario
EU27	3.03	2.91	2.66	2.39	2.70	2.37
EA17	2.31	2.24	1.98	1.81	1.99	1.47

Source: Commission services.

Note: * = Updated figures based on European Commission 2013 spring forecast.

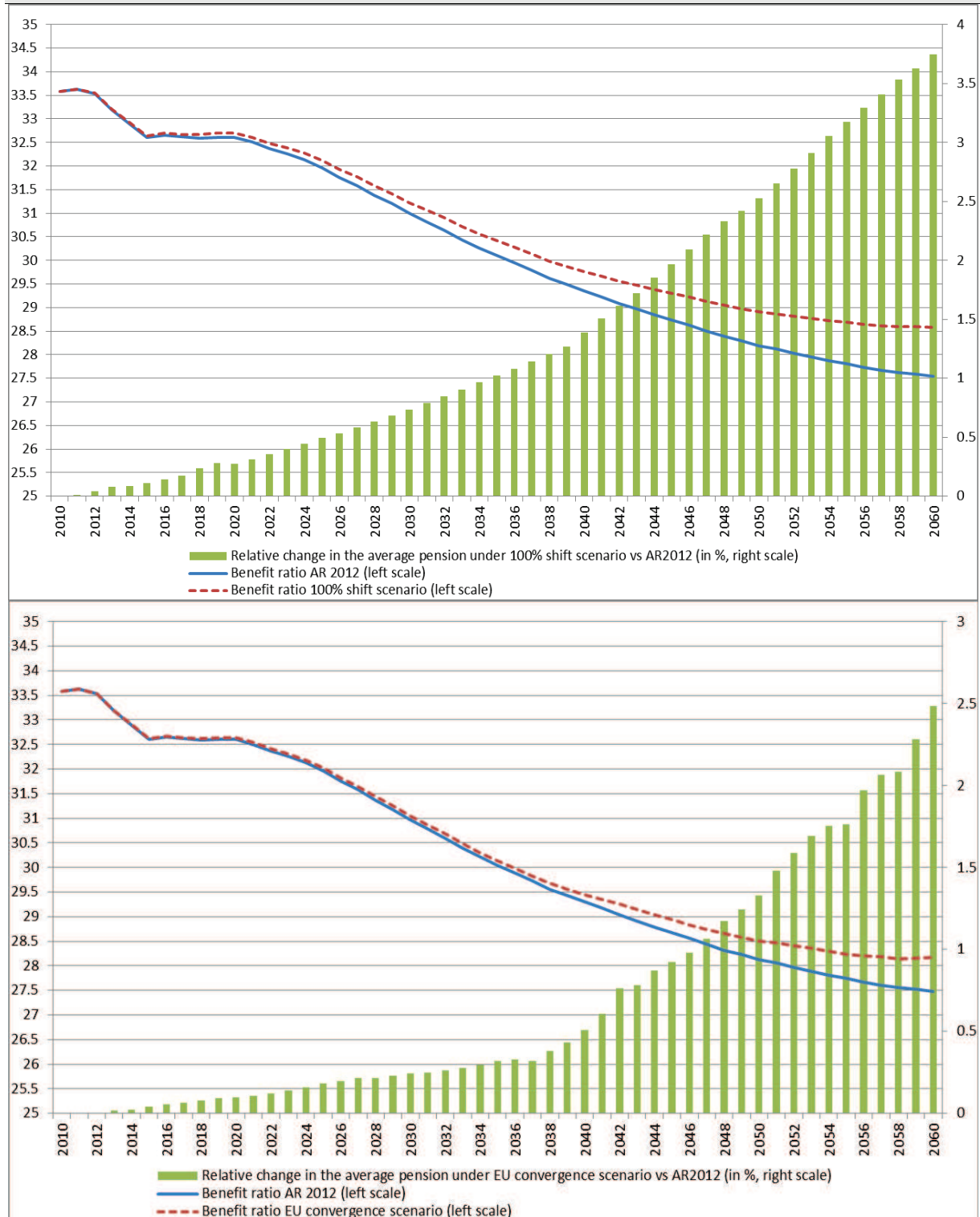
3.6. Adequacy effect

Increasing retirement ages in line with gains in life expectancy not only allows for a substantial reduction in pension expenditures and in fiscal sustainability risks in the long run. It also allows for accruing higher pension entitlements due to a longer working life. This has a positive effect on pension adequacy. The "100% shift scenario" yields an average EU pension level that is around 3.7% higher in comparison to the 2012 Ageing Report baseline scenario in 2060 (green pillars, see [Graph 13](#), upper picture). Moreover, the generally decreasing effect on the average EU benefit ratio that is observable in the 2012 Ageing Report over the projection horizon can, at least to some extent, be reduced (benefit ratio: 27.5% in the 2012 Ageing Report (blue line) vs. 28.6% in the "100% shift scenario" (red line) in 2060). Under the partial shift scenario (66%), the increasing effect on average pensions and the reduction in the benefit ratio decrease is less pronounced.

Under the assumption of a convergence of all Member States to the 2010 EU average share of time spent in retirement, the adequacy effect would be slightly less pronounced (benefit ratio: 28.2% in 2060; average pension 2.5% higher than in baseline). In the first 30 years of the projection period, the average pension is increasing less than in the "100% shift scenario", in both cases in relation to the 2012 Ageing Report (see [Graph 13](#), lower picture). In the first 20-30 years of the projection period the effective retirement age is increasing less strongly in the "EU convergence scenario" than in the "100% shift scenario" and thus the magnitude of higher pension entitlements due to longer working lives is lower. In the "constant time in retirement scenario" the adequacy effect is comparable.

When introducing a rule that only links pension benefits fully to longevity gains while keeping retirement ages constant, as projected in the "100% shift in pension benefits scenario", pension adequacy might become an issue, depending on the country-specific situation. Purely by financial incentives, people would need to work longer by the same amount of years as under the "100% shift scenario", just to keep the same amount of pension entitlements as under current legislation (as modelled in the 2012 Ageing Report; equivalent with the blue lines in [Graph 13](#) below). However, in case individual retirement decisions are not changed, a sustainability factor that adjusts pension benefits can result in severe reductions of individual pension entitlements.

Graph 13 - Benefit ratio and average pension development under the 100% shift (upper graph) and EU convergence scenario (lower graph) in comparison to Ageing Report 2012



Source: Commission services.

4. Summary and policy implications

The analysis of the fiscal impact of a link of retirement ages to gains in life expectancy has shown that both the sustainability as well as the adequacy of pension systems can increase by such a policy approach. Depending on the degree of linkage, sustainability and adequacy gains can be quite substantial. Simulation results show that the expected increases in public pension expenditures could almost be halved, when fully linking retirement ages to life expectancy gains in the future, while the expected decrease in the benefit ratio could be diminished. Overall, during the period of 2010-2060, a cumulated average pension expenditure saving of around 7.5% of GDP could be achieved for the EU as a whole. Particularly high cumulated savings could by 2060 be expected for Belgium, Finland, Bulgaria, Cyprus, Luxembourg, Romania, ranging between around 30 and 50% of GDP by 2060. Under the assumptions of a convergence of all Member States to the 2010 EU average share of lifetime spent in retirement the projected pension expenditure increase due to population ageing could even be further contained over the long-run in the EU as a whole.

Even higher reductions in pension spending in comparison to a rule that increases retirement ages with gains in life expectancy could also be achieved on the aggregate EU level when only linking pension benefits to longevity gains while keeping retirement ages constant. Such a rule would allow for additional cumulated savings of around 5.3% of GDP for the EU. However, in case people do not adapt their retirement behaviour under such a rule, pension adequacy might be endangered.

To reflect a more ambitious pension reform agenda also addressing 'excessive' early retirement, an additional scenario was constructed for which the gap between early and statutory retirement ages is narrowed statutory retirement ages are increased to 67 by 2025 and then further shifted in line with longevity gains. Pension spending for the EU as a whole would rise by one third of the projected increase in the 2012 Ageing Report (by 0.5 pp. of GDP by 2060).⁶⁰

Some adjustment of retirement behaviour on account of life expectancy gains in the future would contribute to the viability of public pension systems, making them more robust to changes in longevity over time. Significant progress has already been made in this direction by many EU Member States, via restrictions in early retirement or legislated increases in the statutory retirement ages. Some additional effort in those countries that have not yet reformed their pension systems properly would make the financing of pension systems in the EU better manageable in the future. However, in most of the postponed retirement scenarios – and especially when taking into account increases in pension entitlements due to longer working lives – to fully stabilize public pension expenditures, further reform measures on top of a retirement age link to gains in life expectancy must be taken in some Member States. This is also related to the generosity of different early retirement options.

Introducing in the pension system a rule linking automatically the increases in retirement ages to gains in life expectancy can thus present an appropriate policy response for today's and

⁶⁰ It needs to be borne in mind that the modelled expenditure reductions due to the increase in the statutory retirement age might in fact not fully materialise as people might take the opportunity to retire early via other pathways, e.g. legal early retirement rules, disability pensions or unemployment benefits before reaching the statutory retirement age.

future policy makers to curb the fiscal challenges of an ageing population while at the same time preserving an adequate standard of living after retirement. If implemented in a clear and transparent way, it can also help to increase the credibility of the pension system. Moreover, it can raise the awareness as well as the acceptance of the population that living longer requires also a more dynamic view on the share of life spent working and in retirement. The ageing problem in the context of pension system sustainability and adequacy is indeed rather a (early) retirement problem.

Given the political difficulties countries generally face when they are introducing changes to their pension systems, introducing a rule such as an automatic link to the anticipated but not granted changes in longevity, instead of having recurrent 'hard' negotiations at different points in time, when the longevity gains have materialized (and potentially turn out to be higher than expected), would be a great help to stabilize and guarantee the financial sustainability of EU pension systems in the future.

Next to the pure increase in the statutory retirement age, the major challenge for the EU is to create the conditions for older workers to live and work longer, healthy, active and prosper to successfully seize the opportunity to make the EU economies sustainable in the long-term, in view of known challenges like population ageing. Retirement age increases thus have to be underpinned by adequate active ageing strategies so that also the effective retirement age is rising.

Annex I - Legislated pension reforms during the last 5 years with impact on statutory (early) retirement ages

From end 2007 onwards, several countries have adopted pension reforms with the aim of increasing statutory (early) retirement ages in the short-, medium- and long-run.

Belgium: The minimum early retirement age and the minimum number of career years required for eligibility will gradually be increased between 2013 and 2016 from 60 to 62 years and from 35 to 40 years, respectively.

Bulgaria: The retirement age increases from 2012 onwards by 4 months each year until reaching 65 years of age for men in 2017 and 63 years of age for women in 2020.

Czech Republic: There is a continuous increase of the statutory retirement age for people born after 1936. The retirement age will not be specified per se, but only with regard to the date of birth. After the unification of retirement ages for men and women, the statutory retirement age will be increased by 2 additional months in comparison to the precedent generation.

Denmark: The retirement age increase specified in the 2006 Welfare Agreement is accelerated. The retirement age for the early retirement scheme VERP will be increased from 60 to 62 years from 2014-2017, while the public old-age pension age will be increased from 65 to 67 years in 2019-2022 (as opposed to 2024-2027 before). VERP is reduced from 5 to 3 years from 2018-2023.

Germany: For persons born after 1946, the statutory retirement age is increased in steps of either 1 or 2 months from 65 years of age, depending on the year of birth, to the age of 67 between 2013 and 2029.

Estonia: The Estonian Parliament decided in April 2010 to increase the statutory official retirement age to the 65 by 2026 for both sexes.

Ireland: The State Pension Transition will be abolished from 2014, while the age of qualification for State Pensions will rise from 66 to 67 in 2021 and then to 68 in 2028.

Greece: In 2012, the retirement age has been increased for men and women to 67. As from 2021, the minimum and statutory retirement ages will be adjusted in line with changes in life expectancy every three years. Upon its first implementation the change within the 2010-2020 ten-year period shall be taken into account.

