NOTES D'ÉTUDES

ET DE RECHERCHE

FISCAL SUSTAINABILITY AND

POLICY IMPLICATIONS FOR THE EURO AREA

Fabrizio Balassone, Jorge Cunha, Geert Langenus, Bernhard Manzke,
Jeanne Pavot, Doris Prammer and Pietro Tommasino

December 2008

NER - E # 225

BANQUE DE FRANCE
EUROSYSTÈME

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES
DIRECTION DE LA RECHERCHE

FISCAL SUSTAINABILITY AND

POLICY IMPLICATIONS FOR THE EURO AREA

Fabrizio Balassone, Jorge Cunha, Geert Langenus, Bernhard Manzke,
Jeanne Pavot, Doris Prammer and Pietro Tommasino

December 2008

NER - E # 225

Fiscal sustainability and policy implications for the euro area

Fabrizio Balassone[a]
Jorge Cunha[b]
Geert Langenus[c]
Bernhard Manzke[d]
Jeanne Pavot[e]
Doris Prammer[f]
Pietro Tommasino[g]

The views expressed in this paper are those of the authors and do not necessarily reflect the views of their institutions.

The authors would like to thank Maximilian Baylor, Louis Bê Duc, Didier Blanchet, Francisco de Castro Fernández, Krisztina Karagyozova, Helvi Kinnunen, Nadine Leiner-Killinger, Richard Morris, Olegs Tkacevs, Kris Van Cauter, Karsten Wendorff and several colleagues from the European System of Central Banks for very helpful comments and discussions and Muriel Bouchet, Cláudia Rodrigues Braz, Francisco de Castro Fernández, Helvi Kinnunen, Nadine Leiner-Killinger and Diarmaid Smyth for their contributions to the country fiches in the Annex.

[a] fabrizio.balassone@bancaditalia.it, Banca d'Italia

[b] jmmccunha@bportugal.pt, Banco de Portugal

[c] geert.langenus@nbb.be, National Bank of Belgium, corresponding author

[d] bernhard.manzke@bundesbank.de, Deutsche Bundesbank

[e] jeanne.pavot@banque-france.fr, Banque de France

[f] doris.prammer@ec.europa.eu, European Commission/Oesterreichische Nationalbank

[g] pietro.tommasino@bancaditalia.it, Banca d'Italia

Abstract

In this paper we examine the sustainability of euro area public finances against the backdrop of population ageing. We critically assess the widely used projections of the Working Group on Ageing Populations (AWG) of the EU's Economic Policy Committee and argue that ageing costs may be higher than projected in the AWG reference scenario. Taking into account adjusted headline estimates for ageing costs, largely based upon the sensitivity analysis carried out by the AWG, we consider alternative indicators to quantify sustainability gaps for euro area countries. With respect to the policy implications, we assess the appropriateness of different budgetary strategies to restore fiscal sustainability taking into account intergenerational equity. Our stylised analysis based upon the lifetime contribution to the government's primary balance of different generations suggests that an important degree of pre-funding of the ageing costs is necessary to avoid shifting the burden of adjustment in a disproportionate way to future generations. For many euro area countries this implies that the medium-term targets defined in the context of the revised stability and growth pact would ideally need to be revised upwards to significant surpluses.

JEL classification: H55, H60

Keywords: population ageing, fiscal sustainability, generational accounting, medium-term objectives for fiscal policy

Résumé

Dans cet article, nous examinons la soutenabilité des finances publiques dans le contexte actuel du vieillisement démographique. Nous menons une analyse critique des travaux réalisés au sein du groupe de travail sur le vieillissement (AWG rattaché au Comité de Politique Economique de l'Union européenne) dont les projections sont largement utilisées par ailleurs. Nous montrons ainsi que le coût budgétaire du vieillisement pourraît être plus élevé que dans le scénario de référence d'AWG. Ensuite, en utilisant de nouvelles estimations du coût du vieillissement établies à partir de l'analyse de sensibilité produite par AWG, nous calculons des indicateurs de soutenabilité pour les pays de la zone euro. Au regard des implications de politique économique, nous évaluons la pertinence des différentes stratégies budgétaires pour restaurer la soutenabilité des finances publiques en prenant en compte l'équité intergénérationnelle. Dans une approche stylisée, fondée sur la contribution tout au long de la vie des individus au solde primaire public, nous montrons qu'il est nécessaire de préfinancer significativement le coût du veillissement pour éviter un report disproportionné de la charge de l'ajustement budgétaire aux générations futures. Cela impliquerait idéalement que les objectifs de moyen terme − définis dans le cadre du nouveau Pacte de Stabilité et de Croissance − soient révisés à la hausse. Pour de nombreux pays, l'objectif de moyen terme correspondrait alors à un excédent public substantiel.

Codes JEL: H55, H60

Mots clés : vieillissement démographique, soutenabilité des finances publiques, comptabilité générationnelle, objectifs de moyen terme des politiques budgétaires

Non-technical summary

Population ageing poses important challenges for policymakers in the coming decades. Increasing outlays for pension, health and elderly care systems will weigh on government budgets while economic growth is projected to decline due to the gradually decreasing population of working age. At the Stockholm European Council in 2001 a three-pronged strategy was formulated to deal with those challenges. It consists of structural reforms to pension and care systems, measures to increase employment and economic growth and fiscal consolidation. In this paper we focus on the latter element and we examine the issue of fiscal sustainability in euro area countries, i.e. the extent to which current fiscal policies can be continued or will have to be adjusted.

We first carry out a critical assessment of the widely-used estimates of the budgetary impact of population ageing by the European Policy Committee's Working Group on Population Ageing. According to this Working Group's most recent estimates ageing would worsen budget balances by around 4.3% of GDP in the 2010-2050 period in the eleven countries that initially formed the euro area in 1999. However, such long-term projections are obviously surrounded with significant uncertainties. Using plausible alternative estimates for key parameters in the Working Group's projections, largely based upon sensitivity analyses carried out by this Working Group, we find that ageing costs in the 2010-2050 period may be 1 percentage point higher.

Against this background, we look at a range of fiscal sustainability indicators and calculate sustainability gaps taking into account the modified ageing costs. We find that, of all the countries considered in this paper, public finances currently only appear to be sustainable in Finland. All other countries will have to adjust their fiscal policies sooner or later. The exact size of the sustainability gaps differs according to the indicator chosen but the ranking of the countries is more robust. The required adjustment effort is much smaller for countries that have recently implemented important structural reforms to their pension systems such as Germany, Austria and Italy.

Sustainability indicators such as the ones considered in this paper typically measure the size of an 'early' adjustment effort to restore fiscal sustainability. In many cases, this early adjustment effort would imply very important consolidation measures in the coming years. In this paper we propose to analyse the appropriateness of such a budgetary strategy on the basis of an intergenerational equity criterion. The method that is used to make this criterion operational is close to a classical generational accounting approach but differs from it in a number of specific aspects. By attributing government revenue and primary expenditure to different age cohorts, we calculate a 'net tax burden' for different generations. We then compare the evolution of this net tax burden for two different budgetary strategies, an early adjustment effort aimed at restoring fiscal sustainability in the coming years already and a more gradual fiscal adjustment spread over the 2010-2050 period. We show for three euro area countries - Belgium, Germany and France - that the earlier fiscal adjustment effort leads to a somewhat flatter profile for the net tax burden across age cohorts: the burden is higher for younger and future generations but the increase is generally less steep than under the more gradual adjustment effort. Hence, an earlier fiscal adjustment, i.e. 'pre-funding' (a large part of) the ageing costs via fiscal consolidation in the coming years can in our view be considered more equitable.

Our calculations of the fiscal burden across age cohorts are partly based upon a number of simplifying assumptions (e.g. with respect to the age profiles for specific government revenue and expenditure items). However, sensitivity analysis shows that the main result - a pre-funding approach is more equitable than a gradual fiscal adjustment - is quite robust to changes in these assumptions.

While our paper does not provide any insights on which policy mix, e.g. structural reforms vs. budgetary pre-funding, is the optimal response to population ageing, its main conclusion seems relevant against the background of the developments in the EU fiscal rules. The ECOFIN Council has indeed recently indicated that long-term fiscal sustainability, notably the future impact of ageing, is to be better taken into account in the definition of the medium-term objectives for fiscal policy introduced in the context of the revised stability and growth pact. In this connection, concerns for intergenerational equity could play a role and could be made operational along the lines suggested here. If our tentative conclusions were confirmed and if no further cost-cutting reforms to pension and care systems are implemented, an upward revision of the medium-term objectives to significant surpluses may then be warranted for many EU Member States.

Résumé non technique

Le vieillissement démographique constituera un important défi pour les gouvernements ces prochaines décennies. Des dépenses croissantes des systèmes de retraite, de santé et de dépendance pèseront sur les budgets des gouvenements alors que la croissance économique pourraît ralentir en raison de la baisse graduelle de la population en âge de travailler. Au Conseil européen de Stockholm de 2001, une stratégie reposant sur trois piliers a été décidée pour relever ces défis. Elle consiste à la fois en des réformes structurelles du système de retraite et de santé, mais aussi en des mesures pour accroître l'emploi, la croissance économique et viser l'assainissement budgétaire. Dans cet aticle, nous nous concentrons sur ce dernier élément et nous examinons la question de la soutenabilité des pays de la zone euro. Nous cherchons donc à savoir, dans quelle mesure les politiques budgétaires actuelles peuvent être poursuivies ou doivent être ajustées.

Nous procédons d'abord à une analyse critique des estimations de l'impact budgétaire du vieillissement de la population qui ont été réalisées par le groupe de travail sur le vieillissement (AWG rattaché au Comité de Politique Economique de l'Union européenne) et qui sont largement utilisées par ailleurs. Selon les dernières projections d'AWG, sur la période 2010-2050, le vieillissement pourrait conduire à une détérioration des soldes publics de 4.3% du PIB en moyenne dans les onze pays qui constituaient initiallement la zone euro en 1999. Toutefois, des projections à aussi long horizon sont entâchées de nombreuses incertitudes. Ainsi, en utilisant des évaluations alternatives mais plausibles pour les paramètres clés des projections, et en nous basant essentiellement sur l'analyse de la sensibilité réalisée par AWG, nous trouvons que le coût du vieillissement pourraît être plus élevé de 1 point de pourcentage sur la période 2010-2050.