Spain: The statutory retirement age increases gradually from 65 to 67 in 2027. At the same time, the voluntary retirement age will rise gradually from the current 63 years to 65 years in 2027; involuntary retirement will increase from 61 years to 63 years in the same period. It is planned that from 2027 onwards, the fundamental parameters of the pension system will be adjusted every 5 years to changes in life expectancy (at the age of 67) between the year of revision and 2027

France: In 2010, the parliament adopted an acceleration of the full pension retirement age increase to 67 and of the minimum retirement age to 62. The following 2012 reform decreased the minimum retirement age again for specific groups to the age of 60.

Italy: Contribution and age requirements for early and old age pensions, and old age allowances are indexed to changes in life expectancy at 65, as measured by the National Statistical Institute over the preceding three years. Indexation to life expectancy is first applied in 2013 by a purely administrative procedure. Subsequent retirement age indexations are envisaged every 3 years in line with the timing for the revision of the transformation coefficients (every two years as of 2021).

Cyprus: The December 2012 pension reform introduces an automatic adjustment of the statutory retirement age every 5 years in line with changes in life expectancy at the statutory retirement age, to be first applied in 2018 thereby covering the period 2018-2023.

Latvia: The retirement age for men and women is increasing to 65 in 2025.

Lithuania: In June 2011, a new law was passed that gradually increases the statutory retirement age from 62.5 to 65 for men and from 60 to 65 for women by 2026.

Hungary: From January 2012, early retirement schemes are gradually eliminated by either phasing out several forms of entitlements or by transformation into non-pension benefits (167/2011 Act). Retirement will in most of the cases only be possible when reaching the statutory retirement age of 65.

The Netherlands: The retirement age for the state pension AOW will be increased from 65 to 67 in 2023 and linked to life expectancy afterwards. Moreover, the increase in the eligibility age for occupational pensions will also be linked to life expectancy, using the same formula as is used for the first pillar pensions.

Austria: Several restrictions in special early retirement schemes have recently been adopted. Moreover, In consequence of a Constitutional Court ruling in the 90ies, the female retirement age will be gradually raised to 65 years in the period from 2024 to 2033 (by ½ years steps).

Poland: Based on the 2012 pension reform, the retirement age gradually increases to 67 for men till 2020 and for women till 2040.

Romania: According to the 2010 pension reform, the statutory retirement age is increased to 60 for women and 65 for men until January 2015. Following this stage, the gradual increase of the retirement age continues for women, from 60 to 63 until January 2030.

Slovakia: As of 2017, the retirement age is going to be automatically (none additional approvals needed) annually increased by the year-on-year difference of 5-year moving average of the life expectancy (unisex).

Slovenia: The 2012 pension reform increases the statutory retirement age 65 for men in 2016 and women in 2020. The early retirement age is increased to the age of 60.

United Kingdom: The pensionable age for the state pension is currently increasing for women from 60 to 65 between April 2016 and November 2018. Afterwards, the State Pension age increases in graduated steps to 68 by 2046 for both men and women.

Source: Commission services, EPC and information provided by the Member States.

Annex II - Sustainability factors in pension systems and links to life expectancy

A few Member States that reformed their pension systems in the recent past have formally introduced a “sustainability factor” and/or other "reduction coefficients" into the specification that determines the amount of pension benefits. This approach introduces a component that changes the size of the pension benefit depending on expected demographic changes such as the life expectancy at the time of retirement. In most of the cases, this leads to a reduction in pension entitlements, having a positive impact on the sustainability of the public pension system as well as on public finances.

In addition, several countries have introduced a link between retirement ages and life expectancy (or age) in their pension system legislation. This approach – which is fully in line with the Commission's recommendations in the Annual Growth Surveys 2011, 2012 and 2013 as well as the 2012 White Paper on pensions – presents one effective form of increasing sustainability in public pension systems. Moreover, by increasing retirement ages, people are assumed to accrue more pension rights and thus a higher pension provided that the labour market allows for working longer. Thus, there is in the end also a positive effect on pension adequacy.

Country	Sustainability factor	Retirement age linked to life expectancy
Germany	X	
Finland	X	
Spain	X	
Italy	X	X
France	X	
Latvia	X	
Poland	X	
Portugal	X	
Sweden	X	
Norway	X	
Czech Republic	X	
Denmark		X*
Greece	X	X
Netherlands		X
Slovakia		X
Cyprus		X

*: Depending on parliamentary decision.

Germany: The pension point value which is generally adjusted annually in relation to the gross wage growth can be altered further on (mainly lowered) by two additional factors: the contribution factor and the sustainability factor:

- The ‘*contribution factor*’ accounts for changes of the contribution rate to the statutory pension scheme and to the subsidised (voluntary) private pension schemes. An increase of contribution rates will reduce the adjustment of the pension point value.
- The ‘*sustainability factor*’ that measures the change of the number of standardized contributors in relation to the number of standardized pensioners, links the adjustment of the pension point value to the changes in the statutory pension scheme’s dependency ratio, the ratio of pensioners to contributors.

Additionally, Germany introduced a specific "*pension assurance law*". The pension point value will not decrease in case of decreasing wages. Theoretical decreases of the pension point value are temporarily frozen and will be counterbalanced with future increases of the pension point value starting from the year 2011.

Finland: The *life-expectancy coefficient* adjusts the pensions upon retirement to the changes in longevity as of 2010. The life expectancy coefficient is the difference of the remaining expected lifetime at age 62 in a particular year compared to the base year 2009, based on population statistics. It cuts the initial pension benefit accordingly. It is possible to counteract the effect of the life expectancy coefficient by postponing retirement.

Spain: It is planned that from 2027 onwards, the fundamental parameters of the pension system will be adjusted every 5 years to changes in life expectancy (at the age of 67) between the year of revision and 2027. The exact content of this sustainability indicator still has to be defined.

Italy: Under the NDC regime the amount of pension is calculated as a product of two factors: the total lifelong contributions, capitalised with the nominal GDP growth rate (five-year geometric average) and the *transformation coefficient*, the calculation of which is mainly based on the probability of death, the probability of leaving a widow or widower, and the average number of years for which a survivor's benefit will be drawn. As a consequence, pension amount is proportional to the contribution rate and inversely related to retirement age - the lower the age, the lower the pension and vice-versa. The transformation coefficients are currently available for the age bracket 57-65. As of 2013, the upper limit is extended to 70. For retirement ages falling below (i.e. disability pensions) or above the range, the lowest and the highest transformation coefficients are respectively applied. Transformation coefficients are updated every three years (every two years as of 2021).

Contribution and age requirements for early and old age pensions, and old age allowances are indexed to changes in life expectancy at 65, as measured by the National Statistical Institute over the preceding three years. Indexation to life expectancy will be first applied in 2013 by a purely administrative procedure. Subsequent retirement age indexations are envisaged every 3 years in line with the timing for the revision of the transformation coefficients (every two years as of 2021).

France: The amount of pensions in the basic private sector (CNAVTS) is partly depending on the *coefficient of proratisation* " $\text{Min}(1, D/T)$ " with D being the contributory period and T the reference length. The pension is reduced in due proportion whenever $D < T$. For people born in 1950 (who are 60 in 2010), T equals 40.5 years, but *this value will increase in line with life expectancy*.

Latvia, Poland and Sweden: The NDC pension systems in Latvia, Poland and Sweden work on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's account value by a *divisor reflecting life expectancy* at the specific date of retirement. An *increase in life expectancy reduces the annual benefit* so that the present value of total expected pension benefits is nearly invariant to changes in the cohort's remaining life expectancy and the individual's retirement age. In general, the individual can counteract the negative effect on the annuity caused by increasing life expectancy by postponing the date of retirement, thus giving strong incentives to prolong the working career.

Moreover, regardless of the demographic or economic development, the Swedish pension system ensures that it will be able to finance its obligations with a fixed contribution rate and fixed rules for calculation of benefits. This is done via an *automatic balancing mechanism* that is activated if the current liabilities of the system are greater than the calculated assets. In this case the indexation is reduced until the financial stability of the system is restored.

Portugal: The sustainability factor adjusts pensions upon retirement to changes in life expectancy. The sustainability factor is given by the ratio between the average life expectancy at the age of 65 in 2006 and that same indicator in the year before pension entitlement, as measured by the National Statistics Institute. This ratio is applied to new old-age pensions since the beginning of 2008 and is updated on an annual basis.

Czech Republic: There is a continuous increase of the statutory retirement age for people born after 1936. The retirement age will not be specified per se, but only with regard to the date of birth. After the unification of retirement ages for men and women, the statutory retirement age will be increased by 2 additional months in comparison to the precedent generation.

Denmark: *Changes in the statutory retirement age due to increases in life expectancy* have to be confirmed by Parliament 10 years before they take effect. In the projection, it is assumed that Parliament confirms these increases in the retirement age.⁶¹ A specific formula for calculating the pension age on the basis of future observed mean life expectancy for 60 year olds is enshrined in the legislation.

Greece: As from 2021, the minimum and statutory *retirement ages* will be *adjusted in line with changes in life expectancy* every three years. Upon its first implementation the change within the 2010-2020 ten-year period shall be taken into account. Moreover, a strict link between contributions and benefits and a sustainability factor that revises benefits in line with contributions to avoid any future deficit in the system is introduced.

Netherlands: The retirement age for the state pension AOW will be gradually increased from 65 to 67 in 2021 and linked to life expectancy afterwards. Moreover, the increase in the eligibility age for occupational pensions will also be linked to life expectancy, using the same formula as is used for the first pillar pensions.

Slovakia: As of 2017, the retirement age is going to be automatically (none additional approvals needed) annually increased by the year-on-year difference of 5-year moving average of the life expectancy (unisex).

Cyprus: The December 2012 pension reform introduces an automatic adjustment of the statutory retirement age every 5 years in line with changes in life expectancy at the statutory retirement age, to be first applied in 2018 thereby covering the period 2018-2023.

Source: Commission service, EPC and information provided by the Member States.

⁶¹ In case the parliament will not confirm the change in retirement age based on an increase in life expectancy, this would imply an underestimation of public pension expenditure in the Danish projections.

Annex III – Methodological Annex

(1) Projecting labour force developments using the cohort simulation model (CSM)

The Cohort Simulation Model (CSM) calculates entry rates to and exit rates from the labour market by gender and cohort. The methodology was initially developed in the OECD⁶², but its implementation in the Ageing Report publications follows Carone (2005), namely the use of single ages instead of the average of 5-years age groups.

The dynamic cohort approach is based on the estimates of labour market exit and entry rates of a “synthetic” generation/cohort. The cohort is “synthetic” because, due to lack of individual longitudinal data on labour market transitions, the same individual cannot be followed over time. Instead, it is assumed that those individuals aged $x+1$ at year $t+1$ are representative of the same generation observed in the previous year (aged x at time t). Due to the lack of specific information on each individual's behaviour, this assumption neglects inflows and outflows from the labour market that cancel out.⁶³

Participation rate projections are produced by applying the average entry and exit rates observed over the period 2001-2010 by gender and single age to the period 2011-2060. Specifically, average entry rates observed for the period 2001-2010 are kept constant over the entire projection period. For example, average entry rates for persons aged x , calculated for the period 2001 to 2010 (with x varying between 15 and 74 years of age), are applied to persons aged X over the projection horizon of 2011 to 2060 in order to calculate future participation rates. In this way, the CSM captures “cohort effects”, namely the one resulting from the stronger attachment of younger women of latest cohorts to the labour market.

The CSM is also able to incorporate a broad typology of pension reforms, such as increases in the statutory retirement age, the convergence of women's lower statutory retirement age to that of men's, the linking of the statutory retirement age to changes in life expectancy, the tightening of conditions for early retirement, and changes in (price) incentives affecting the retirement decision. The likely impact of pension reforms is incorporated in the labour force projections by appropriately changing average labour market exit probabilities.

(2) The calculation of entry rates

Entry rates into the labour market from inactivity are calculated as follows:

The calculation of the number of persons that enter the labour market (coming from inactivity) takes into account the size of each gender/age group. It can be expressed as:

⁶² See Burniaux et al. (2003), and Scherer (2002), which developed a dynamic version of Latulippe (1996) methodology.

⁶³ For example, this means that if in year t there are 100 persons aged x in the labour force and in the following year (when aged $x+1$) these same individuals leave the labour force (for whatever reason, such as discouragement, death or emigration), but they are replaced by other 100 individuals aged $x+1$, previously not part of the labour force, no change in the size of our “synthetic” cohort is observed. As a consequence, the calculated net rates of exit and entry are equal to zero, while the actual (gross) value is 100 per cent.

$$NLF_x^{t+1} = (Pop_{max_{wa}} - LF_x^t) - (Pop_{max_{wa}} - LF_{x+1}^{t+1})$$

$$\text{with } LF_x^t + NLF_{x+1}^{t+1} \leq Pop_{max_{wa}},$$

where NLF is the number of people expected to become active between ages x and x+1; $Pop_{max_{wa}}$ is the maximum population in working age that can potentially enter the labour force (which is usually slightly lower than the overall civilian population in working age, due for example to illness/inability) and LF is the number of active persons (in labour force) aged x in year t and aged x+1 in year t+1.

By multiplying and dividing for the population aged x at time t (which is supposed to remain the same as the population aged x+1 at time t+1), the following equation is obtained:

$$NLF_x^{t+1} = [(Pr_{max} - Pr_x^t) - (Pr_{max} - Pr_{x+1}^{t+1})] * Pop_x^t$$

where Pr_{max} is the upper limit to the participation rate (we assume 0.99 for both male and female⁶⁴). Thus, the rate of entry, *Ren*, can be calculated by dividing the number of people expected to become active by the number of people inactive at time t, that is:

$$Ren = \frac{NLF_x^{t+1}}{Pop_{max_{wa}} - LF_x^t} = [(Pr_{max} - Pr_x^t) - (Pr_{max} - Pr_{x+1}^{t+1})] * \frac{Pop_x^t}{Pop_{max_{wa}} - LF_x^t}$$

which, taking into account that $PR_x^t = \frac{Pop_x^t}{LF_x^t}$ and $Pr_{max} = \frac{Pop_{max_{wa}}^t}{Pop_x^t}$, can be reformulated as:

$$Ren_{x+1} = [(Pr_{max} - Pr_x^t) - (Pr_{max} - Pr_{x+1}^{t+1})] * \frac{1}{(Pr_{max} - Pr_x^t)}$$

$$\text{or } Ren_{x+1} = \left[1 - \frac{(Pr_{max} - Pr_{x+1}^{t+1})}{(Pr_{max} - Pr_x^t)} \right] \geq 0$$

$$\text{or } Ren_{x+1} = \frac{(Pr_{x+1}^{t+1} - Pr_x^t)}{(1 - Pr_x^t)} \geq 0 \text{ when } Pr_{max}=1.$$

After re-arranging, the analytical formulation used for projecting participation rates based on these entry rates is obtained:

$$PR_{x+1}^{t+1} = Ren_{x+1} * (PR_{max} - PR_x^t) + PR_x^t$$

Thus, projections of participation rates for each single-year cohort (x+1) can be calculated by applying the entry rates observed in a given year or period over the period of projections (t=2011-2060). In practical terms, the entry rates for each age have been calculated on the basis of the average of the participation rates observed over the period 2001-2010.

⁶⁴ Burniaux et al. (2003) used as maximum value for participation rate (Pr_{max}) 0.99 for male and 0.95 for female.

(3) The calculation of exit rates

In the same way, when participation rates for two adjacent single-year age groups are falling, an *exit rate from the labour market* (i.e. the net reduction in the labour force relative to the number of people who were initially in the labour force in the same cohort the year before) can be calculated as follows:

The number of persons that leave the labour market at time $t+1$ is equivalent to:

$$OP_x^{t+1} = LF_x^t - LF_{x+1}^{t+1}$$

where OP is the number of individual expected to become inactive between age x and $x+1$, and LF is the number of active persons (in labour force) aged x in year t and aged $x+1$ in year $t+1$.

By multiplying and dividing for the population aged x at time t , which is supposed to remain the same as the population aged $x+1$ at time $t+1$, one gets:

$$OP_x^{t+1} = (PR_x^t - PR_{x+1}^{t+1}) * Pop_x^t$$

where PR are the participation rates.

Thus, the (conditional) rate of exit, Rex , can be calculated by dividing the number of people that become inactive at time $t+1$ by the number of people active at time t . That is,

$$Rex = \frac{OP_x^{t+1}}{LF_x^t} = (PR_x^t - PR_{x+1}^{t+1}) * \frac{Pop_x^t}{LF_x^t}, \text{ which can also be re-arranged as}$$

$$Rex = \frac{OP_x^{t+1}}{LF_x^t} = 1 - \frac{PR_{x+1}^{t+1}}{PR_x^t}.$$

As a consequence, this Rex can also be used to project participation rates of older workers as:

$$PR_{x+1}^{t+1} = (1 - Rex_{x+1}) * PR_x^t \text{ and}$$

$$PR_{x+n}^{t+n} = (1 - Rex_{x+1})(1 - Rex_{x+2})(1 - Rex_{x+3}) * \dots * (1 - Rex_{x+n-1}) * PR_x^t.$$

(4) Average exit age from the labour force⁶⁵

In order to estimate the “average exit age” from the labour force (used in this paper as an approximation for the effective retirement age), the CSM is again used. The methodology is based on the comparison of labour force participation rates over time.

The conditional probability for each person to stay in the labour force at age a in year t , (conditional upon staying in the labour force in year $t-1$), can be calculated by using the observed activity rates (Pr) as follows:

$$\underline{\text{Probability to stay}} = cProb_{a,t}^{stay} = \frac{Pr_a^t}{Pr_{a-1}^{t-1}} \quad \text{where } 0 \leq cProb_{a,t}^{stay} \leq 1.$$

Thus, at time t , the conditional probability for each person to exit at age a ($cProb_{a,t}^{ex}$) is simply equal to:

⁶⁵ See Carone (2005).

$$\text{Probability of exit} = cProb_{a,t}^{ex} = 1 - \frac{Pr_a^t}{Pr_{a-1}^{t-1}} = 1 - cProb_{a,t}^{stay} \quad \text{where } 0 \leq cProb_{a,t}^{ex} \leq 1.$$

Assuming that nobody retires before the minimum age m (e.g. before $m=50$), the (unconditional) probability that any person will still be in the labour force (that is the probability of not retiring before a given age a) can be calculated as the product of all the conditional probabilities to stay in the labour force from age m to age $a-1$:

$$\text{Probability of not retiring before age } a = Prob_{a,t}^{notret} = \prod_{i=m}^{a-1} cProb_i^{stay}$$

Thus, the probability of retiring at age a can be calculated as the product of the unconditional probability of not retiring from age m to a and the (conditional) probability of exit, that is:

$$\text{Probability of retiring at age } a = Prob_{a,t}^{ret} = Prob_{a,t}^{notret} cProb_{a,t}^{ex}$$

By assuming that everybody will be retired at a given age M (e.g. $M=74$), the sum of the probability of retiring between the minimum age m and the maximum age M is equal to 1:

$$\sum_{a=m}^M Prob_a^{ret} = 1.$$

The “average exit age” or effective age of retirement from the labour market is then calculated as the weighted sum of the retirement ages (between the minimum and the maximum age of retirement, say 50-74), where the weights are the probability of retiring at each age a , as follows:

$$\text{Average exit age} = Aea = \sum_{a=m}^M Prob_a^{ret} * a.$$

(5) Measuring the impact on labour force of an increase in retirement ages in line with gains in life expectancy

The impact of an increase in retirement ages in line with gains in life expectancy is modelled by considering the likely impact of each scenario on the probability of withdrawing from the labour market when ageing, due to changes in the statutory "normal" age of retirement or in the early retirement age, that is the age at which benefits are first available. This likely impact is incorporated in the basic projections of labour forces by means of the probabilistic model CSM used by the European Commission. The link of current statutory and early retirement ages (2010 as a base year) with changes in life expectancy is in a first step applied irrespective of already legislated future increases in early/statutory retirement ages that are taken into account in the (updated) 2012 Ageing Report projections. Especially in the short- and medium-run, retirement ages might thus be increasing faster under current legislation than under the modelled scenarios. As a consequence, also the projected impact on the labour force – and especially on the effective retirement age – might in some cases be higher in the 2012 Ageing Report projections than under the simulated scenarios, leading thus potentially to a financially more sustainable outcome for the pension system. In a second step, a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the simulation scenario is assumed at every point in time over the projection horizon and then later on applied for the pension expenditure projections (for a more detailed description, see box above on "Effective retirement age projections under the simulation scenarios").

(5.1) Progressive shifting of exit probabilities distribution in shift scenarios

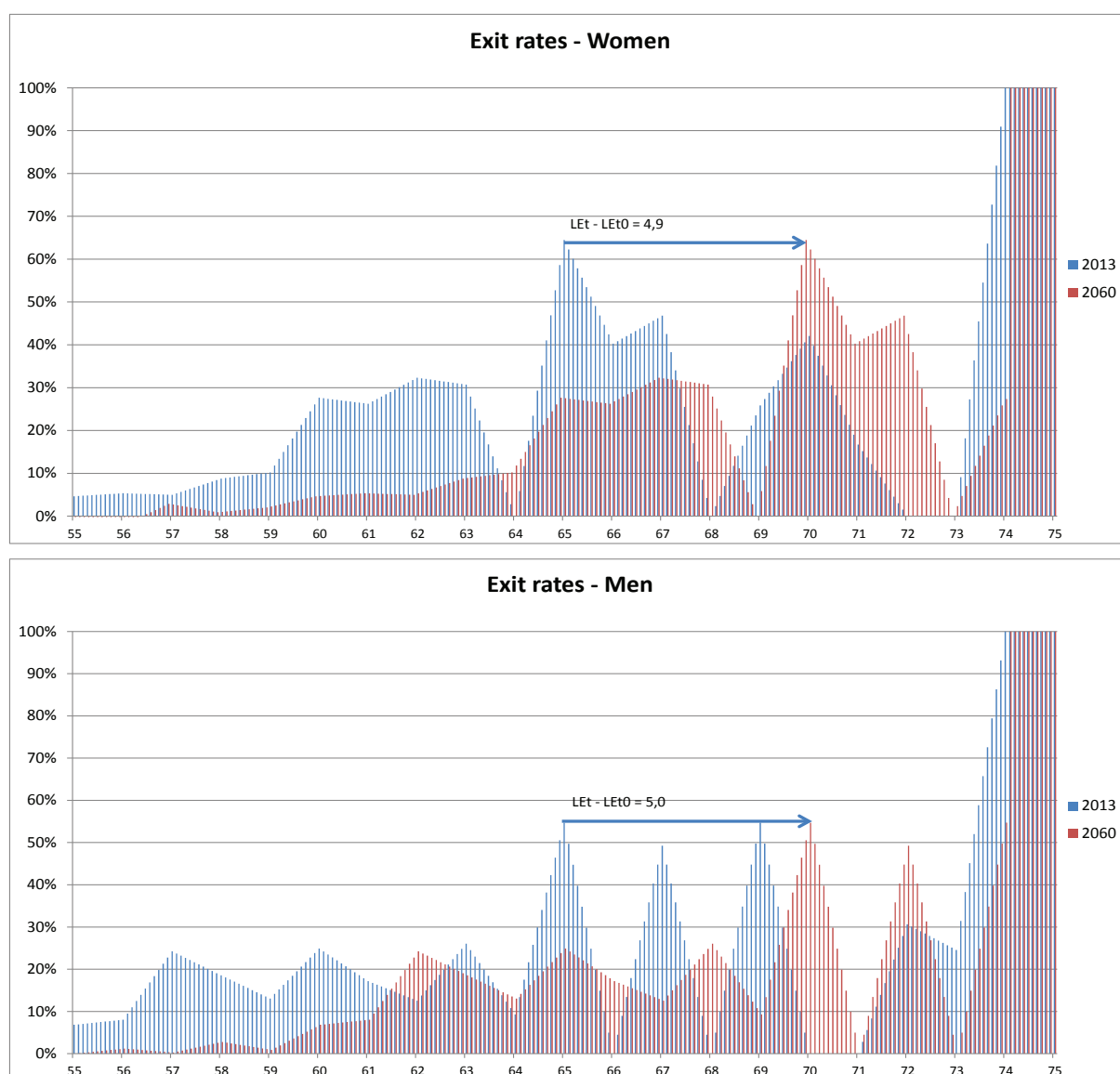
Under the "shift" scenarios, the exit probabilities distribution is progressively shifted to the right (i.e. to higher ages) so that the exit probabilities at each single age are moved (partially) in line with gains in life expectancy as illustrated in [Graph 14](#):

$cProb_{a,t}^{ex} = cProb_{a-(LE_t-LE_{t_0}),t_0}^{ex}$ ⁶⁶, where LE is the life expectancy at the statutory retirement age.