Dans ce cadre, nous nous penchons sur un large éventail d'indicateurs de soutenabilité et calculons des indicateurs d'écart de soutenabilité ou « *sustainability gaps* » en prenant en compte nos nouvelles évaluations du coût du vieillissement. Parmi tous les pays étudiés dans cet article, seule la Finlande semble être dans une situation soutenable. Tous les autres pays devront, tôt ou tard, ajuster leurs politiques budgétaires. Si la taille exacte de l'écart de soutenabilité dépend de l'indicateur choisi, le rang de classement des pays est plus robuste d'un indicateur à l'autre. En particulier, l'ajustement requis est plus petit dans les pays qui ont récemment mis en œuvre des réformes structurelles importantes de leur système de retraite comme l'Allemagne, l'Autriche ou l'Italie.

Les indicateurs de soutenabilité considérés dans cet article mesurent généralement la taille d'un ajustement budgétaire nécessaire à la restauration rapide de la soutenabilité des finances publiques. Dans beaucoup de cas, cet ajustement impliquerait des mesures de consolidation budgétaire assez drastiques pour ces prochaines années. Dans cet article, nous proposons d'analyser la pertinence de telles stratégies budgétaires sur la base d'un critère d'équité intergénérationnelle. La méthode utilisée pour rendre opérationnel ce critère est proche de la comptabilité générationnelle classique mais en diffère cependant par nombre d'aspects spécifiques. En attribuant aux différentes cohortes le bénéfice des dépenses publiques et la charge des prélèvements obligatoires, nous calculons une « charge fiscale nette» pour chacune des générations. Nous comparons ensuite l'évolution de cette charge fiscale nette pour deux stratégies budgétaires différentes, une stratégie d'ajustement budgétaire rapide visant à restaurer la soutenabilité budgétaire dans les prochaines années et une stratégie plus graduelle qui répartit les efforts d'ajustement budgétaire sur la période 2010-2050. Pour trois pays de la zone euro – Belgique, Allemagne et Italie – , nous montrons que l'ajustement budgétaire rapide conduit à une profil plus plat des charges fiscales nettes des différentes cohortes : la charge est plus forte pour les générations les plus jeunes ou à venir, mais l'augmentation est moins forte que dans le cas

d'un ajustement plus graduel. En ce sens, un ajustement budgétaire rapide, c'est-à-dire un préfinancement (substantiel) du coût budgétaire du vieillissement au moyen de la consolidation budgétaire peut être considéré comme plus équitable.

Notre évaluation de la charge fiscale nette des différentes générations est fondée sur de nombreuses hypothèses simplificatrices (par exemple le profil par âge des postes budgétaires de dépenses ou de recettes). Toutefois, une analyse de sensibilité montre que le résultat principal, à savoir que l'approche du préfinancement est plus équitable que l'ajustement graduel, est assez robuste aux changements d'hypothèses.

Notre article ne permet pas de conclure sur le policy mix optimal (réformes structurelles/réformes budgétaires) à mettre en œuvre pour faire face au vieillissement démographique. Toutefois, ses principales conclusions sont pertinentes dans le cadre actuel du développement des règles budgétaires dans l'Union européenne. En effet, le Conseil ECOFIN a décidé récemment que la soutenabilité à long terme des finances publiques, et plus particulièrement l'impact du vieillissement, devrait mieux être prise en compte dans la redéfinition des objectifs de moyen terme des politiques budgétaires consécutive à la réforme du Pacte de Stabilité et de Croissance. Dans cette optique, des considérations d'équité intergénérationnelle pourraient jouer un rôle et nous proposons ici une façon de les rendre opérationnelles. Si nos conclusions provisoires devaient être confirmées et si aucune réforme substantielle visant à diminuer les dépenses des systèmes de retraite et de santé n'était mise en œuvre, il serait nécessaire de réviser à la hausse les objectifs de moyen terme. Pour de nombreux pays, l'objectif de moyen terme correspondrait alors à un excédent budgétaire public assez élevé.

Introduction

Populations are ageing rapidly in nearly all EU Member States, due to gradually increasing life expectancy, the baby-boom baby-bust cycle observed in the second half of the last century and a long-run trend towards low birth rates. Awareness of the potentially very important macroeconomic and budgetary implications of these demographic changes has increased in recent years. Authorities now routinely try to gauge the impact of population ageing on the sustainability of public finances and increasingly take into account the findings of these studies when defining their economic policies. In this connection, a three-pronged strategy was formulated at the Stockholm European Council in 2001. It entails a rapid reduction of public debt, an increase in employment and productivity and reforms to existing pension, health and long-term care systems. Policy responses should obviously comply with all relevant EU fiscal rules and be tailored to restore fiscal sustainability in a timely manner.

With respect to the budgetary pillar of that three-pronged strategy and in accordance with the Conclusions of the ECOFIN Council of 9 October 2007, long-term fiscal sustainability, notably the future impact of ageing, is to be better taken into account in the definition of the medium-term objectives (MTOs) for fiscal policy introduced in the context of the revised stability and growth pact. One of the key questions in this respect is to what extent future ageing-related expenditure should be pre-funded by attaining high primary surpluses in the coming years.

This paper does not provide any insights on which policy mix, e.g. structural reforms vs. budgetary pre-funding, is the optimal response to population ageing. It simply wants to contribute to the debate on the appropriate timing of the budgetary component of the response to population ageing - and the definition of 'ageing-augmented' MTOs in particular - keeping all other things equal. We specifically analyse the relative merits of an 'early' fiscal adjustment (implying a strong fiscal tightening for many countries in the following years) and a more gradual fiscal adjustment. In this connection, we propose to use intergenerational equity as the main criterion and to look into the intergenerational implications of these two stylised strategies on the basis of the lifetime net contribution to the government's primary balance of different cohorts.

The remainder of the paper is organised as follows. The first section assesses the EU-wide projections of the ageing costs used as a benchmark in the current institutional context. This is done on the basis of a detailed analysis for most euro area countries.[1] On the basis of this assessment, we present alternative estimates of the ageing costs for each of the different countries considered. The second section is devoted to the quantification of the sustainability gaps (taking into account the alternative estimates of the ageing costs). The third section then looks at the intergenerational implications of different adjustment strategies to restore fiscal sustainability along the lines suggested above for a selected group of euro area countries (Belgium, Germany, and France). The final section presents some concluding remarks.

1 Individual country fiches are in Annex.

1 Age-related expenditure projections by the Working Group on Ageing Populations: a risk- assessment exercise

1.1 The projections of the Working Group on Ageing Populations: a bird's eye view

From the mid-80s, when it became apparent that Western countries were experiencing major changes in their demographic structure, an increasing number of studies have examined the long-term prospects for public budgets. These studies usually focus on expenditure items which are particularly dependent on the age structure of populations (pensions, health, education). Some studies also develop projections for the primary balance and estimate the adjustment required to ensure budgetary sustainability (usually meaning a stable undiscounted debt to GDP ratio).

International organisations have been at the forefront in the development of the literature.[2] Their studies allowed cross-country comparison thanks to methodological homogeneity. However, since the reliability of age-related expenditure projections depends on detailed and updated institutional knowledge, the paucity of national projections represented a major drawback. Growing awareness of the impact of population ageing gradually led to a substantial increase in the resources devoted to national long-term expenditure projections. Yet, at the turn of the century, projections for the main age-related expenditure items were available only for a few industrial countries.

Against this background, the age-related expenditure projections by the Working Group on Ageing Populations (AWG) for EU member states come with a unique value added. They are produced in a multilateral setting involving national authorities and an international organisation, thus reconciling as much as possible national detail and cross-country comparability.

The 2006 AWG report covers 25 EU member states and for most of them provides projections for pensions, health care, long-term care, education, and unemployment benefits (EPC and EC, 2006).[3] The projections reflect the impact of enacted legislation, including provisions already legislated but coming only into force over time. The report is rich in sensitivity analysis.

In the report, the main results under the reference scenario are summarised as follows[4]: "Overall, ageing populations" (are) "projected to lead to increases in public spending in most Member States by 2050 on the basis of current policies, although there is a wide degree of diversity across countries. The following points should be highlighted:

- for the EU15 and the Euro-area as a whole, public spending is projected to increase by about 4 percentage points between 2004 and 2050; […]

- most of the projected increase in public spending will be on pensions, health care and long-term care. Potential offsetting savings in terms of public spending on education and unemployment benefits are likely to be limited;

- the budgetary impact of ageing in most Member States starts to become apparent as of 2010. However, the largest increases in spending […] take place between 2020 and 2040"

2 See Heller et al. (1986), Leibfritz et al. (1995), and Franco and Munzi (1997).

3 Countries included are the EU15 (the 12 countries in the euro area at the time of the report – Austria, Belgium, Finland, France, Germany, Greece, Spain, Ireland, Italy, Luxembourg, the Netherlands, and Portugal – plus Denmark, Sweden and the UK) and EU10 (the ten new member states which joined the union before the report was prepared: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, and Slovenia). Not all expenditure items are projected for all countries.

4 EC and EPC, 2006, p. 10. See also the table reproduced later in the main text.

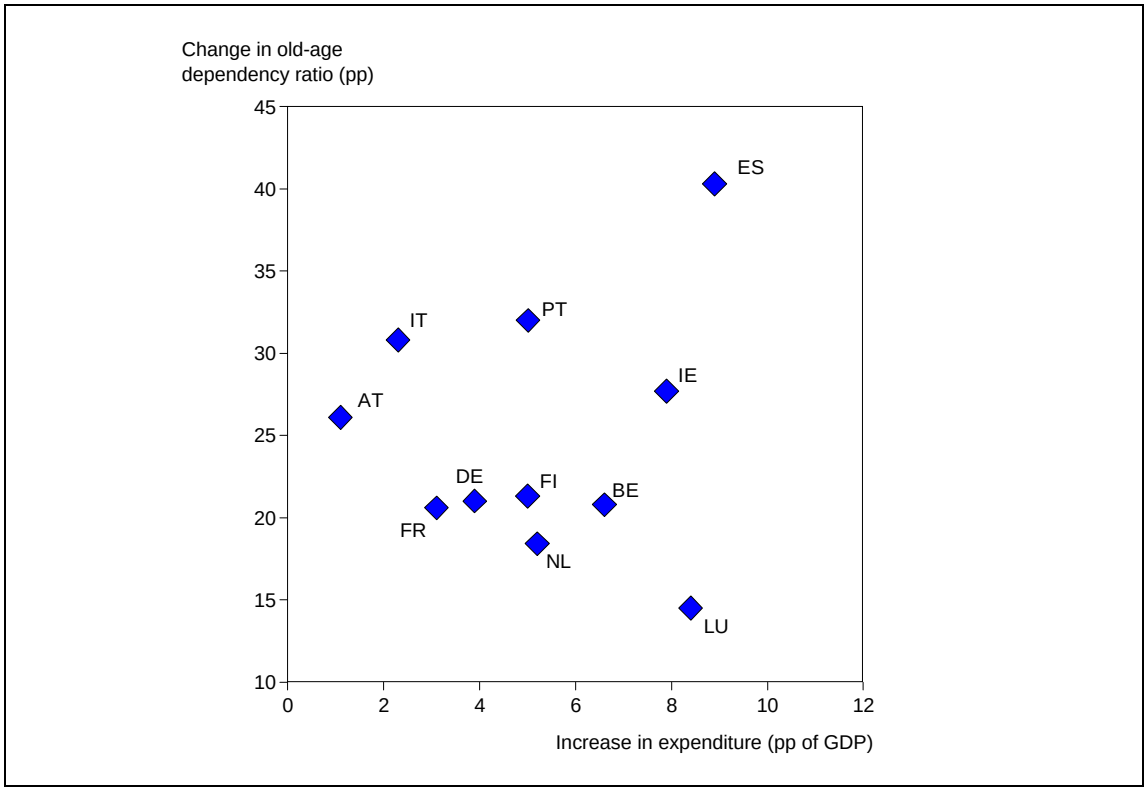
This paper focuses on the countries that were in the euro area at the time of the AWG report. The assumptions underlying the AWG baseline projections are analysed in detail in this section in order to assess whether the underlying risks are broadly balanced or not. To this end we mostly rely on sensitivity analyses accompanying AWG projections.

The AWG projections encompass five public expenditure items which are likely to be affected by ageing: pensions, health care, long-term care, education and unemployment. Most of these items directly depend on the age structure of populations. Other expenditure items not considered by the AWG, such as family allowances, may also depend on demographics. Certain revenue categories may also be affected by population ageing: ageing-induced shifts in consumption patterns may have an impact on indirect taxes while taxes and social contributions levied on wages obviously depend on the age structure of the population.

1.2 The AWG projections for ageing-related spending in the euro area: main results

The AWG projections encompass the 2004-2050 period but we choose to focus on the 2010-2050 period since the projected change between 2004 and 2010 has in some cases been outdated by new data and most of the expenditure increase occurs after 2010.[5]

Graph 1: Changes in dependency ratios and expenditure ratio (2010-2050)



Ageing-related spending rises by 4.3 p.p. of GDP on average in the euro area (excluding Greece[6]) over the 2010-2050 period in the baseline scenario of the AWG (Table 1.1). Increases range from 1.1 p.p. (Austria) to 8.9 p.p. of GDP (Spain). For most countries, expenditure peaks around 2040. For all countries except Austria and Italy the bulk of the increase comes from pensions. For Italy, this reflects the introduction of a defined-contribution scheme in 1995. In Austria, it is the result of reforms enacted as of 2000 which increased the legal retirement age, linked contributions more

5 Early in 2007 a major social security reform was approved in Portugal. Updated projections, peer-reviewed at the AWG and approved at the EPC in October 2007, are used throughout this paper.

6 Pension and long-term care expenditure data were not provided for Greece in the AWG projection exercise.

closely to benefits (with actuarial reductions for early pensions) and switched the indexation rule for pensions from wages to prices as of 2006.

There is no clear correlation between projected expenditure increases and expected changes in old-age dependency ratios. Graph 1 shows that Italy and Austria, whose dependency ratios are expected to increase more than average, are the countries where expenditure is projected to grow least. At the same time, the countries where expenditure is projected to grow most (Luxembourg, Spain and Ireland) and by similar amounts (around 8 p.p. of GDP) are characterised by very different expected increases in dependency ratios (from 15 to 40 p.p.). This reflects differences in pension systems rules or maturity and/or in health and long-term care policies.

1.3 The AWG projections for ageing-related spending in the euro area: main assumptions

1.3.1 Demographic assumptions

The demographic scenario underlying the expenditure projections was prepared by Eurostat. It is based on, though not identical to, the EUROPOP2004 projection released by Eurostat in 2005.[7] The fertility rate assumptions are the same as those in the baseline of EUROPOP2004; the assumptions on life expectancy at birth are based on a scenario produced by Eurostat specifically for the AWG; the migration assumptions are the same as those in the baseline of EUROPOP2004 except for Germany, Italy and Spain, where adjustments were made to the level and/or age structure of migrants to incorporate more recent information.

More specifically:

- fertility rates increase over the projection period in all countries except France and Ireland, where small declines are projected for the sake of convergence. Fertility rates remain well below the replacement rate stabilising population size (2.1). Nevertheless, except for France and Ireland, the downward past trends are assumed to be curbed;

- life expectancy at birth is projected to rise further, though at a slower pace than over the 1960-2000 period, when it increased by about eight years in EU countries (three months *per annum*).

In this scenario population in the euro area will not be much smaller in 2050, but it will be significantly older: population of working age will decline by 16 percent. This aggregate picture hides wide cross-country variation. The population is projected to fall sharply in Italy and Germany and to increase substantially in France, the Netherlands, Ireland, Belgium and Luxemburg. Changes in the age structure of population are less diverse. Population aged less than 15 years and population of working age (from 15 to 64 years old) will decline in all countries except Ireland and Luxembourg (by 17% and 16% respectively, for the euro area). Population aged 65 or more will increase in all countries, with hikes ranging from 17% to 30%.

7 'EU-25 population rises until 2025, then falls', Eurostat press release 448/2005, 8 April 2005.

Table 1.1 - Changes in age-related public expenditure ratios between 2010 and 2050 projected by AWG

	Pensions			Health care			Long-term care			Unemployment benefits			Education			Total		
	Level	Change from 2010 to:		Level	Change from 2010 to:		Level	Change from 2010 to:		Level	Change from 2010 to:		Level	Change from 2010 to:		Level	Change from 2010 to:	
	2010	2030	2050	2010	2030	2050	2010	2030	2050	2010	2030	2050	2010	2030	2050	2010	2030	2050
BE	10.4	4.3	5.1	6.4	0.7	1.2	0.9	0.4	0.9	2.0	-0.20	-0.2	5.2	-0.20	-0.2	25.1	4.8	6.6
DE	10.5	1.8	2.6	6.3	0.6	0.9	1.0	0.4	1.0	1.1	-0.2	-0.2	3.6	-0.3	-0.4	22.5	2.2	3.9
GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ES	8.9	2.9	6.8	6.3	1.0	2.0	0.5	0.0	0.3	0.9	-0.2	-0.2	3.2	-0.2	-0.1	19.7	3.7	8.9
FR	12.9	1.4	1.9	8.0	0.9	1.5	0.3	0.1	0.2	1.1	-0.2	-0.2	4.7	-0.2	-0.2	27.0	2.0	3.1
IE	5.2	2.7	5.9	5.5	0.9	1.8	0.6	0.1	0.6	0.6	0.0	0.0	3.5	-0.3	-0.4	15.4	3.4	7.9
IT	14	1.0	0.7	6.0	0.7	1.1	1.5	0.2	0.7	0.4	-0.1	-0.1	3.9	-0.4	-0.2	25.7	1.6	2.3
LU	9.8	5.2	7.6	5.3	0.6	1.0	1.0	0.1	0.5	0.3	0.0	-0.1	3.1	-0.4	-0.7	19.4	5.6	8.4
NL	7.6	3.1	3.6	6.3	0.8	1.1	0.5	0.0	0.3	1.5	0.0	0.0	4.7	-0.1	-0.1	20.6	4.1	5.2
AT	12.8	1.2	-0.6	5.5	0.8	1.3	0.7	0.3	0.8	0.6	0.0	0.0	4.6	-0.4	-0.5	24.2	1.8	1.1
PT	11.9	1.5	4.1	6.8	-0.2	0.4	0.5	0.1	0.4	0.8	0.0	0.0	4.7	-0.2	0.1	24.7	1.2	5.0
FI	11.2	2.8	2.5	5.8	0.8	1.2	1.9	1.1	1.6	1.2	-0.1	-0.1	5.6	-0.2	-0.3	25.6	4.5	5.0
EA-11 (excluding Greece)	11.4	1.9	2.8	6.6	0.8	1.3	0.8	0.2	0.6	1.0	-0.2	-0.1	4.1	-0.3	-0.2	23.8	2.5	4.3

Source: EC (2006)

Table 1.2- Population of working age, participation rates, unemployment: changes over the 2003-2050 period

	Population of working age (1)		Participation rate (2)		Workforce (1)		Unemployment (2)		Employment (1)	
	2003	2050	2003	2050	2003	2050	2003	2050	2003	2050
Austria	5.5	4.7	72.2	79.1	4.0	3.7	4.3	3.4	3.8	3.6
Belgium	6.8	6.3	65.0	70.0	4.4	4.4	8.2	6.5	4.1	4.1
Finland	3.5	3.0	74.5	79.6	2.6	2.4	9.2	6.5	2.4	2.2
France	39.0	37.4	69.3	73.1	27.0	27.3	9.0	7.0	24.6	25.4
Germany	55.5	45.0	72.6	79.0	40.3	35.6	7.0	7.0	37.5	33.1
Greece	7.5	5.9	65.3	69.9	4.9	4.1	9.8	7.0	4.4	3.8
Spain	29.1	22.9	67.5	76.7	19.6	17.6	11.6	7.0	17.4	16.3
Ireland	2.7	3.2	68.8	77.2	1.9	2.5	4.8	3.4	1.8	2.4
Italy	38.5	29.3	62.9	70.3	24.2	20.6	8.9	6.5	22.1	19.3
Luxembourg	0.3	0.4	65.0	68.4	0.2	0.3	3.7	4.2	0.2	0.3
the Netherlands	11.0	10.6	76.4	80.4	8.4	8.5	3.7	3.2	8.1	8.2
Portugal	7.1	5.5	72.7	77.7	5.2	4.3	6.7	5.6	4.8	4.0
Euro-area avg.	206.5	174.2	69.1	75.3	142.7	131.2	9.0	6.4	129.8	122.8

(1) Millions
(2) Percentages
Source: EC (2006)

Macroeconomic assumptions

The participation rate is projected to increase by about 6 p.p. over 2003-2050 in the euro area. As a result, the workforce declines less than population of working age (8% versus 16%). This mainly reflects the tendency for women belonging to recent cohorts to have participation levels higher than those of older cohorts. Moreover, the trend reduction in participation rates due to population ageing is assumed to be offset by the effects of pension reforms.

Unemployment rates are assumed to rapidly converge to their structural level and stay constant thereafter. Unemployment in the euro area is projected to fall from 9.0% in 2003 to 7.6% in 2010 and 6.4% in 2050. As a result, the reduction in the number of employed people over 2003-2050 is lower than the reduction in the workforce (5% versus 8%).

Labour productivity growth rises from 1.1% on average over the 2004-10 period, to 1¾% over the 2011-50 period, thus limiting the slowdown in GDP growth due to falling employment.