Consequently, the country specific gaps between early and statutory retirement ages as observed in the base year remain unchanged. This is a strong assumption since it is implicitly assumed that all legal and institutional settings (e.g. contributory period) will move in line with changes in life expectancy. This also includes that changes in life expectancy are spent in good health since exit probabilities are not adjusted to incorporate higher exits due to disability.

In the "strict shift scenarios" (hence, applying the shift of 2010 retirement ages in line with gains in life expectancy irrespective of current legislation), t_0 – i.e the point in time when the shift of the exit probabilities starts to be applied – is obviously the beginning of the projection horizon.

Graph 14 – Exit rates by single age in 2013 and 2060 under the 100% shift scenario (Luxembourg)



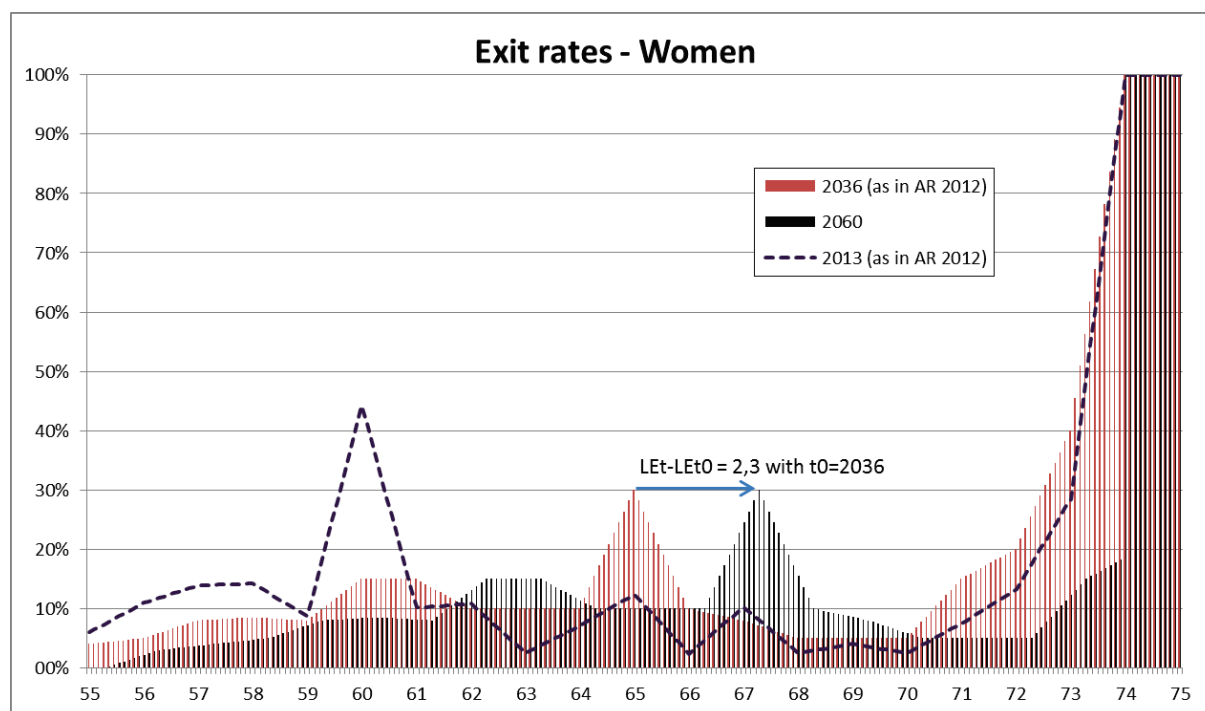
⁶⁶ In order to be able to shift progressively the exit probabilities distribution, exit probabilities by linearly interpolated tenths of ages are used (e.g. age 60.0, 60.1, 60.2,,,60.9).

Source: Commission services.

However, as explained in Box 1, the value of t_0 varies in the combined projections of the strict progressive shift of retirement ages (exit probabilities distribution) and the 2012 Ageing Report baseline projections in the CSM. In these combined projections, the 2012 Ageing Report exit probabilities are applied as long as the effective retirement age is projected to increase stronger under current legislation. Once the effective retirement age is projected to be higher under the "strict" shift scenario, the exit probabilities distribution as projected for the 2012 Ageing Report at that specific point in time (the new t_0) is shifted in line with changes in life expectancy at retirement. This approach ensures that, on one hand, the shift in line with life expectancy is applied once Member States' current retirement age legislation is not anymore designed to absorb further changes in life expectancy. On the other hand, the shift is nevertheless applied properly on top of current legislation at that specific point in time so that the shape of the country-specific exit probabilities distribution reflecting pension system specificities remains unchanged.

This means that for example in Austria, in the "100% shift scenario" (as described in box 1 above), the exit rates for women as estimated in the 2012 Ageing Report labour force projections are used for women from the beginning of the projection horizon (dashed line) until 2036 (red bars). Up to that point, the average effective retirement age outcome based on current legislation is higher than the application of a shift of 2010 statutory/early retirement ages over that horizon in line with longevity gains. Beyond 2036, the current legislation is not anymore designed to absorb further changes in life expectancy and therefore, the shift of retirement ages in line with increases in life expectancy continues to be applied from 2036 onwards up to 2060 (black bars) on top of the current legislation (i.e. based on the exit probabilities distribution as projected for the 2012 Ageing Report at that point in time) as illustrated in Graph 15.

Graph 15 – Exit rates by single age for women in 2013, 2036 and 2060 under the 100% shift scenario (Austria)



Source: Commission services.

(5.2) Progressive shifting of the average effective retirement age to reach a certain share of lifetime spent in retirement

Under the scenarios in which a certain share of adult lifetime spent in retirement is targeted, the current exit probabilities distribution is deducted from the probabilities of retiring so that the average effective retirement age is equal to the average effective retirement age that has to be reached to either keep the individual 2010 share of lifetime spent in retirement constant or to converge gradually up to 2060 towards the 2010 EU share of lifetime spent in retirement:

$$(LE_t / ((\sum_{a=m}^M Prob_a^{ret} * a) + LE_t)) = (LE_{t_0} / (Aea_{t_0} + LE_{t_0}))_{EU27}.$$

Therefore, the estimates of the probabilities of retirement ($Prob_a^{ret}$) to resolve the main equation are done by using a Dantzig's simplex algorithm⁶⁷. This algorithm is a linear program in which linear inequalities are transformed into linear equations so that, for each gender, the following holds:

$$(LE_t / ((\sum_{a=m}^M Prob_a^{ret} * a) + LE_t)) = (LE_{t_0} / (Aea_{t_0} + LE_{t_0})) + ((LE_{t_0} / (Aea_{t_0} + LE_{t_0}))_{EU27} - (LE_{t_0} / (Aea_{t_0} + LE_{t_0}))) * ((t - t_0) / (2060 - t_0))$$

(objective function)

$$\text{with } cProb_{a,t}^{ex} = 1 - \frac{Pr_a^t}{Pr_{a-1}^{t-1}} = 1 - cProb_{a,t}^{stay} \text{ and } cProb_{a,t}^{ex} = 1 - \frac{Pr_a^t}{Pr_{a-1}^{t-1}} = 1 - cProb_{a,t}^{stay}$$

$$\text{s.t. } \sum_{a=m}^M Prob_a^{ret} = 1 \text{ and}$$

$Prob_{a,t}^{ret} \leq Prob_{a,t_0}^{ret}$ (for each single age between 50 and 59) to prohibit possible increases in retirement probabilities at early ages; and

$\sum_{a=m}^M Prob_{a,t}^{ret} \leq \sum_{a=m}^M Prob_{a,t-1}^{ret}$ (for ages 50 (m) to 71 (M)) so that for each year, the cumulative probability of retirement is below the one of the previous year.

The exit rates are then deducted ex post from the probabilities of retirement as calculated by the linear program at each given age as described in (4)⁶⁸.

The 2012 Ageing Report exit rates (either observed average over the period 2001-2010 or estimated) are replaced with the new estimated exit rates by the CSM as described above, but only in case the outcome is financially more sustainable than the legally anticipated retirement age increase, to estimate the participation rates and by later on the level of employment and total hours worked.

(6) Measuring the impact on potential GDP

The calculated labour force as described in (5) is then converted in labour supply as in the Ageing Report 2012. As a general rule, actual unemployment rates are assumed to converge to NAWRU rates by 2015, and thereafter gradually decline towards country-specific historical minima capped at 7.3% , which corresponds to the EU27 NAWRU average (based on the

⁶⁷ Dantzig, G.B. (1951). Maximization of a linear function of variables subject to linear inequalities. In: Activity Analysis of Production and Allocation, (T.C. Koopmans, editor). Wiley, New York, 339-347.

⁶⁸ Exit rates are deducted from the cumulated probabilities of retiring corresponding to the targeted average effective exit age.

Spring 2011 DG ECFIN's Economic Forecasts). In order to avoid changes in total/average unemployment rates as a result of the interaction between cohort-specific structural unemployment rates (u_{ag}) and the structure of the labour force, the age-specific unemployment rates (by gender) for each projection year are calculated as follows:

$$u_{a,g}^t = \frac{u_{total}^t}{\sum_{a,g} \{u_{a,g}^{2010} * l_{a,g}^t\}} * u_{a,g}^{2010}$$

where

$$l_{a,g}^t = \frac{LF_{a,g}^t}{LF_{total}^t}$$

where $u_{a,g}^t$ is the unemployment rate in age group a , gender g , and period t ; u_{total}^t is the total unemployment rate in period t ; and $l_{a,g}^t$ is the fraction in the total labour force.

This means that longer working time is not translated fully in employment since the unemployment rate structure (by age and gender) observed in the base year (2010) is kept constant throughout the projection period, thereby age/gender values are adjusted proportionally in order to satisfy a given total unemployment rate target.

The production function framework is then used to project long term GDP growth as also done in the 2012 Ageing Report. The new labour supply component (employment and total hours worked) calculated by the CSM under the modelled scenarios is introduced in the production function model, *ceteris paribus*. Consequently, the other components, namely total factor productivity, the NAWRU and the capital stock, remain unchanged in comparison to the 2012 Ageing Report:

$$\text{Log}(Yp) = \text{Log}(\text{trendTFP}) + \beta \text{Log}(LF * (1 - \text{NAWRU}) * \text{Hours}) + ((1 - \beta) \text{Log}K)$$

This approach has been chosen to ease comparison with the 2012 Ageing Report. Moreover, the relationship between age and productivity is difficult to measure. Some studies shows a negative effect on labour productivity and economic growth (Feyrer, 2009⁶⁹; Headey and Hodge, 2009⁷⁰) while others with a focus on firm level suggest that productivity is higher with high shares of older workers (Malmberg, Lindh, and Halvarsson, 2005⁷¹; Van Ours and Stoeldraijer, 2010⁷²).

⁶⁹ Feyrer, J., 2009, "The US productivity slowdown, the baby boom, and management quality", National bureau of economic research, Working paper 15474.

⁷⁰ Headey, D. and A. Hodge, 2009, "The Effect of Population Growth on Economic Growth: A Meta-Regression Analysis of the Macroeconomic Literature." Population and Development Review 35:221.

⁷¹ Malmberg, B., T. Lindh, and M. Halvarsson, 2005, "Productivity consequences of workforce ageing - Stagnation or a Horndal effect?," Arbetsrapport 2005:17, Institute for Futures Studies.

⁷² Van Ours, J.C. and L. Stoeldraijer, 2010, "Age, Wage and Productivity" CESifo Working Paper Series No. 2965.

(7) Measuring the impact on public pension expenditures

The extension of working lives due to an increase in the retirement age (done either by a parallel shift of current labour market exit probabilities by single year and sex to higher ages ("shift" scenarios) or by adjusting the exit probabilities distribution to achieve a target effective retirement age ("constant time spent in retirement" and "EU convergence" scenarios)) increases total labour supply in a proportional manner, thus increasing employment (whereas the structural unemployment remains unchanged in comparison to the 2012 Ageing Report) as well as GDP and reducing the number of pensioners. On the one hand, the reduction of pensioners will decrease pension expenditures, but, on the other hand, the pension benefits received by new pensioners are increased due to higher pension contributions based on longer working lives and the average pension itself is also increasing in line with increased GDP growth.

(7.1) Pensioners effect

The number of pensioners is equal to the number of pensioners as reported in the 2012 Ageing Report baseline scenario, yet reduced by the increase in the labour force as modelled in the scenarios linking retirement ages to increases in longevity compared to the 2012 Ageing Report results.

$$Ns_t = Nb_t - (LFs_t - Lfb_t),$$

where Ns is the number of pensioners and LFs is the labour force under the modelled scenarios, whereas Nb is the number of pensioners and Lfb is the labour force under the 2012 Ageing Report baseline scenario.

(7.2) Benefit ratio effect

To measure how average pension benefits are affected by a prolonged working life due to a link of retirement ages to longevity gains in each Member States, the 2012 Ageing Report baseline scenario is compared with an alternative scenario in which the participation rate (and also the employment rate) of older workers is higher ("higher older workers employment scenario").

In the 2012 Ageing Report, Member States were *inter alia* asked to provide pension expenditure projections using national pension models for a scenario with the employment/participation rate of older workers (55-64) being 5 p.p. higher than under the 2012 Ageing Report baseline scenario. The increase is introduced linearly over the period 2016-2025 and remains 5 p.p. higher thereafter. The higher employment rate of this group of workers is assumed to be achieved purely through a reduction of the inactive population. This scenario is used because an increase in the retirement age as simulated in the modelled scenarios of this paper indirectly leads to an increase in employment of older workers. Hence, the resulting benefit ratio effect can be taken as a good modelling approximation to calculate the benefit ratio effect of a retirement age link to life expectancy.

Moreover, this approach captures, *inter alia*, changes in wage profiles, disability prevalence or average job tenure in the benefit ratio that were modelled by Member States in their national models.

However, due to a lack of details for the stock and flows of pension expenditure for this "higher older workers employment scenario", the average elasticity of the pension benefits to the effective exit age over the period in which the gradual increase in the activity of older workers is introduced (i.e. 2016-2025) is calculated:

$$E_{PB,Aea} = \frac{AVG_{2016}^{2025} ((PBh_t / PBh_{t-1}) - (PBb_t / PBb_{t-1}))}{((Aea_h_{2025} - Aea_b_{2025}) / (2025 - 2016))}$$

where $PB = PensExp / N$, i.e. the average pension benefit per pensioner either under the baseline scenario (PBb) or the alternative higher older workers employment rate scenario (PBh). Aea is the average effective retirement age either for the baseline scenario (Aea_b) or the alternative higher older workers employment rate scenario (Aea_h).

In case the projections as provided by the Member States in the 2012 Ageing Report for the higher older workers employment scenario do not result in a higher benefit ratio in comparison to the baseline – which under the assumptions of this paper should however be the case for a prolonged working life –, mainly due to a lack of alternative data for the number of pensioners, then the projected CSM results for employment rates under different simulation scenarios were taken to approximate the number of pensioners in the higher older workers scenario to come up with a benefit ratio elasticity that reflects higher benefit ratios for longer working lives (done for the Czech Republic, Denmark, Germany, Estonia, Ireland, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia, Sweden and the UK). If also CSM results did not provide a proper elasticity, the EU average was applied to Member States (Greece, France, Italy, Slovenia).

To illustrate the budgetary impact of a rule that links pension benefits to life expectancy gains, the 100% shift scenario is also separately run under the assumption that the benefit ratio as projected in the 2012 Ageing Report baseline scenario for the years 2010-2060 is kept constant.

(7.3) Public pension expenditure

The total gross public pension expenditure is calculated as follows:

$$PensExp_t = \frac{(Ns_t * PBb_t * (((Aea_s_t - Aea_s_{t0}) - (Aea_b_t - Aea_b_{t0})) * E_{PB,Aea}))}{GDPs_t}$$

where Aea_s is the average effective retirement age under the scenario linking retirement ages to increases in longevity and $GDPs$ is the gross domestic product under the scenario linking retirement ages to increases in longevity as calculated in (5).

Therefore, total public pension expenditure is calculated according to the (increasing) average pension per projection year due to longer working lives multiplied by the decreased number of pensioners according to the respective postponed retirement scenario. For countries that are mainly based on NDC pension systems (IT, LV, PL and SE), the overall effect on the scheme's finances should theoretically be neutral as the shorter period of pension payments is fully outweighed by increased individual pension entitlements, due to longer working lives. For simplicity reasons, the change in pension expenditures in comparison to the 2012 Ageing Report is thus set to be 0.

Expenditures on other age-related items (health care, long-term care, education and unemployment benefits) evolve in line with the (updated) 2012 Ageing Report figures⁷³. Overall sustainability figures are thus calculated according to total costs of ageing under the different scenarios based only on updated pension expenditure figures.

⁷³ See footnote 26.

Annex Table 14 - Change in statutory and effective retirement ages under postponed retirement vs. Ageing Report 2012

		Life expectancy at age 65										Average effective retirement age (2012 Ageing Report baseline projections)									
		Male					Female					Male					Female				
		2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
BE	17.5	18.4	19.4	22.3	4.8	21.0	21.9	22.9	25.7	4.7	BE	61.5	62.1	62.1	62.1	0.6	61.6	62.3	62.3	62.3	0.8
BG	14.0	15.3	16.6	20.6	6.6	17.1	18.4	19.7	23.6	6.5	BG	63.2	64.7	64.7	64.7	1.5	61.5	62.5	62.5	62.5	1.1
CZ	15.4	16.5	17.7	21.2	5.8	18.8	19.9	21.1	24.5	5.7	CZ	62.9	63.5	64.3	65.6	2.7	60.1	61.1	62.6	65.1	5.0
DK	16.9	17.9	19.0	22.0	5.1	19.7	20.8	21.9	25.1	5.5	DK	64.2	66.2	67.0	67.2	2.9	62.3	65.3	66.5	66.3	4.0
DE	17.5	18.5	19.5	22.4	4.9	20.7	21.6	22.6	25.4	4.7	DE	64.3	65.4	65.7	65.7	1.4	63.5	64.7	65.3	65.3	1.8
EE	14.2	15.5	16.9	20.9	6.7	19.2	20.4	21.6	24.9	5.7	EE	63.8	64.7	65.4	65.4	1.6	64.5	64.6	65.0	65.0	0.5
IE	17.0	18.0	19.1	22.2	5.2	20.2	21.2	22.4	25.5	5.3	IE	65.1	65.1	65.1	65.1	0.0	66.7	66.6	66.5	66.6	-0.1
EL	18.0	18.9	19.9	22.6	4.6	20.3	21.1	22.0	24.6	4.3	EL	62.5	62.8	63.1	64.0	1.5	62.4	62.7	62.9	63.8	1.5
ES	18.3	19.2	20.2	22.9	4.6	22.2	23.0	23.9	26.3	4.0	ES	62.6	64.4	65.3	65.3	2.7	63.9	65.4	65.9	65.9	2.0
FR	18.6	19.5	20.4	23.0	4.4	22.8	23.6	24.4	26.6	3.8	FR	60.1	62.2	62.8	62.8	2.7	60.2	62.2	62.8	62.8	2.6
IT	18.2	19.1	20.1	22.8	4.6	21.8	22.7	23.6	26.1	4.3	IT	61.7	65.9	66.1	67.3	5.5	61.4	65.5	65.4	67.5	6.2
CY	17.9	18.8	19.8	22.5	4.7	20.1	21.1	22.2	25.3	5.1	CY	65.4	65.4	65.4	65.4	0.0	63.8	63.8	63.8	63.8	0.0
LV	13.6	15.0	16.5	20.6	7.0	18.3	19.5	20.8	24.4	6.2	LV	64.3	65.0	65.4	65.4	1.1	63.8	64.7	65.3	65.3	1.5
LT	13.7	15.0	16.4	20.4	6.7	18.5	19.6	20.8	24.2	5.7	LT	63.5	64.0	64.3	64.3	0.8	61.7	62.9	63.8	63.8	2.1
LU	17.5	18.4	19.5	22.4	4.9	21.2	22.2	23.3	26.1	4.8	LU	59.6	59.6	59.6	59.6	0.0	60.6	60.5	60.5	60.5	-0.1
HU	14.2	15.5	16.9	20.9	6.8	18.3	19.5	20.9	24.6	6.3	HU	61.2	64.7	65.3	65.3	4.1	60.3	64.3	64.8	64.8	4.6
MT	17.1	18.1	19.2	22.2	5.1	20.3	21.3	22.4	25.4	5.1	MT	61.3	63.0	64.0	64.0	2.7	60.3	61.7	62.6	62.6	2.4
NL	17.6	18.5	19.5	22.3	4.7	21.0	21.9	22.9	25.6	4.7	NL	64.6	66.7	67.2	68.1	3.6	62.5	64.6	65.2	66.2	3.7
AT	17.7	18.6	19.6	22.4	4.7	21.0	21.9	22.9	25.6	4.6	AT	61.8	62.9	63.0	63.1	1.3	60.6	61.8	62.5	62.8	2.2
PL	15.0	16.2	17.5	21.2	6.2	19.2	20.3	21.5	24.8	5.6	PL	62.2	66.0	66.0	66.0	3.8	58.8	61.8	64.0	65.8	7.0
PT	17.2	18.1	19.2	22.1	4.9	20.5	21.4	22.4	25.1	4.6	PT	64.5	65.4	65.8	65.8	1.4	64.7	65.4	65.7	65.7	1.0
RO	14.2	15.5	16.9	20.8	6.6	17.3	18.6	20.0	23.8	6.5	RO	63.1	64.0	64.0	64.0	0.9	61.2	61.8	62.6	62.6	1.4
SI	16.5	17.6	18.7	21.9	5.4	20.3	21.3	22.4	25.3	5.0	SI	62.1	63.8	63.8	63.8	1.7	59.7	62.4	63.5	63.5	3.8
SK	14.3	15.5	16.9	20.8	6.5	18.1	19.3	20.6	24.3	6.2	SK	61.4	61.9	62.6	66.2	4.8	58.7	61.7	62.4	65.9	7.2
FI	17.4	18.3	19.4	22.3	4.9	21.4	22.2	23.2	25.8	4.4	FI	63.4	64.1	64.1	64.1	0.7	62.6	63.9	63.9	63.9	1.2
SE	18.3	19.2	20.1	22.7	4.3	21.2	22.1	23.1	25.7	4.6	SE	65.1	65.6	65.6	65.6	0.5	64.0	64.4	64.4	64.4	0.4
UK	18.1	19.0	20.0	22.8	4.7	20.8	21.8	22.8	25.7	4.9	UK	64.7	64.8	64.9	65.8	1.1	63.3	64.2	65.2	65.8	2.5
EA17	17.9	18.8	19.8	22.6	4.7	21.5	22.4	23.3	25.9	4.4	EA17	62.5	64.4	64.8	65.1	2.6	62.2	64.2	64.6	65.1	2.8
EU27	17.3	18.3	19.4	22.4	5.1	20.8	21.8	22.8	25.6	4.8	EU27	62.9	64.6	64.9	65.3	2.4	62.0	63.8	64.5	65.1	3.1