1.3.2 "Expenditure" assumptions

Given legislation and past contributory careers, pensions are mostly determined by demographic and macroeconomic assumptions, but projections for health and long-term care also depend on other elements such as the evolution over time of: (1) age and gender-contingent demand and consumption of health and long-term care (as summarised in expenditure profiles by age category), and (2) the relative cost of services.

The AWG reference scenario for health expenditure assumes that: (a) half of the projected increase in life expectancy is spent in good health[8], (b) the income elasticity of health care spending is close to one, and (c) the relative cost of health services does not change over time.

Long-term care projections assume that (a) age-specific disability rates fall by half of the projected decrease in age-specific mortality rates, (b) unit costs increase in line with GDP per worker, and (c) the probability of receiving formal care remains constant. The first assumption implies that about half of the projected gains in life expectancy up to 2050 would be spent in good health and free of disability. The second assumption acknowledges the labour-intensive nature of the sector and, hence, the likelihood of increasing relative costs (different from the reference scenario for health care). The third assumption implies that the share of elderly people receiving formal care remains constant.

1.4 Risk assessment

Long-term projection exercises are subject to many uncertainties. These stem from various elements such as macroeconomic or demographic assumptions and the policy implementation risks (e.g. as regards current legislation for pension systems including rules on indexation of pension benefits). We try to identify and assess these risks in the AWG projections and, where they are deemed likely to materialise and quantifiable, we factor them into the projections (see section 1.5).[9]

1.4.1 Demographic and macroeconomic assumptions

Changes in life expectancy and old-age dependency ratios may be underestimated. Projections underlying the AWG 2006 exercise were based on the 2000 census. For the countries considered here, a comparison

---

8 This is an intermediate hypothesis between a "pure ageing" assumption (the age profile of per capita spending on health remains constant over time so that all gains in life expectancy are assumed to be spent in bad health) and a "constant health" assumption (all future gains in life expectancy are spent in good health).

9 We focus the discussion below on the area as a whole. For an overview of the different countries, please refer to the country fiches in the aforementioned Annex.

with earlier projections based on the 1995 census shows that in the population projections used by the AWG: (a) life expectancy at birth in the base year of the projections is, on average, about one year higher for both men and women; (b) the projected increase in life expectancy at birth up to 2050 is almost one year higher for men; (c) the old-age dependency ratio is 1.5 p.p. higher both at the beginning and at the end of the projection.

Available information suggests that the next update of demographic projections could result in revisions of a similar nature in several countries. Moreover, other demographic assumptions (such as those concerning increases in fertility rates) can be questioned. Longevity projections are surrounded by a significant degree of uncertainty. The degree of this uncertainty is difficult to measure. In the past, the numbers of the elderly (especially the oldest) were systematically under-predicted (Visco, 2006). Yet, this is the group on which much of age-related expenditure is concentrated. There are also significant lags in the production and adoption of mortality tables.

With respect to the macroeconomic assumptions, the projected increase in the participation rate can be considered either as too optimistic or too fast in some countries. Indeed, the overall employment rate is assumed to reach the 70% Lisbon employment rate target in 2020. Yet, in some countries, improvements made until now do not seem to be in line with this assumption. Finally, concerning the assumed evolution of unemployment one should consider both the variability of NAIRU estimates and the ad-hoc nature of the assumptions regarding the convergence to the EU-15 average.

1.4.2 "Expenditure" assumptions

With respect to pension expenditure, risks primarily pertain to the development of entitlements. Specific risks may come from the rising share of the elderly in the voting population, in particular for countries where the replacement ratio is low and/or indexation of pension benefits is lower than nominal wage growth.

Demography and health status are not the only determinants of the evolution of health-care expenditure. Medical practices may change due to technological improvements or to consumer preferences. Moreover, relative costs might increase as productivity growth in the health sector is lower than in the rest of the economy. In the AWG reference scenario, however, all factors different from the evolution of morbidity are taken account of by assuming an elasticity of expenditure to income that is 1.1 at the beginning of the period, gradually declining to 1 thereafter. While the AWG justifies this assumption with OECD data showing that the elasticity has declined in the nineties relative to the eighties (EC 2005), this is likely to be due to the enactment of cost-containment policies (price caps, wage moderation). These policies cannot be sustained forever (Dormont et al, 2007). Assuming a series of repeated cost-cutting reforms would be difficult to reconcile with a no-policy change scenario. The upside risks concerning income elasticity appear larger when considering that it is used as a catch-all term capturing also technological developments. Oliveira Martins and Maisonneuve (2006) show that the growth of health care expenditure per capita has been constantly 1 p.p. higher than that implied by ageing and forecast health status.

Pressure for more public provision/financing of long-term care services could grow in the coming decades due to changes in family structure and women labour market participation. These trends may constrain the supply of informal care within households. For countries with less developed formal care systems today, the projected increase in public spending may underestimate the pressure.[10]

[10] This issue is more relevant for the 'southern' Euro-area countries such as Greece, Italy, Portugal and Spain than for Finland, where formal long-term care is already more developed (partly reflecting higher female employment rates).

Table 1.3- Euro Area: Modifications to AWG projections and their sources (% of GDP)

	Pensions		Health				Long term care				Total			
	AWG change over 2010-2050	new estimates (*)	AWG change over 2010-2050	new estimates	Sources of revision:		AWG change over 2010-2050	new estimates	Sources of revision:		AWG change over 2010-2050	new estimates	Sources of revision:	
					Life Exp.	Inc. Elast.			Life Exp.	More formal care			Life Exp.	Expend. Ass.
BE	5.1	5.1	1.2	1.4	0.0	0.2	0.9	1.1	0.0	0.2	6.6	7.0	0.0	0.4
DE	2.6	2.5	0.9	1.4	0.2	0.3	1.0	1.5	0.1	0.4	3.9	4.8	0.5	0.4
GR	-	12.0	-	1.5	-	-	-	1.8	-	-	-	15.4	-	-
ES	6.8	6.8	2.0	2.2	0.0	0.2	0.3	1.1	0.0	0.8	8.9	9.9	0.0	1.0
FR	1.9	2.4	1.5	1.8	0.2	0.2	0.2	0.4	0.0	0.2	3.1	4.1	0.7	0.4
IE	5.9	5.9	1.8	2.2	0.0	0.4	0.6	0.9	0.0	0.3	7.9	8.6	0.0	0.7
IT	0.7	0.8	1.1	1.4	0.1	0.2	0.7	1.5	0.1	0.7	2.3	3.5	0.3	0.9
LU	7.6	7.6	1.0	1.4	0.0	0.4	0.5	0.8	0.0	0.3	8.4	9.1	0.0	0.7
NL	3.6	3.6	1.1	1.3	0.0	0.2	0.3	1.1	0.0	0.8	5.2	6.2	0.0	1.0
AT	-0.6	-0.2	1.3	1.7	0.1	0.3	0.8	1.3	0.0	0.5	1.1	2.4	0.5	0.8
PT	4.1	4.1	0.4	0.6	0.0	0.2	0.4	0.8	0.0	0.4	5.0	5.6	0.0	0.6
FI	2.5	2.5	1.2	1.4	0.0	0.2	1.6	2.1	0.0	0.5	5.0	5.7	0.0	0.7
EA-12	-	3.1	-	1.6	-	-	-	1.1	-	-	-	5.5	-	-
EA-11 (excluding Greece)	2.8	2.9	1.3	1.6	0.1	0.2	0.6	1.1	0.0	0.5	4.3	5.3	0.3	0.6

(*) enterely due to higher life expectancy. For Germany, it also includes consequences of recent pension reforms.

(**) Unemployments benefits and Education are kept the same and are included in the total.

Sources: EPC and EC (2006) and country studies contained in the aforementioned Annex

1.5 *Factoring the risks into the projections*

An in-depth risk assessment was carried out for individual euro area member states.[11] On this basis the AWG reference scenario was modified in a mechanical way taking into account plausible alternative assumptions for key parameters and mostly using information from AWG sensitivity analyses with a view to addressing some of the concerns discussed above.

For countries where more recent demographic projections are available indicating higher life expectancy than in the AWG reference scenario, we increase the expenditure projection by multiplying the difference between those more recent life expectancy estimates and the ones used by the AWG with the impact of an extra life year on spending as estimated by the AWG (an increase in life expectancy at birth of 1-1.5 year by 2050 is estimated to increase both pension and health expenditure by 0.3 p.p. on average in the EU).[12]

We also use a constant income elasticity of health expenditure as the benchmark assumption (1.1 throughout the projection period). AWG estimates suggest that an increase of 0.1 in the income elasticity of health spending leads to an expenditure increase of 0.6 percent of GDP on average in the euro area.

Finally, our headline scenario is based upon an increase in the provision of formal long-term care. We refer to an AWG simulation based on the assumption of an increase by 1% a year in the share of dependent elderly people receiving formal care, for the 2004-2020 period, with half the additional people receiving care in institutions and the other half at home: this entails an expenditure increase of 1.1 p.p. of GDP compared to the AWG reference scenario.

1.6 *Conclusions and limitations of our work*

This different set of assumptions leads to a projected increase in spending of 5.3 p.p. of GDP for the euro area (excluding Greece[13]), 1 p.p. more than in the AWG reference scenario (Table 1.3). Higher life expectancy only accounts for 0.3 p.p. of GDP; the effect is especially high for France, Germany and Austria. The increase in formal long-term care leads to 0.5 p.p. of GDP of extra spending, with peaks in Spain, the Netherlands, and Italy. Finally, constant income elasticity of health-care spending inflates projected expenditure by 0.2 p.p. of GDP.

By confining ourselves to alternative AWG scenarios we may still underestimate risks. For instance, a 1.1 income elasticity of health expenditure may still be low; the increase in long-term care may be stronger than what is implied by assuming that per capita spending grows in line with GDP per worker; the shift towards formal long-term care may be more marked than in the AWG scenario.

In addition, we do not take into account policy implementation risks which are especially difficult to quantify as, by their very nature, they reflect entirely discretionary decisions. Such risks may be large. In some countries pensions are indexed to prices only; this will lead to a substantial decline in benefit ratios between the start and the end of the retirement period which may be unsustainable.[14] There is also a risk that the falling purchasing power of pensions in relation to wage growth will exert pressures on other social security schemes. Pension reforms may thus generate additional costs in the form of income

---

11 Please refer to the aforementioned Annex.

12 Our use of recent demographic projections is incomplete. New projections do not necessarily revise life expectancy alone. For example, in the case of France, higher fertility rate would partly offset the impact of higher life expectancy on long term expenditure. We could not take this into account as there is no AWG alternative scenario for fertility rates.

13 Including Greece (with alternative sources, documented in the aforementioned Annex) the increase in spending amounts to 5.5 p.p.

14 Knell et al (2006) and the Study Group on Ageing (2007) discuss, respectively, the cases of Austria and of Belgium.

support and other benefits. Moreover, while projections are based on current legislation, the implementation of provisions to adjust pension spending to demography over time may be delayed.[15]

Finally, we do not factor in macroeconomic risks. The AWG estimates that lower labour productivity growth by 0.25 p.p. over the projection horizon increases the level of pension spending by 0.4 p.p. of GDP on average in the EU. In the euro area changes are the highest in Portugal (1.3 p.p. of GDP) and in Austria and Spain (1.0 p.p.), while in Germany, Ireland, Luxembourg and the Netherlands pensions are connected to earnings and no change is projected due to lower productivity. An employment rate which is 1 p.p. higher than the baseline is projected to result in only small changes (in the 0.0-0.1 range for most countries), unless the increase is concentrated among older workers (an increase by 5 p.p. in the employment rate of older workers is projected to reduce spending by 0.2 p.p. of GDP on average in the euro area, with the highest impacts, 0.3-0.4 p.p., in France, Austria and Belgium).

15 In Italy actuarial updates adjusting entitlements to life expectancy, legislated in 1995 and due in 2005, were postponed. Based on a recent agreement between the government and trade unions, the update is expected to take place in 2010.

2 Ageing and fiscal sustainability

As indicated in the previous section, ageing will have a substantial impact on the budget balances of almost all euro area countries considered in the 2010-2050 period. In this section, the implications for the sustainability of public finances will be assessed. The first paragraph briefly reviews the theoretical notion of fiscal sustainability and assesses deficit-dynamics in the countries considered. The second paragraph then looks into the quantification of the sustainability gaps for these individual euro area countries.

2.1 Fiscal sustainability and deficit-debt dynamics

The notion of fiscal sustainability typically refers to the possibility of continuing current fiscal policy: sustainable policies are those that can be indefinitely continued while unsustainable policies will ultimately have to be modified. However, while the general intuition is clear, different specifications have been provided in the literature[16], generally pertaining to restrictions on the evolution of public debt.

From a theoretical point of view, notions of sustainability fall into two broad families (Spaventa, 1987). According to Domar (1944), the public debt ratio should converge to a finite value in order to avoid that the tax burden has to rise continuously. Other specifications in the same vein, such as those advocated by Buiter (1985) and Blanchard et al (1990), are more specific and require the debt ratio to converge back to its initial level. These definitions try to capture the idea, first advanced by Keynes (1923) that an ever-increasing tax-rate is not sustainable in the long-run.

According to a second, less restrictive notion of sustainability, fiscal policies are sustainable as long as the discounted value of all future primary surpluses equals the current level of public debt (see for example Blanchard et al, 1990). This is in turn true if and only if in the long run the rate of growth of the debt-to-GDP ratio is lower than the interest rate[17]. Hence, the 'intertemporal budget constraint' expressed in ratios to GDP is more agnostic with respect to the path of public debt than the other definitions of sustainable policies.

Despite the absence of a clear-cut theoretical benchmark, the 'conventional wisdom' definition of fiscal sustainability would imply that continuously rising and/or extremely high debt ratios are unsustainable. Against this background, it seems appropriate to first assess the impact of ageing on deficit-debt dynamics in the absence of any policy changes.

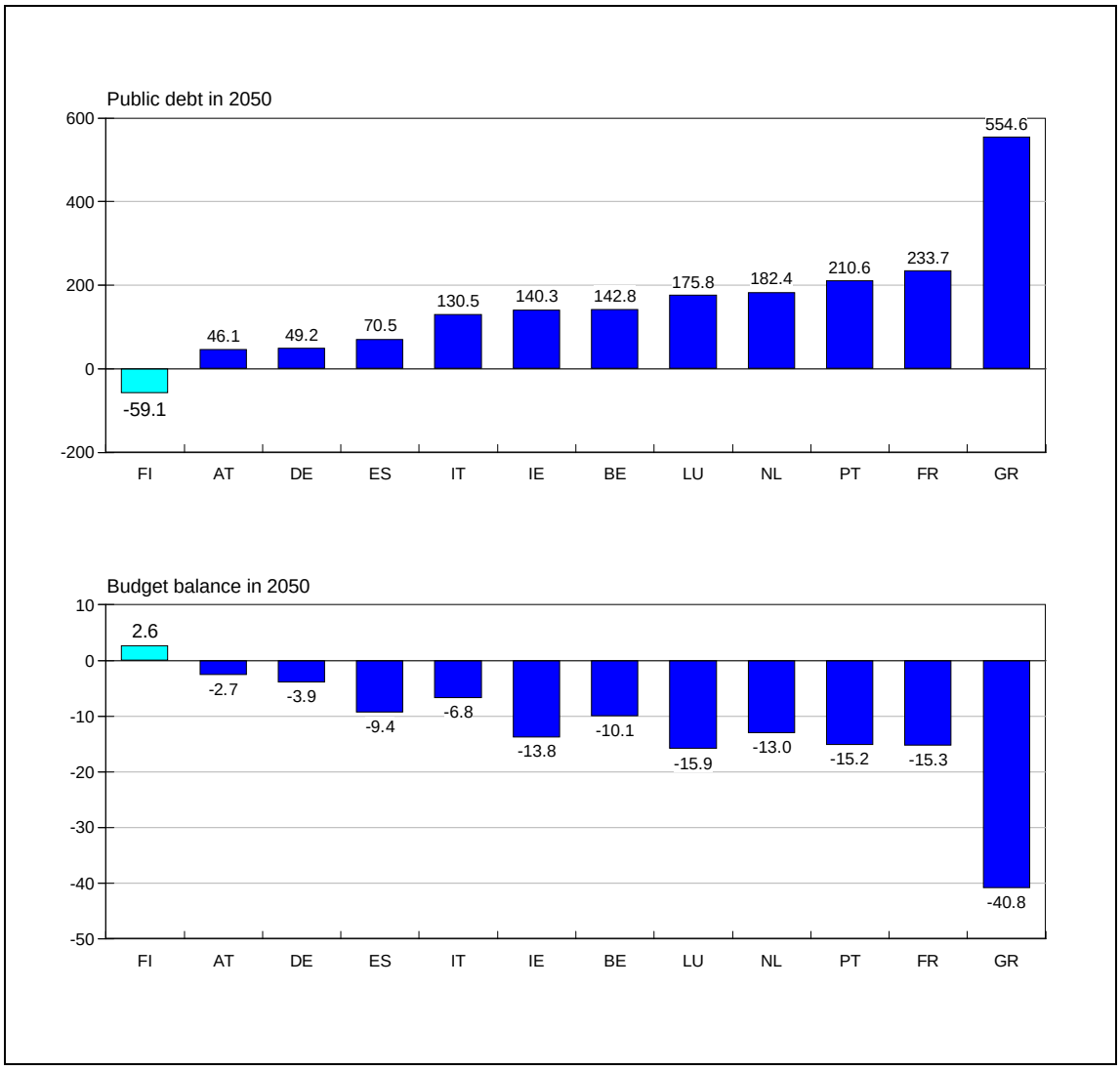
To this end, budgetary outcomes for 2050 are calculated here taking into account the macroeconomic projections of the AWG's 2006 Report (European Commission, 2006) and assuming that from 2008 onwards the primary balance is only affected by the ageing-related changes in government expenditure determined in section 1. The implicit interest rate on public debt was assumed to converge to 5.1% (which corresponds to a real rate of 3% and inflation of 2%, as assumed by the AWG) for all countries by 2015. No deficit-debt adjustments were taken into account. A similar set of assumptions will be used throughout this section for the calculation of the different sustainability indicators.

16 See Balassone and Franco (2000) for a detailed overview.

17 An infinite number of sequences for the primary balance can in principle satisfy the intertemporal budget constraint and if the latter is expressed in ratios to GDP, some sequences may even imply a continuously increasing debt ratio.

Graph 2.1 - Fiscal outcomes in the absence of policy changes[1]

(percentages of GDP; lightly shaded bars indicate favourable deficit-debt dynamics in the post-2050 period)



1 Assuming that government revenue and non-ageing related primary expenditure (in structural terms) remain constant with respect to GDP at the 2007 level and that the implicit interest rate on public debt gradually converges to 5.1% by 2015.

This exercise suggests that, taking into account the likely budgetary consequences of population ageing in the next decades, public finances are currently only sustainable in Finland. That country would still record a budget surplus of close to 2.5% of GDP in 2050 with a negative public debt ratio of some 60% of GDP[18]. Only in Finland deficit-debt dynamics would be favourable at the end of the period considered. All other countries considered would end up with substantial and increasing deficit and debt ratios in 2050 (only in Austria, Germany and Spain public debt would be smaller than GDP in 2050). Hence, it seems clear that in all countries considered, except Finland, policies will ultimately have to be modified.

18 It should be stressed that, in actual practice, a gross consolidated debt ratio (Maastricht definition) can not fall below zero. Negative values for debt ratios used throughout this paper should be understood as a(n increase in the) net financial asset position.

2.2 Measurement of sustainability gaps

As is clear from the wide range of deficit and debt ratios attained in 2050, the extent to which policies have to be changed in order to restore fiscal sustainability differs from country to country. Different approaches for the measurement of these 'sustainability gaps' exist. They typically attempt to quantify the fiscal effort required to reach a certain outcome at a pre-determined date in the future.