	Life expectancy at age 65										Average statutory retirement age (current legislation reflected in 2012 Ageing Report)									
	Male					Female					Male					Female				
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change
BE	17.5	18.4	19.4	22.3	4.8	21.0	21.9	22.9	25.7	4.7	BE	65.0	65.0	65.0	65.0	0.0	65.0	65.0	65.0	0.0
BG	14.0	15.3	16.6	20.6	6.6	17.1	18.4	19.7	23.6	6.5	BG	63.0	65.0	65.0	65.0	2.0	60.0	63.0	63.0	3.0
CZ	15.4	16.5	17.7	21.2	5.8	18.8	19.9	21.1	24.5	5.7	CZ	62.2	63.7	65.0	69.3	7.2	58.7	61.7	64.7	10.7
DK	16.9	17.9	19.0	22.0	5.1	19.7	20.8	21.9	25.1	5.5	DK	65.0	66.0	68.0	72.5	7.5	65.0	66.0	68.0	72.5
DE	17.5	18.5	19.5	22.4	4.9	20.7	21.6	22.6	25.4	4.7	DE	65.0	65.8	67.0	67.0	2.0	65.0	65.8	67.0	67.0
EE	14.2	15.5	16.9	20.9	6.7	19.2	20.4	21.6	24.9	5.7	EE	63.0	63.8	65.0	65.0	2.0	61.0	63.8	65.0	65.0
IE	17.0	18.0	19.1	22.2	5.2	20.2	21.2	22.4	25.5	5.3	IE	66.0	66.0	67.0	68.0	2.0	66.0	66.0	67.0	68.0
EL	18.0	18.9	19.9	22.6	4.6	20.3	21.1	22.0	24.6	4.3	EL	65.0	65.0	68.0	70.7	5.7	60.0	65.0	68.0	70.7
ES	18.3	19.2	20.2	22.9	4.6	22.2	23.0	23.9	26.3	4.0	ES	65.0	65.8	67.0	67.0	2.0	65.0	65.8	67.0	67.0
FR	18.6	19.5	20.4	23.0	4.4	22.8	23.6	24.4	26.6	3.8	FR	62.5	64.5	64.5	64.5	2.0	62.5	64.5	64.5	64.5
IT	18.2	19.1	20.1	22.8	4.6	21.8	22.7	23.6	26.1	4.3	IT	65.3	66.9	67.8	70.3	4.9	60.3	66.9	67.8	70.3
CY	17.9	18.8	19.8	22.5	4.7	20.1	21.1	22.2	25.3	5.1	CY	65.0	65.0	65.0	65.0	0.0	65.0	65.0	65.0	65.0
LV	13.6	15.0	16.5	20.6	7.0	18.3	19.5	20.8	24.4	6.2	LV	62.0	63.8	65.0	65.0	3.0	62.0	63.8	65.0	65.0
LT	13.7	15.0	16.4	20.4	6.7	18.5	19.6	20.8	24.2	5.7	LT	62.5	64.0	65.0	65.0	2.5	60.0	63.0	65.0	65.0
LU	17.5	18.4	19.5	22.4	4.9	21.2	22.2	23.3	26.1	4.8	LU	65.0	65.0	65.0	65.0	0.0	65.0	65.0	65.0	65.0
HU	14.2	15.5	16.9	20.9	6.8	18.3	19.5	20.9	24.6	6.3	HU	62.0	65.0	65.0	65.0	3.0	62.0	65.0	65.0	65.0
MT	17.1	18.1	19.2	22.2	5.1	20.3	21.3	22.4	25.4	5.1	MT	61.0	63.0	65.0	65.0	4.0	60.0	63.0	65.0	65.0
NL	17.6	18.5	19.5	22.3	4.7	21.0	21.9	22.9	25.6	4.7	NL	65.0	66.3	67.8	69.8	4.8	65.0	66.3	67.8	69.8
AT	17.7	18.6	19.6	22.4	4.7	21.0	21.9	22.9	25.6	4.6	AT	65.0	65.0	65.0	65.0	0.0	60.0	60.0	63.5	65.0
PL	15.0	16.2	17.5	21.2	6.2	19.2	20.3	21.5	24.8	5.6	PL	65.0	67.0	67.0	67.0	2.0	60.0	60.0	64.8	67.0
PT	17.2	18.1	19.2	22.1	4.9	20.5	21.4	22.4	25.1	4.6	PT	65.0	65.0	65.0	65.0	0.0	65.0	65.0	65.0	65.0
RO	14.2	15.5	16.9	20.8	6.6	17.3	18.6	20.0	23.8	6.5	RO	64.0	65.0	65.0	65.0	1.0	59.0	61.0	63.0	63.0
SI	16.5	17.6	18.7	21.9	5.4	20.3	21.3	22.4	25.3	5.0	SI	63.0	65.0	65.0	65.0	2.0	61.0	65.0	65.0	65.0
SK	14.3	15.5	16.9	20.8	6.5	18.1	19.3	20.6	24.3	6.2	SK	62.0	62.6	63.9	67.7	5.7	57.9	62.6	63.9	67.7
FI	17.4	18.3	19.4	22.3	4.9	21.4	22.2	23.2	25.8	4.4	FI	65.5	65.5	65.5	65.5	0.0	65.5	65.5	65.5	65.5
SE	18.3	19.2	20.1	22.7	4.3	21.2	22.1	23.1	25.7	4.6	SE	64.0	64.0	64.0	64.0	0.0	64.0	64.0	64.0	64.0
UK	18.1	19.0	20.0	22.8	4.7	20.8	21.8	22.8	25.7	4.9	UK	65.0	66.0	66.0	68.0	3.0	60.0	66.0	66.0	68.0
EA17	17.9	18.8	19.8	22.6	4.7	21.5	22.4	23.3	25.9	4.4	EA17	64.5	65.6	66.4	67.1	2.6	63.2	65.5	66.4	67.1
EU27	17.3	18.3	19.4	22.4	5.1	20.8	21.8	22.8	25.6	4.8	EU27	64.4	65.6	66.2	67.1	2.7	62.2	64.8	65.9	67.0

Source: Commission services, Eurostat (EUROPOP2010).

Note: Figures for effective retirement ages proxied by projections on effective exit ages from the labour market based on Cohort Simulation Model (CSM) (reference age group 50-74) and EUROPOP2010. Effective retirement age projections based on a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the strict application of the respective simulation scenario at every point in time over the projection horizon (see also Graph 3). Data not updated for non-peer reviewed countries with recently legislated increases in statutory retirement ages and/or reforms with effects on effective exit ages (Status May 2013).

Annex Table 15 - Change in statutory and effective retirement ages under postponed retirement vs. Ageing Report 2012

	Average effective retirement age (66% shift scenario)														Average effective retirement age (100% shift scenario)													
	Male														Female													
	Change							2011							Change							2011						
	2060	2030	2020	2011	2020	2030	2060	2060	2030	2020	2011	2020	2030	2060	2060	2030	2020	2011	2020	2030	2060	2060	2030	2020	2011	2020	2030	2060
BE	2.1	62.1	62.1	61.6	62.3	62.3	63.2	1.7	62.1	62.1	61.5	62.1	62.6	65.1	3.6	62.1	62.3	61.6	62.3	62.3	64.7	3.1	62.1	62.3	61.6	62.3	62.3	64.7
BG	4.0	65.0	64.7	61.6	62.5	63.4	65.6	4.1	64.7	64.7	63.4	64.7	65.7	68.8	5.5	64.7	62.8	61.6	62.8	64.0	67.3	5.6	64.7	62.8	61.6	62.8	64.0	67.3
CZ	3.5	64.3	63.5	60.1	61.1	62.6	65.1	5.0	63.5	63.9	62.9	63.9	65.0	68.0	5.1	63.9	61.1	60.1	61.1	62.6	65.5	5.4	63.9	61.1	60.1	61.1	62.6	65.5
DK	2.9	67.0	66.2	62.4	65.3	65.5	66.3	4.0	66.2	66.2	64.2	66.2	67.0	68.3	4.1	66.2	65.3	62.4	65.3	65.5	67.1	4.8	66.2	65.3	62.4	65.3	65.5	67.1
DE	1.8	65.7	65.4	63.5	64.7	65.3	65.3	1.8	65.4	65.4	64.3	65.4	65.7	67.5	3.2	65.4	64.7	63.5	64.7	65.3	66.7	3.2	65.4	64.7	63.5	64.7	65.3	66.7
EE	3.6	67.6	64.7	64.6	65.3	66.4	66.4	1.9	64.7	64.7	64.0	64.8	66.1	69.0	5.0	64.8	65.3	64.6	65.3	65.3	68.1	3.4	64.8	65.3	64.6	65.3	65.3	68.1
IE	2.7	66.3	66.3	66.9	67.3	67.5	68.9	2.1	66.3	66.3	65.2	66.1	66.9	69.2	4.0	66.3	67.1	66.9	67.1	67.8	69.6	2.7	66.3	67.1	66.9	67.1	67.8	69.6
EL	1.5	64.0	63.1	62.4	62.7	62.9	63.8	1.5	62.4	62.4	62.6	63.4	64.2	66.5	4.0	62.4	62.8	62.4	62.8	63.8	67.2	4.8	62.4	62.8	62.4	62.8	63.8	67.2
ES	2.7	65.3	64.4	63.9	65.4	65.9	66.2	2.3	64.4	64.4	62.6	64.4	65.3	66.6	4.0	64.4	65.4	63.9	65.4	65.9	67.4	3.5	64.4	65.4	63.9	65.4	65.9	67.4
FR	2.7	62.8	62.8	60.2	62.2	62.8	62.8	2.6	62.2	62.2	60.1	62.2	62.8	64.3	4.1	62.2	62.2	60.2	62.2	62.8	63.8	3.6	62.2	62.2	60.2	62.2	62.8	63.8
IT	5.5	66.1	65.9	61.4	65.5	65.4	67.5	6.2	65.9	65.9	61.7	65.9	66.1	67.3	5.5	65.9	65.5	61.4	65.5	65.4	67.5	6.2	65.9	65.5	61.4	65.5	65.4	67.5
CY	1.8	65.6	65.6	63.8	63.8	64.4	66.2	2.4	65.6	65.6	65.6	65.5	66.5	68.6	3.0	65.6	63.8	63.8	63.8	65.0	67.8	3.9	65.6	63.8	63.8	63.8	65.0	67.8
LV	4.1	66.2	66.2	64.0	64.7	65.3	66.3	2.3	66.2	66.2	64.6	65.5	66.7	69.6	5.1	66.2	64.7	64.0	64.7	65.5	68.0	4.0	66.2	64.7	64.0	64.7	65.5	68.0
LT	3.0	65.1	64.0	61.7	62.9	63.8	65.4	3.7	64.0	64.0	63.8	64.4	65.4	68.8	5.0	64.0	62.9	61.7	62.9	63.9	67.2	5.5	64.0	62.9	61.7	62.9	63.9	67.2
LU	2.9	60.3	60.9	60.7	61.1	61.6	63.2	2.5	60.3	60.3	59.7	60.6	61.5	64.1	4.4	60.6	61.2	60.7	61.2	62.1	64.8	4.2	60.6	61.2	60.7	61.2	62.1	64.8
HU	4.2	65.3	65.3	60.3	64.3	64.8	64.8	4.6	64.7	64.7	61.2	64.7	65.3	67.6	6.4	64.7	64.3	60.3	64.3	64.8	65.7	5.4	64.7	64.3	60.3	64.3	64.8	65.7
MT	2.8	64.0	64.0	60.3	61.7	62.6	63.5	3.2	63.0	63.0	61.3	63.0	64.0	65.8	4.5	63.0	61.7	60.3	61.7	62.6	65.1	4.8	63.0	61.7	60.3	61.7	62.6	65.1
NL	3.6	67.2	67.2	62.6	64.6	65.2	66.2	3.7	67.2	67.2	64.9	66.7	67.2	68.7	3.8	67.2	64.6	62.8	64.6	65.2	66.8	4.0	67.2	64.6	62.8	64.6	65.2	66.8
AT	2.5	63.0	63.0	60.6	61.8	62.5	63.4	2.7	62.9	62.9	61.8	62.9	63.3	65.7	3.9	62.9	61.8	60.6	61.8	62.5	64.9	4.3	62.9	61.8	60.6	61.8	62.5	64.9
PL	3.8	66.0	66.0	58.8	61.8	64.0	65.8	7.0	66.0	66.0	62.2	66.0	66.0	67.4	5.2	66.0	61.8	58.8	61.8	64.0	65.8	7.0	66.0	61.8	58.8	61.8	64.0	65.8
PT	2.7	65.8	65.8	64.7	65.4	65.7	67.2	2.6	65.4	65.4	64.5	65.4	66.2	68.3	3.9	65.4	65.8	64.7	65.8	67.0	68.8	4.2	65.4	65.8	64.7	65.8	67.0	68.8
RO	3.4	64.3	64.3	61.2	62.4	64.1	66.2	5.0	64.0	64.0	63.1	64.0	65.2	68.2	5.1	64.0	62.3	61.2	62.3	63.5	66.7	5.4	64.0	62.3	61.2	62.3	63.5	66.7
SI	2.9	63.8	63.8	59.7	62.4	63.5	63.5	3.8	63.8	63.8	62.1	63.8	63.8	66.6	4.4	63.8	62.4	59.7	62.4	63.5	63.7	4.0	63.8	62.4	59.7	62.4	63.5	63.7
SK	4.8	62.5	64.2	58.7	61.7	62.4	65.9	7.2	62.5	62.5	61.4	62.6	63.9	67.6	6.2	62.6	61.7	58.7	61.7	62.4	65.9	7.2	62.6	61.7	58.7	61.7	62.4	65.9
FI	2.6	64.4	64.4	62.6	63.9	63.9	64.9	2.3	64.1	64.1	63.4	64.1	65.0	67.3	4.0	64.1	63.9	62.6	63.9	63.9	66.3	3.6	64.1	63.9	62.6	63.9	63.9	66.3
SE	2.6	66.2	66.2	64.0	64.6	65.2	66.8	2.8	65.8	65.8	65.1	65.8	66.7	68.6	3.5	65.8	64.8	64.0	64.8	65.7	68.0	4.0	65.8	64.8	64.0	64.8	65.7	68.0
UK	3.7	66.0	66.0	63.3	64.2	65.2	66.2	3.0	65.6	65.6	64.8	65.6	66.5	68.6	3.8	65.6	64.2	63.3	64.2	65.2	66.2	4.9	65.6	64.2	63.3	64.2	65.2	66.2
EA17	2.9	64.9	64.9	62.2	64.2	64.6	65.3	3.1	64.4	64.4	62.5	64.4	64.9	66.6	4.0	64.4	64.2	62.3	64.2	64.6	66.3	4.1	64.4	64.2	62.3	64.2	64.6	66.3
EU27	3.2	65.1	65.1	62.0	63.9	64.6	65.5	3.5	64.7	64.7	62.9	64.7	65.3	67.1	4.2	64.7	63.8	62.0	63.8	64.6	66.6	4.6	64.7	63.8	62.0	63.8	64.6	66.6