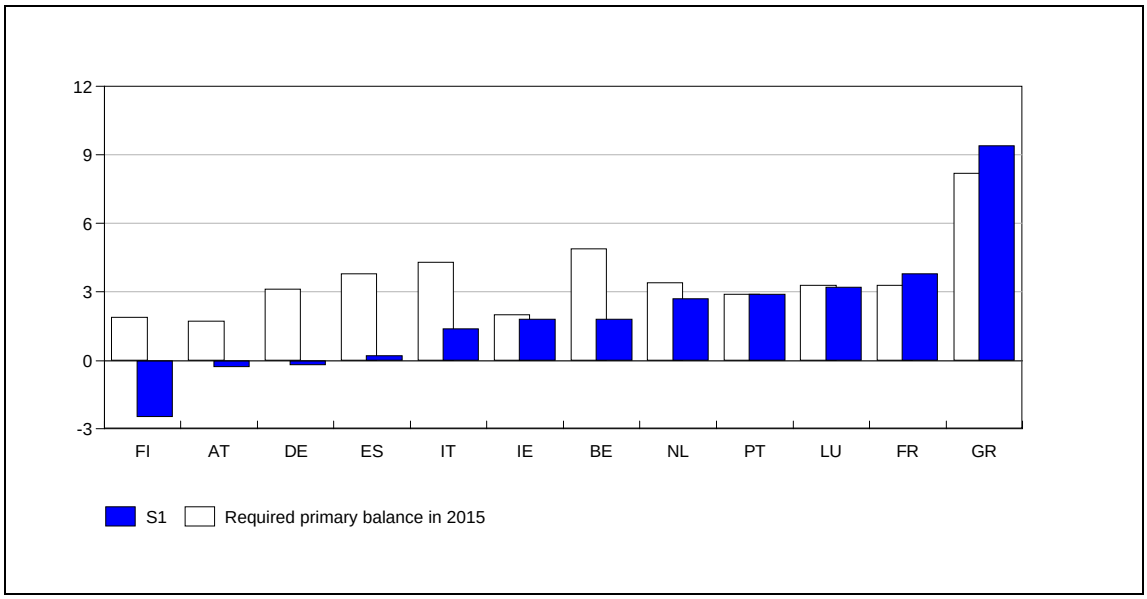
In this connection, the tax-gap indicator proposed by Blanchard et al (1990) can be considered as one of the most general examples: it measures the required change in the tax ratio that, taking into account the projected development of primary expenditure and assumptions concerning the implicit interest rate on public debt and deficit-debt adjustments, would yield the same public debt ratio at the end of a given period as the one existing at the beginning of that period. In the context of the ageing problem, the period considered could be the one covered by the projections of ageing-related expenditure pressures (until 2050 in the case of the AWG) and the indicator would then measure the adjustment needed to avoid an increase in the debt ratio due to ageing.

2.2.1 Sustainability indicators used by the European Commission

The European Commission typically uses two quantitative indicators in its assessment of the sustainability of public finances in EU Member States (e.g. European Commission, 2007). The so-called S1 indicator is inspired by both the tax-gap indicator proposed by Blanchard et al. and the reference value for public debt defined in the Treaty on the European Community: it is defined as the size of the 'permanent budgetary adjustment necessary for the gross consolidated debt to reach 60% of GDP in 2050'. It is more specifically defined as the difference between the primary balance required in a certain target year to bring the debt ratio to 60% in 2050 - assuming that, after the target year, the primary balance is only affected by the ageing-related expenditure increases - and the one actually projected for that target year. It should be stressed that this S1 indicator is *time-dependent*: The S1 indicators published by the European Commission are typically linked to a target year in the medium term (e.g. at the end of the time horizon of the stability programmes) but, in principle, S1 can also be calculated using t+1 as the target year. Apart from the estimates of these ageing costs, the calculation of S1 also depends on a number of assumptions pertaining to activity growth, the implicit-interest rate on public debt and deficit-debt adjustments.

Graph 2.2 - Sustainability indicators: $S1_{2015}$

(percentages of GDP)



The S1 indicator was re-calculated using 2015 as the target year and taking into account the ageing costs derived in section 1 and using similar assumptions (e.g. on activity growth, the implicit interest rate on public debt, deficit-debt adjustments) as above. For the debt ratio, the gross consolidated debt according to the Maastricht definition was used[19]. The results show that Austria, Germany and, especially, Finland would overshoot the primary balance required by 2015 to reach a 60% debt ratio in 2050 without any policy changes, as witnessed by the negative values for the S1 indicator. All other countries considered need to tighten fiscal policy in order to prevent the debt ratio from exceeding 60% in 2050 with the required improvements in the primary balance ranging from 0.2% of GDP for Spain to 9.4% of GDP for Greece[20]. These estimates are more pessimistic than those by the European Commission (4/2006), that considers public finances of IE, NL and FI as sustainable according to S1. As pointed out in Langenus (2006) the S1 indicator can be criticised as closing the indicated sustainability gap, i.e. bringing the primary balance to the level suggested by the indicator, only leads to a certain debt ratio by 2050 but does not restrict debt dynamics after that date in any way. For all of the countries considered here, debt dynamics would actually be unfavourable if they implement the fiscal adjustment suggested by the S1 indicator: keeping the primary balance constant after 2050 would imply a (rapidly) increasing debt ratio from the level of 60% in 2050, which seems at odds with the 'common wisdom' definition of fiscal sustainability. In addition, this clearly violates the Maastricht convergence criterion requiring that debt ratios above 60% have to be reduced at a satisfactory pace.

The second sustainability indicator that is routinely used by the European Commission, the so-called S2 indicator, is more directly linked to the aforementioned theoretical definition of sustainability proposed by Blanchard et al (1990): it measures the size of the 'permanent budgetary adjustment necessary to fulfil the intertemporal budget constraint' (European Commission, 2007). It should be stressed that, in principle, an infinite number of sequences for the primary balance can satisfy this constraint. Hence, the indicator needs to be defined more clearly to be operational.

As for S1, the S2 indicator used by the European Commission is time-dependent. The required 'permanent budgetary adjustment' is calibrated as the difference between the primary balance required in a certain target year to equate the present value of the sequence of all future primary balances in percentages of GDP (and assuming that, after the target year, the primary balance is only affected by the ageing-related spending increases) to the debt ratio projected at the beginning of the target year and the primary balance actually projected for that target year. Under the assumption that growth and interest rates stay constant over time, this can be mathematically expressed as (see European Commission, 2006):

$$S2 = \frac{1+r}{1+g}\left(d_{ty-1} - \sum_{i=ty+1}^{\infty} \Delta pb_i \left(\frac{1+g}{1+r} \right)^{i-ty} \right) - pb_{ty-1}$$

19 For some countries, the European Commission subtracts assets in pension funds from the debt position and therefore uses a modified (net) debt concept (see European Commission, 2005). In theory, i.e. with perfect capital markets, including financial assets as a stock variable in the intertemporal budget constraint leads to the same result as including the return on these assets as a flow variable since, from a present-value perspective, future interest or dividend payments would be equal to the current value of assets. Including both, the stock and the flow variable, however, would imply that the assets are counted twice. As the primary balance includes returns on financial assets, our calculations are based on gross debt figures (i.e. without deducting public pension fund assets).
In addition, we – like the EC (2007) – assume that returns on property income stay constant in relation to GDP which requires a growing asset position. While this might not be fully consistent with the assumption of zero deficit-debt adjustments, the resulting error should be small for most countries. Only for countries with large financial asset positions (the Netherlands and Finland) the sustainability indicators might more substantially underestimate the true size of the problem (see European Commission, 2006).

20 As the AWG report (EPC and EC, 2006) does not provide any projections for pension expenditure alternative sources were used, most notably the pension projections in the updates of the Greek stability programme. For further details please see the Greek country fiche in the aforementioned Annex.

with: pb_i = (projected) primary balance for year i (in percentages of GDP)

d_i = (projected) public debt for year i (in percentages of GDP)

r = interest rate

g = GDP growth rate

ty = chosen target year

It should be stressed that, as S2 (nor S1) is not discounted back to the current year, the exact value of this indicator depends on the chosen target year and will be higher, the further this target year lies in the future.

By choosing the appropriate discount factor - $(1+g)/(1+r)$ in the formula above with, more specifically, r being set equal to the implicit interest rate on public debt - the definition of S2 is clearly linked to the law of motion of the public debt ratio. Since the primary balance is assumed to be affected by the ageing costs only and, hence, stays constant after the last year covered by projections of ageing costs, compliance with the intertemporal budget constraint then implies a constant public debt ratio after that year, as shown in Box 1. As the AWG projections currently cover the years up to 2050, S2 is actually equal to the fiscal effort needed in a given target year to reach a debt-stabilising budget balance in 2050. The corresponding debt ratio reached in 2050 (and maintained thereafter) differs from country to country and depends on the implicit interest rate (which, however, is the same for all countries concerned according to the assumptions used here) and economic growth after 2050 and the primary balance reached in 2050 (see box 1). The latter depends in turn on the initial conditions and the ageing costs.

Box 1 - The intertemporal budget constraint, the S2 indicator and debt dynamics

The European Commission uses the S2 indicator to operationalise the theoretical benchmark of the intertemporal budget constraint. The purpose of this box is to show that in the particular circumstances studied in this paper (and also assumed by the European Commission to calculate S2) with the activity growth, the implicit interest rate on public debt and the primary balance being assumed constant after a certain date (2050), the S2 indicator is equivalent to imposing a constant public debt ratio from that date onwards.

The intertemporal budget constraint generally implies:

$$d_0 = \sum_{t=1}^{\infty} pb_i \left(\frac{1+g}{1+r}\right)^i \qquad (1)$$

with: d_i = debt ratio in year i

pb_i = the ratio of the primary balance to GDP in year i

g = nominal GDP growth (assumed constant, for simplicity)

r = the implicit interest rate on public debt (assumed constant, for simplicity)

if $\forall\ j \rangle T,\ pb_j = pb_T = \overline{pb}$ then (1) reduces to:

$$d_0 = \sum_{i=1}^{T} pb_i \left(\frac{1+g}{1+r}\right)^i + \left(\frac{1+g}{1+r}\right)^T \overline{pb}\ \sum_{i=1}^{\infty}\left(\frac{1+g}{1+r}\right)^i \qquad (2)$$

Using the formula for the sum of an infinite geometric series, (2) can be rewritten as:

$$d_0 = \sum_{i=1}^{T} pb_i \left(\frac{1+g}{1+r}\right)^i + \left(\frac{1+g}{1+r}\right)^T \overline{pb}\,\frac{1+g}{r-g} \qquad (3)$$

which is equivalent to: $d_0 - \sum_{i=1}^{T} pb_i \left(\frac{1+g}{1+r}\right)^i = \left(\frac{1+g}{1+r}\right)^T \overline{pb}\,\frac{1+g}{r-g}$ (4)

Multiplying both sides of (4) by $\left(\frac{1+r}{1+g}\right)^T$ leads to:

$$d_0 \cdot \left(\frac{1+r}{1+g}\right)^T - \sum_{i=1}^{T} \left(\frac{1+r}{1+g}\right)^{T-i} pb_i = \frac{1+g}{r-g}\,\overline{pb} \qquad (5)$$

As the left-hand side of equation (5) is the expression for the debt ratio in T, this implies:

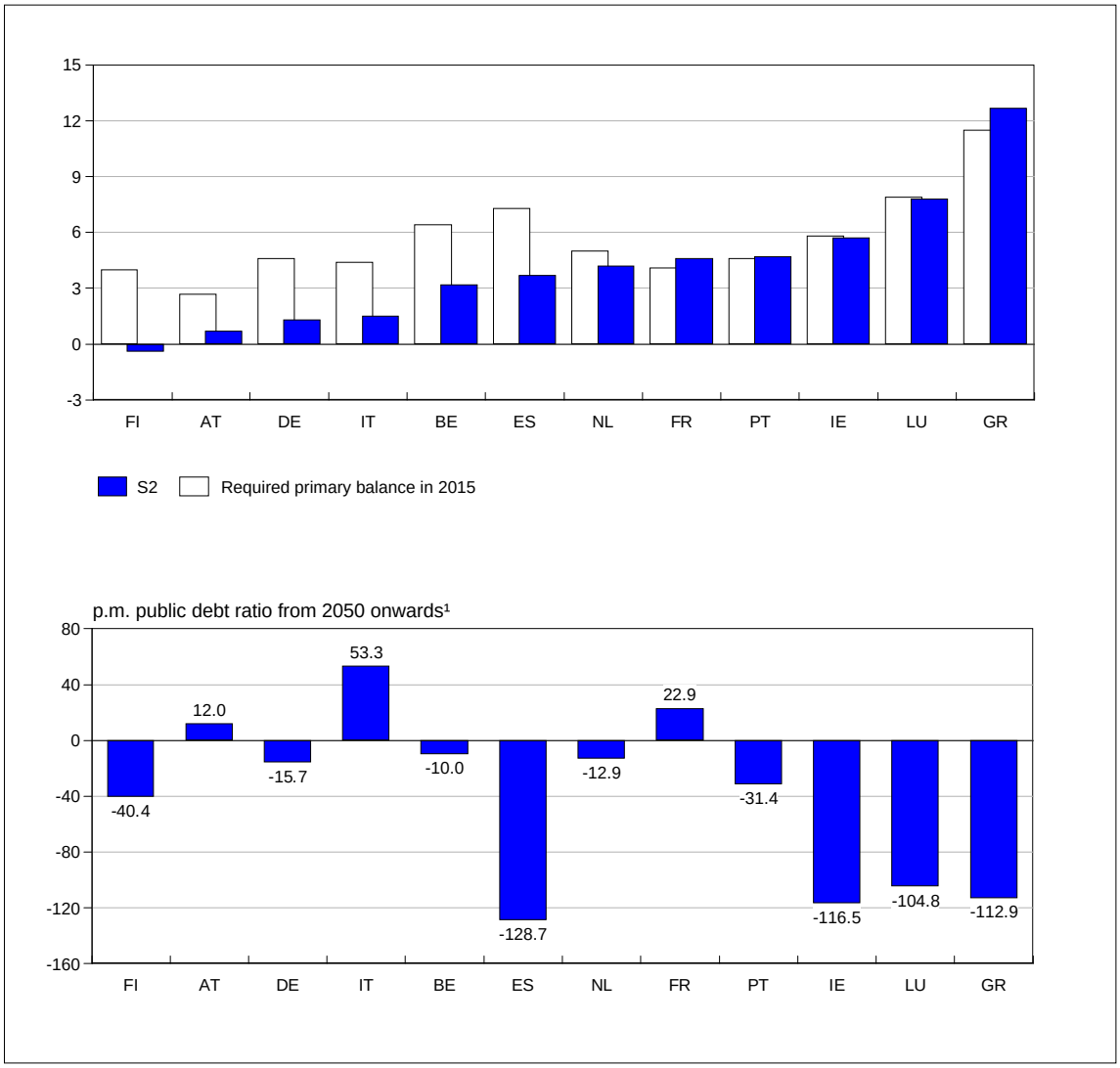
$\overline{pb} = \frac{r-g}{1+g}\, d_T$ (6), which means that: $\forall\ j \rangle T : d_j = d_t = \overline{d}$ (7)

Hence, the S2 indicator is equivalent to imposing a constant debt ratio in the post-2050 period.

The S2 indicator is also re-calculated here using 2015 as the target year and taking into account the same assumptions as for S1. According to this indicator, public finances are currently only sustainable in Finland. For all other countries the value for S2 is positive, ranging from 0.7% of GDP in Austria to close to 13% of GDP for Greece. Similarly, the European Commission (4/2006) only considers public finances sustainable in Finland according to the S2 indicator; however it indicates a much smaller adjustment effort for the remaining countries. The constant debt ratios reached as of 2050, if the fiscal adjustment suggested by the S2 indicator was implemented, also vary greatly, from more than 50% of GDP in Italy to large negative debt ratios in Spain, Ireland, Luxembourg and Greece. Differences in the stable end-of-period debt ratio are mainly related to the primary balance reached at the end of the period by the different countries. In the Italian case, for instance, the primary balance is still positive, which implies a positive debt ratio in 2050 (as the implicit interest rate on public debt exceeds nominal GDP growth for all countries). This is also the case for other countries with relatively low ageing costs such as Austria and France. For countries with much higher ageing-related expenditure increases, such as Ireland, Luxembourg, Spain and Greece, the adjustment effort implied by S2 would lead to a primary deficit - and, hence, a negative debt ratio - in 2050.

Graph 2.3 - Sustainability indicators: $S2_{2015}$

(percentages of GDP)



¹ This is the constant debt ratio that would apply from 2050 onwards if the sustainability gap was closed by increasing the primary balance expected for the target year (2015) by S2.

2.2.2 Alternative sustainability indicators

Two alternative sustainability indicators are proposed in Langenus (2006). The first one, S3, is a variant of the S2 indicator used by the European Commission. Rather than defining the budgetary adjustment required to reach a debt-stabilising budget balance in 2050 (or, more generally, at the end of the period considered) as an 'abrupt' increase in the target year, the required adjustment is calibrated as a gradual improvement of the primary balance in the years leading up to the target year. As the fiscal adjustment starts earlier, S3 is typically somewhat lower than S2, all other things equal.

The second alternative indicator, S4 (originally used by Delbecque and Bogaert (1994)) measures the required gradual adjustment in the primary balance in the period up to the target year in order to reach a balanced budget by 2050. Like S1, this indicator does in principle not restrict debt dynamics and may correspond to a rising public debt ratio after the period considered. However, since the restriction imposed by S4 (a balanced budget in 2050) is stronger than the one associated with S1 (a debt ratio of 60% in 2050), the public finance position at the end of the period considered implied by S4 is typically much sounder than the one implied by S1.

Table 2.1 - Sustainability indicators: S3 $_{2015}$ and S4 $_{2015}$
(percentages of GDP)

	S3	p.m.		S4	p.m.	
		required primary balance	2050 debt ratio		required primary balance	2050 debt ratio[1]
Finland	-0.4	4.1	-38.5	-0.7	3.7	***-19.2***
Austria	0.7	2.6	10.6	0.7	2.7	5.7
Germany	1.2	4.5	-18.8	1.1	4.4	***-10.0***
Italy	1.4	4.3	48.7	1.8	4.7	25.1
Spain	3.5	7.1	-139.8	2.4	6.0	***-75.9***
Belgium	3.1	6.3	-20.1	2.9	6.1	***-9.7***
Netherlands	4.1	4.8	-26.7	3.8	4.5	***-12.2***
Ireland	5.5	5.6	-130.5	4.1	4.3	***-64.4***
Portugal	4.4	4.4	-45.5	4.1	4.0	***-24.6***
France	4.4	3.9	7.4	4.4	4.0	3.5
Luxembourg	7.8	7.9	-130.4	5.6	5.7	***-43.2***
Greece	12.0	10.8	-151.5	10.8	9.6	***-80.2***

[1] Figures in bold italics indicate a rising debt ratio in the post-2050 period if the 2050 primary balance is kept constant as a percentage of GDP.

Both of the alternative sustainability indicators were calculated taking into account the same assumptions as for S1 and S2. The results for S3 are very much in line with those for S2: public finances currently only seem to be sustainable in Finland. All other countries will need to adjust their fiscal policy. Sustainability gaps are much smaller in Austria, Germany and Italy than in Ireland, Portugal, France, Luxembourg and, especially, Greece. As for S2, substantial negative public debt ratios are associated with the fiscal adjustment effort implied by S3 in many of the countries considered.

The results for the S4 indicator are quite similar. The ranking of countries on the basis of sustainability concerns is only marginally different: Finland is again the only country where public finances appear to be sustainable while the biggest sustainability gaps are found for the Netherlands, Ireland, Portugal, France, Luxembourg and, especially, Greece. Debt ratios in 2050 associated with the adjustment effort implied by S4 range from 25% in Italy to large negative values in Greece, Spain and Ireland. For some countries, deficit-debt dynamics at the end of the period considered are unfavourable with the debt ratios set to worsen as of 2050 if the primary balance is kept constant. However, in the sample this is only the case for countries that post negative debt ratios in 2050.

All in all, the analysis carried out in this section clearly shows that population ageing jeopardises fiscal sustainability in all the euro area countries considered except Finland. The actual measurement of sustainability gaps differs depending on the indicators used and, more specifically, their definition of the adjustment effort required to restore sustainability. However, the lowest sustainability gaps are typically found for Austria, Germany and Italy - countries that have undertaken more important pension reforms in the recent past - while the problems appear to be more severe in the Netherlands, Ireland, Portugal, France, Luxembourg and, in particular, Greece.

The sustainability indicators used here are based upon a concrete specification of the adjustment effort needed to close the sustainability gap. By their construction, they are typically of the 'pre-funding' type, i.e. they measure the size of an 'early' adjustment effort, as the chosen target year usually does not lie very far in the future. However, this should by no means be interpreted as a policy recommendation: the

indicators only measure the size of the problem taking the medium term as the relevant benchmark, they do not imply anything about the appropriateness of such a relatively early adjustment effort to restore fiscal sustainability. The issue of which policy response is more appropriate - e.g. the 'early' fiscal adjustment measured by the sustainability indicators or a more gradual restoration of fiscal sustainability over the whole 2008-2050 period - can only be addressed on the basis of clearly defined criteria and this is done in the next section.

3 Intergenerational distribution effects of alternative adjustment strategies

3.1 Introduction

So far we have looked at the implications of demographic ageing on the public expenditure of twelve euro area countries on the basis of AWG projections. We have adjusted these estimates where it was deemed appropriate and derived new headline figures for the expected increase in the ratio of ageing-related expenditure to GDP (section 1). On the basis of these new headline estimates sustainability gaps for the twelve countries considered were calculated and it was shown that current policies are not sustainable for most countries (section 2).

In this section, the relative merits of different budgetary strategies to ensure fiscal sustainability are investigated. This question has received considerable attention from EU political bodies for a long time. In a report to the March 2001 European Council of Stockholm, the Commission and the Ecofin Council agreed on a three-pronged strategy for addressing the budgetary consequences of demographic ageing: i) achieving or maintaining budget balances that reduce public debt at a fast pace and thereby lower interest payments and allow for a (partial) pre-funding of ageing-related costs; ii) raising employment rates especially amongst older workers and women, and iii) reforming social transfer systems (possibly including funding of public pensions). More recently, the debate has gained momentum. In the context of the 2005 reform of the Stability and Growth Pact, the Council called for implicit liabilities to be taken into account in the determination of medium-term budgetary objectives (MTOs) for EU member states. In the debate on how to implement this request, one of the main questions is to what extent future ageing-related expenditure should be pre-funded by attaining high primary surpluses in the following years.