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	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change		2011	2020	2030	2060	Change	2011	2020	2030	2060	Change																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR		IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	EA17	EU27																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	65.0	65.7	66.4	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	65.0	65.7	66.3	68.2	3.2	

Source: Commission services, Eurostat (EUROPOP2010).

Note: Figures for effective retirement ages proxied by projections on effective exit ages from the labour market based on Cohort Simulation Model (CSM) (reference age group 50-74) and EUROPOP2010. Effective retirement age projections based on a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the strict application of the respective simulation scenario at every point in time over the projection horizon (see also Graph 3). Data not updated for non-peer reviewed countries with recently legislated increases in statutory retirement ages and/or reforms with effects on effective exit ages (Status May 2013).

Annex Table 16 - Change in statutory and effective retirement ages under postponed retirement vs. Ageing Report 2012

	Average effective retirement age (constant time in retirement scenario)										Average effective retirement age (EU convergence scenario)											
	Male					Female					Male					Female						
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change		
	BE	61.5	62.1	62.1	64.4	2.9	61.6	62.3	62.3	64.0	2.4	BE	61.5	62.1	63.2	67.8	6.3	61.6	62.3	62.7	66.5	4.9
	BG	63.2	64.7	65.6	69.5	6.3	61.5	62.5	63.4	66.6	5.1	BG	63.2	64.7	64.7	66.3	3.1	61.5	62.5	62.6	64.5	3.1
	CZ	62.9	63.8	64.9	68.5	5.6	60.1	61.1	62.6	65.1	5.0	CZ	62.9	63.5	64.4	67.0	4.1	60.1	61.1	62.6	65.5	5.4
	DK	64.2	66.2	67.0	68.5	4.4	62.3	65.5	65.5	66.5	4.3	DK	64.2	66.2	67.0	67.5	3.4	62.3	65.5	65.5	66.3	4.1
	DE	64.3	65.4	65.7	67.3	3.0	63.5	64.7	65.3	65.7	2.2	DE	64.3	65.4	65.7	68.0	3.7	63.5	64.7	65.3	66.2	2.7
	EE	63.8	64.8	66.2	70.3	6.6	64.5	65.3	66.3	69.3	4.9	EE	63.8	64.7	65.4	66.4	2.6	64.5	64.6	65.0	65.4	1.0
	IE	65.1	65.9	66.8	69.5	4.4	66.7	67.4	68.3	70.6	4.1	IE	65.1	65.5	66.0	67.5	2.4	66.7	66.6	66.5	66.6	-0.1
	EL	62.5	63.1	64.0	66.4	3.9	62.4	62.7	62.9	65.4	3.0	EL	62.5	63.5	64.6	68.0	5.5	62.4	62.7	63.3	65.5	3.1
	ES	62.6	64.4	65.3	66.4	3.8	63.9	65.4	65.9	67.2	3.3	ES	62.6	64.4	65.3	68.2	5.6	63.9	65.4	65.9	66.7	2.8
	FR	60.1	62.2	62.8	63.9	3.8	60.2	62.2	62.8	63.0	2.8	FR	60.1	62.2	63.2	67.0	6.9	60.2	62.2	62.8	67.0	6.8
	IT	61.7	65.9	66.1	67.3	5.5	61.4	65.5	65.4	67.5	6.2	IT	61.7	65.9	66.1	68.0	6.3	61.4	65.5	65.4	67.5	6.2
	CY	65.4	66.0	66.8	69.2	3.8	63.8	63.8	64.5	67.2	3.4	CY	65.4	65.8	66.3	67.8	2.4	63.8	63.8	64.1	66.0	2.2
	LV	64.3	65.5	67.0	70.2	6.0	63.8	64.7	65.8	69.0	5.4	LV	64.3	65.0	65.4	65.9	1.8	63.8	64.7	65.3	65.3	1.5
	LT	63.5	64.5	65.9	70.1	6.7	61.7	62.9	63.8	66.0	4.3	LT	63.5	64.0	64.4	66.2	2.8	61.7	62.9	63.8	65.4	3.7
	LU	59.6	60.5	61.5	64.4	4.8	60.6	61.2	62.0	64.4	3.9	LU	59.6	61.1	62.9	68.0	8.4	60.6	61.6	62.7	66.4	5.9
	HU	61.2	64.7	65.3	68.1	6.9	60.3	64.3	64.8	65.4	5.1	HU	61.2	64.7	65.3	66.5	5.3	60.3	64.3	64.8	65.5	5.2
	MT	61.3	63.0	64.0	65.6	4.3	60.6	61.7	62.6	64.0	3.4	MT	61.3	63.0	64.0	67.2	6.0	60.6	61.7	62.6	66.0	5.4
	NL	64.7	66.7	67.2	69.4	4.6	62.7	64.6	65.2	66.7	4.0	NL	64.7	66.7	67.2	68.1	3.6	62.7	64.6	65.2	66.6	3.9
	AT	61.8	62.9	63.4	66.3	4.5	60.6	61.8	62.5	63.5	2.9	AT	61.8	62.9	64.0	68.0	6.2	60.6	61.8	62.5	66.4	5.7
	PL	62.2	66.0	66.0	68.4	6.2	58.8	61.8	64.0	65.8	7.0	PL	62.2	66.0	66.0	67.0	4.8	58.8	61.8	64.0	65.8	7.0
	PT	64.5	65.4	65.9	68.5	4.0	64.7	65.4	65.7	67.5	2.8	PT	64.5	65.4	65.8	67.5	3.0	64.7	65.4	65.7	66.0	1.3
	RO	63.1	64.0	65.3	69.5	6.4	61.2	62.0	63.1	66.5	5.3	RO	63.1	64.0	64.1	66.5	3.4	61.2	61.8	62.6	64.9	3.7
	SI	62.1	63.8	63.8	66.9	4.8	59.7	62.4	63.5	63.5	3.8	SI	62.1	63.8	63.9	67.4	5.2	59.7	62.4	63.5	65.4	5.8
	SK	61.4	62.8	64.3	69.5	8.1	58.7	61.7	62.4	65.9	7.2	SK	61.4	62.2	63.3	66.5	5.1	58.7	61.7	62.4	65.9	7.2
	FI	63.4	64.1	64.8	67.5	4.1	62.6	63.9	63.9	65.5	2.9	FI	63.4	64.1	64.8	67.5	4.1	62.6	63.9	63.9	66.3	3.7
	SE	65.1	65.6	66.3	68.5	3.4	64.0	64.5	65.3	67.5	3.5	SE	65.1	65.6	66.3	68.3	3.2	64.0	64.4	64.9	66.5	2.5
	UK	64.7	65.5	66.4	69.2	4.4	63.3	64.2	65.2	66.8	3.5	UK	64.7	65.4	66.1	68.3	3.6	63.3	64.2	65.2	66.4	3.2
	EA17	62.5	64.5	64.9	66.5	3.9	62.2	64.2	64.6	65.8	3.5	EA17	62.5	64.5	65.1	67.8	5.2	62.2	64.2	64.6	66.7	4.5
	EU27	62.9	64.7	65.3	67.3	4.4	62.0	63.8	64.5	66.0	4.0	EU27	62.9	64.7	65.2	67.7	4.8	62.0	63.8	64.5	66.5	4.5

	Average statutory retirement age (constant time in retirement scenario)										Average statutory retirement age (EU convergence scenario)										
	Male					Female					Male					Female					
	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	2011	2020	2030	2060	Change	
BE	65.0	65.7	66.5	68.9	3.9	65.0	65.7	66.4	68.6	3.6	BE	65.0	66.4	67.9	72.5	7.5	65.0	66.1	67.4	71.1	6.1
BG	63.0	64.2	65.5	69.3	6.3	60.0	60.9	62.0	65.1	5.1	BG	63.0	63.6	64.2	66.1	3.1	60.0	60.6	61.2	63.0	3.0
CZ	62.2	63.2	64.4	67.9	5.8	58.7	59.5	60.5	63.3	4.6	CZ	62.2	63.0	63.8	66.4	4.3	58.7	59.7	60.8	64.3	5.6
DK	65.0	65.8	66.7	69.4	4.4	65.0	65.8	66.6	69.3	4.3	DK	65.0	65.6	66.3	68.4	3.4	65.0	65.7	66.5	68.8	3.8
DE	65.0	65.8	66.7	69.3	4.3	65.0	65.6	66.3	68.3	3.3	DE	65.0	65.9	66.9	70.0	5.0	65.0	65.7	66.5	68.8	3.8
EE	63.0	64.3	65.6	69.8	6.8	61.0	61.9	62.9	66.0	5.0	EE	63.0	63.5	64.1	65.8	2.8	61.0	61.2	61.4	62.1	1.1
IE	66.0	66.8	67.7	70.4	4.4	66.0	66.9	67.8	70.7	4.7	E	66.0	66.4	66.9	68.4	2.4	66.0	65.9	65.9	65.7	-0.3
EL	65.0	65.7	66.5	68.9	3.9	60.0	60.6	61.4	63.5	3.5	EL	65.0	66.0	67.1	70.5	5.5	60.0	60.7	61.4	63.6	3.6
ES	65.0	65.8	66.6	69.1	4.1	65.0	65.6	66.4	68.5	3.5	ES	65.0	66.1	67.3	70.9	5.9	65.0	65.6	66.2	68.0	3.0
FR	62.5	63.2	64.0	66.5	4.0	62.5	63.0	63.6	65.4	2.9	FR	62.5	64.1	65.8	71.0	8.5	62.5	63.8	65.2	69.4	6.9
IT	65.3	66.0	66.8	69.1	3.8	60.3	60.9	61.6	63.5	3.2	IT	65.3	66.6	68.0	72.3	7.0	60.3	61.3	62.3	65.5	5.2
CY	65.0	65.7	66.6	69.0	4.0	65.0	65.8	66.7	69.3	4.3	CY	65.0	65.5	66.0	67.6	2.6	65.0	65.6	66.2	68.1	3.1
LV	62.0	63.3	64.8	69.2	7.2	62.0	63.0	64.2	67.6	5.6	LV	62.0	62.3	62.7	63.7	1.7	62.0	62.3	62.6	63.6	1.6
LT	62.5	63.8	65.2	69.5	7.0	60.0	60.8	61.8	64.6	4.6	LT	62.5	63.1	63.7	65.5	3.0	60.0	60.7	61.5	64.0	4.0
LU	65.0	65.9	66.9	69.8	4.8	65.0	65.7	66.5	68.9	3.9	LU	65.0	66.5	68.3	73.4	8.4	65.0	66.1	67.3	70.9	5.9
HU	62.0	63.4	64.9	69.4	7.4	62.0	63.1	64.3	67.8	5.8	HU	62.0	63.1	64.2	67.8	5.8	62.0	63.1	64.3	67.9	5.9
MT	61.0	61.9	62.8	65.7	4.7	60.0	60.7	61.6	64.0	4.0	MT	61.0	62.2	63.5	67.6	6.6	60.0	61.1	62.3	66.0	6.0
NL	65.0	66.2	67.5	71.4	6.4	65.0	65.7	66.5	68.8	3.8	NL	65.0	65.9	66.9	70.0	5.0	65.0	65.7	66.4	68.7	3.7
AT	65.0	65.9	66.9	69.8	4.8	60.0	60.6	61.2	63.1	3.1	AT	65.0	66.2	67.5	71.5	6.5	60.0	61.1	62.3	66.0	6.0
PL	65.0	66.2	67.6	71.6	6.6	60.0	60.7	61.6	64.1	4.1	PL	65.0	66.0	67.0	70.2	5.2	60.0	61.3	62.7	67.1	7.1
PT	65.0	65.8	66.6	69.2	4.2	65.0	65.6	66.2	68.0	3.0	PT	65.0	65.6	66.3	68.2	3.2	65.0	65.3	65.6	66.5	1.5
RO	64.0	65.3	66.7	70.9	6.9	59.0	60.0	61.1	64.5	5.5	RO	64.0	64.7	65.5	67.9	3.9	59.0	59.7	60.5	63.0	4.0
SI	63.0	63.9	65.0	68.2	5.2	61.0	61.7	62.4	64.7	3.7	SI	63.0	64.1	65.2	68.8	5.8	61.0	62.3	63.6	67.8	6.8
SK	62.0	63.5	65.2	70.3	8.3	57.9	58.9	60.0	63.3	5.4	SK	62.0	63.0	64.0	67.3	5.3	57.9	59.2	60.7	65.2	7.3
FI	65.5	66.3	67.2	69.9	4.4	65.5	66.1	66.8	68.8	3.3	FI	65.5	66.3	67.2	69.9	4.4	65.5	66.3	67.1	69.6	4.1
SE	64.0	64.6	65.4	67.5	3.5	64.0	64.7	65.4	67.6	3.6	SE	64.0	64.6	65.3	67.3	3.3	64.0	64.5	65.0	66.6	2.6
UK	65.0	65.8	66.7	69.5	4.5	60.0	60.7	61.4	63.7	3.7	UK	65.0	65.7	66.4	68.6	3.6	60.0	60.6	61.3	63.4	3.4
EA17	64.5	65.3	66.2	68.7	4.2	63.2	63.8	64.5	66.5	3.3	EA17	64.5	65.7	66.9	70.8	6.3	63.2	64.0	65.0	67.8	4.6
EU27	64.4	65.3	66.3	69.1	4.6	62.2	62.9	63.6	65.8	3.6	EU27	64.4	65.5	66.6	70.0	5.5	62.2	63.1	64.0	66.8	4.6

Source: Commission services, Eurostat (EUROPOP2010).

Note: Figures for effective retirement ages proxied by projections on effective exit ages from the labour market based on Cohort Simulation Model (CSM) (reference age group 50-74) and EUROPOP2010. Effective retirement age projections based on a combination of the most favourable effective retirement age outcome among the 2012 Ageing Report scenario and the strict application of the respective simulation scenario at every point in time over the projection horizon (see also Graph 3). Data not updated for non-peer reviewed countries with recently legislated increases in statutory retirement ages and/or reforms with effects on effective exit ages (Status May 2013).

Annex Table 17 - Change in public pension expenditure under postponed retirement vs. Ageing Report 2012

	Change 2010-2060 in public pension expenditure (p.p. of GDP)					
	AR 2012	66% shift scenario	100% shift scenario	100% shift in pension benefits scenario	Constant time in retirement scenario	EU convergence scenario
BE	5.1	4.4	3.4	3.4	3.7	2.1
BG	-0.7	-1.7	-2.2	-2.3	-2.5	-1.3
CZ	2.6	2.5	2.0	1.9	1.8	2.0
DK	-1.1	-1.1	-1.3	-1.6	-1.3	-1.2
DE	2.6	2.6	2.4	1.6	2.6	2.1
EE	-1.1	-1.2	-1.4	-2.2	-1.6	-1.3
IE	4.1	3.6	3.3	2.6	3.2	3.9
EL	1.0	1.0	1.0	1.0	0.2	-0.6
ES	3.6	3.5	2.8	2.8	2.8	2.5
FR	0.5	0.5	-0.1	-0.3	0.0	-1.7
IT	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9
CY	8.7	7.3	6.5	6.5	6.0	7.0
LV	-3.7	-3.7	-3.7	-4.7	-3.7	-3.7
LT	3.5	3.0	2.4	1.4	2.5	2.9
LU	9.4	8.0	7.3	6.7	7.5	6.9
HU	0.5	0.3	-0.5	-0.9	-0.8	-0.6
MT	5.5	5.5	4.7	4.1	4.6	4.0
NL	1.7	1.7	1.7	1.6	1.3	1.6
AT	2.0	1.6	0.8	0.5	0.4	-0.6
PL	-2.0	-2.0	-2.0	-2.2	-2.0	-2.0
PT	0.2	-0.2	-0.6	-1.4	0.0	-0.3
RO	3.7	2.2	1.6	1.6	1.6	2.2
SI	7.1	6.9	6.5	6.2	6.3	5.2
SK	2.7	2.7	2.6	2.4	2.3	2.7
FI	3.2	2.2	1.2	1.2	1.2	1.1
SE	0.6	0.6	0.6	-0.9	0.6	0.6
UK	1.5	1.2	1.1	0.4	1.0	1.3
EA17	1.8	1.7	1.2	1.0	1.3	0.5
EU27	1.4	1.2	0.8	0.5	0.8	0.4
EU15	1.4	1.3	0.9	0.5	0.9	0.4
EU12	0.7	0.3	0.2	-0.1	0.1	0.0

Source: Commission services.

Note: After the publication of the 2012 Ageing Report, figures for Belgium, Bulgaria, Czech Republic, Denmark, Hungary, Latvia, Netherlands, Poland and Slovakia have been updated, to be taken into account in the budgetary surveillance exercise during the 2013 European Semester. EU averages have changed accordingly ("AR2012" baseline scenario).

Annex Table 18 - Long-term sustainability indicator - S2

	AR 2012*	66% shift scenario	100% shift scenario	100% shift in pension benefits scenario	Constant time in retirement scenario	EU convergence scenario
BE	6.9 (4)	6.4	5.7	5.6	5.9	4.6
BG	1.1 (-0.4)	0.4	-0.1	-0.2	-0.1	0.7
CZ	5 (1.8)	4.9	3.9	3.9	4.4	4.6
DK	1.7 (-1.3)	1.7	1.6	1.4	1.5	1.6
DE	1.4 (1.5)	1.4	1.3	0.9	1.3	1.1
EE	1.2 (-0.1)	1.0	0.9	0.5	0.8	1.1
IE	4.2 (3.2)	3.7	3.4	2.9	3.3	4.0
EL	-2.7 (0.2)	-2.7	-2.7	-2.7	-3.3	-3.9
ES	5.6 (2.3)	5.6	5.1	5.1	5.1	4.8
FR	1.9 (0.6)	1.9	1.5	1.4	1.5	0.3
IT	-2.1 (-0.3)	-2.1	-2.1	-2.1	-2.1	-2.1
CY	9 (5.9)	8.1	7.4	7.3	7.2	7.9
LV	-1 (-1.8)	-1.0	-1.0	-1.7	-1.0	-1.0
LT	5.7 (3.1)	5.5	5.1	4.6	5.2	5.4
LU	8.6 (6.5)	7.5	7.0	6.5	7.1	6.6
HU	-0.1 (-0.2)	-0.2	-0.5	-0.8	-0.7	-0.6
MT	6.8 (3)	6.8	6.4	6.1	6.4	6.0
NL	6.5 (1)	6.5	6.5	6.4	6.4	6.5
AT	4 (1.7)	3.8	3.3	3.1	3.1	2.4
PL	2.8 (-0.8)	2.8	2.8	2.7	2.8	2.8
PT	0 (-0.3)	-0.3	-0.6	-1.1	-0.3	-0.3
RO	4.1 (2.4)	3.2	2.6	2.6	3.0	3.2
SI	8.6 (4.8)	8.5	8.3	8.1	8.2	7.5
SK	4.9 (1.5)	4.9	4.4	4.0	4.7	5.0
FI	6.2 (2.1)	5.5	4.9	4.8	4.9	4.8
SE	2.4 (0)	2.4	2.4	1.1	2.4	2.4
UK	6.2 (1.2)	5.9	5.7	5.1	5.8	6.0
EU27	3 (1)	2.9	2.7	2.4	2.7	2.4
EA17	2.3 (1.2)	2.2	2.0	1.8	2.0	1.5

Source: Commission services.

Note: * = Updated figures based on European Commission 2013 spring forecast. Figures in brackets show the pension expenditure contribution to the overall S2 indicator. In the alternative scenarios, the respective contribution would be reduced in line with the change in the overall S2 indicator.

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