In principle, many different combinations and characteristics of the three-pronged strategy defined in 2001 are conceivable. Here, the focus is exclusively on the budgetary component, i.e. different choices concerning the adjustments to the (primary) budget balance. However, the methodology suggested here can in principle be extended to also include specific reforms aimed at increasing participation rates or reducing ageing-related expenditure. In any case, the impact of past reforms and a gradual increase in participation rates are already included in the adjusted AWG projections which form the basis of this section.

A range of criteria can be applied when assessing the appropriateness of different budgetary strategies. For example, the impact on economic growth could be considered. An early adjustment might require a pronounced fiscal tightening over the following years, which could prove to be disruptive to the economy in the short run, even tough it might lead to higher GDP in the long run.[21] In this paper, we only look at the criterion of intergenerational distribution.

Budgetary strategies can differ with respect to a number of dimensions. We show results that compare strategies affecting different sets of budgetary categories: The case of a lump sum tax is simulated by distributing the adjustment burden equally on persons of all ages while an increase e.g. in social security contributions is modelled by burdening the working age population only. However, the main focus is on strategies that differ with respect to the timing of the adjustment effort. Therefore, an 'early adjustment' scenario, closing the sustainability gap by 2015, along the lines suggested by the S4 indicator, is compared to a 'gradual adjustment' scenario, in which consolidation is stretched out over the period 2008-2050.

To make sure that the conclusions of the analysis are robust with respect to countries' initial conditions and ageing prospects, a sufficiently diverse group of euro area member states is selected: i) Germany with a low sustainability gap due to a relatively favourable initial budget balance and a slightly below average increase in ageing-related expenditure, ii) Belgium which has a medium-sized sustainability gap, despite a

21 See e.g. Hauner, Leigh and Skaarup (2007).

relatively favourable initial budget balance, due to a sharp projected increase in ageing-related expenditure, and iii) France which has a comparatively large sustainability gap, despite a below average expected increase in ageing-related expenditure, due to an unfavourable initial budgetary position. [22]

3.2 Methodology and data

In the literature, issues of intergenerational distribution are usually analysed within the framework of generational accounting.[23] Like most sustainability indicators, generational accounting takes into account the intertemporal budget constraint. However, it adds an intergenerational perspective to the analysis. This is achieved by calculating the present value of total net tax payments to the government over the (remaining) lifetime of a cohort born in a specific year, where net tax payments are defined as taxes paid minus transfers received.[24] This present value of net tax payments is labelled generational account. The intergenerational distribution of the net tax burden is analysed by comparing the generational accounts of different cohorts.[25]

Usually, the generational account of a newborn in the base year is compared to that of future generations (those born after the base year). According to the customary, albeit arbitrary, convention in generational accounting, all generations already living in the base year are exempted from the policy change necessary to satisfy the intertemporal budget constraint while any required adjustment effort is spread evenly over all future generations. Therefore, generational accounts in general indicate a higher burden for future generations if a sustainability gap exists.

In this section, we in principle follow the generational accounting approach. However, the conventional generational accounting methodology has several drawbacks with regard to our objective and we tried to accommodate this by introducing some modifications. Firstly, most generational accounting studies for Europe forecast pension expenditure on the basis of their own models. These models are necessarily less elaborate than the sometimes very sophisticated pension models and databases that are used in projections by national institutions. Since future pension expenditure is determined not only by cohort effects but also by numerous legislative changes the full impact of which is sometimes only felt after several decades, it is preferable to revert to pension forecasts made with large models and a comprehensive database. This might be less obvious for other revenue and expenditure categories which are less influenced by effects that fully mature only after a long time. By basing our calculations on the (adjusted) AWG projections, we benefited from the detailed national forecasts that enter these projections.[26] This approach also ensures consistency – except for the adjustments made in section 1 - with the AWG projections which underlie the sustainability analysis at the European level. However, this procedure also implies that all revenue and expenditure categories not deemed to be age-specific by the AWG are distributed evenly over all cohorts – an assumption that is clearly not in line with empirical

---

22 This assessment is based on the results for the S4 indicator shown in table 2.1. The European Commission (2008) judges the three considered countries to be at "medium risk" with Germany being a borderline case to low risk.

23 A different approach has been suggested by Langenus and Eugène (2005) and applied by Langenus (2006). They compare the implications of different budgetary strategies on the evolution of an average working-age person's financial contribution to the government's primary balance over time. They regard a situation in which successive generations of workers contribute roughly the same amount, corrected for nominal wage growth, as "intergenerationally fair". The main difference between this and the generational accounting approach is that they take a cross-section instead of a longitudinal perspective, as they focus on net tax payments for individual years rather than over the total lifetime of a cohort.

24 In some studies, not only transfers but also other government expenditure such as spending on general administration, domestic and external security, and investment are allocated (evenly) to different cohorts.

25 Of course, only generational accounts at birth are comparable as the generational account of e.g. a 30-year old person fails to reflect the net tax payments already borne over the first three decades of his/her life. For a more detailed description of the generational accounting approach see, for example, Auerbach, Gokhale and Kotlikoff (1994), Raffelhüschen (1999) or Bonin (2001).

26 A drawback of this procedure is that these models are often not fully disclosed to the public and therefore are largely a 'black box' to outsiders. The AWG tries to overcome this problem by a peer review process.

facts. However, with a more extensive database, this exercise could be extended to a fully-fledged generational accounting procedure with age-specific expenditure profiles for a wide range of additional budgetary categories.

A second drawback of the standard generational accounting approach is that the focus is on two cohorts only – newborns and those born one year later (representing future generations). As shown, for example, by Bonin (2001), with increasing life expectancy and policy measures that become effective only in the future, generational accounts of future generations cannot just be represented by the cohort born immediately after the base year: the generational account changes for every future generation. Moreover, considering the full lifetime generational accounts only of cohorts born in the base year (2007 in our study) or later implies that the intergenerational redistribution between all currently living cohorts can not be analysed correctly. We therefore explicitly calculate total lifetime generational accounts for the cohorts born between 1970 and 2050.[27] To our knowledge, this has rarely been done before.[28]

We then compare lifetime generational accounts under different budgetary strategies. Instead of explicitly targeting an 'optimal' strategy that minimises intergenerational redistribution, we compare two strategies that differ in the timing of the adjustment. In the first strategy, named early adjustment approach, the primary balance is increased in equal yearly steps until 2015 to ensure a balanced budget in 2050. In the second strategy, named gradual approach, the fiscal adjustment is spread out over the whole 2008-2050 period. This gradual adjustment is calibrated to generate the same public debt ratio in 2150 as the early adjustment strategy with a view to making both strategies comparable when analysing their intergenerational implications.

The restriction of an identical public debt ratio in 2150 may not be fully satisfactory when comparing the lifetime burden for two alternative budgetary strategies of generations born until 2050 only as the public debt ratio in 2150 is obviously also affected by (part of) the lifetime burden of generations born in the 2051-2150 period. Theoretically, a comparison of alternative budgetary strategies on the basis of intergenerational equity may then be biased by neglecting the generations born after 2050. However, alternative restrictions to make the budgetary strategies considered comparable - e.g. an identical debt ratio in 2050 - were deemed to be less appropriate.

Once the calculations are done, we need a criterion to decide which strategy has the more equitable distributional consequences. In the literature, several alternatives are proposed. Among the most prominent are the utilitarian social welfare function, that under restrictive assumptions implies redistribution until complete equality is achieved, and the maximin criterion proposed by Rawls, which maximises the utility of the person with the minimum utility.[29] However, the assumptions under which these results are derived are highly questionable and it is unclear how this should be applied in an intertemporal setting. In this regard, taking a constant net tax burden across different generations as a benchmark is an appealing solution. It is an economical solution in terms of computational effort, it is easily understood and has the property to give equal weight to present and future generations even though the latter do not take part in current political decision-making process. It needs to be pointed out, however, that the intergenerational distribution of the burden imposed by government budgetary activity is ultimately a normative question that does not have clear-cut answers.[30] An efficiency argument may

---

27 While more generations are alive in the period 1970 to 2150 in which we analyse public finance developments, only for cohorts born between 1970 and 2050 their whole lifespan is covered.

28 One example is Auerbach, Gokhale and Kotlifkoff (1995).

29 See e.g. Rosen (1999) and Rawls (1971).

30 In fact, similar to progressive income taxation, an intertemporally rising net tax rate has sometimes been proposed in the literature in order to redistribute from (richer) future to (poorer) currently living generations.

also be made for an even distribution of lifetime net tax payments, as Barro (1979) has shown that an unchanged tax ratio minimises the deadweight loss of taxation.[31]

Therefore, in this paper an adjustment strategy will be deemed preferable if it leads to a flatter time profile for the total net tax burden across cohorts born in different years. This assumes that a relatively constant net lifetime contribution to the government's primary balance (deflated by nominal per capita GDP) across generations can be deemed equitable. This is methodologically close to imposing a constant lifetime net tax rate for all generations – a concept named generational balance in the generational accounting literature. Alternative definitions could pertain to keeping either the absolute (discounted) amount of the lifetime contribution constant across generations or the difference between market income and this amount constant across generations. These definitions would be consistent with a net tax rate that is, respectively, constantly decreasing or increasing over time.

The lifetime generational account of an average person born in year k is given by

$$GK_k = \sum_{s=k}^{k+D} \sum_{z} h_{s-k,z,s} S_{s,k} \frac{1}{(1+r)^{s-k}}.$$

In this equation, D represents the highest age considered, $h_{a,z,s}$ the age-specific per capita amounts of individual revenue and primary expenditure categories z for a person of age a in year s and $S_{s,k}$ the likelihood of a person born in k to survive until period s, while r denotes the discount rate.

The age-profiles h for the individual ageing-related expenditure categories (pension, health, long-term care, unemployment and education) are taken from various sources.[32] However, the delineation of these sources often does not exactly match those in the national accounts. It is therefore clear that the payment profiles obtained in this way and extrapolated to cover the population as a whole deviate from the aggregate figures shown in the national accounts. For this reason we adopt a two-stage approach, as is customary in the literature. In the first stage, the age-specific payment profiles are derived from the various data sources. In the second stage, the age-specific per capita amounts are multiplied by a scaling factor which is uniform for all age groups. This scaling factor is defined so as to ensure that in the aggregate - taking into account the size of the age classes - the respective national account figure is reached. In other words, while in the first stage only the relative positions of persons of different ages are determined, in the second stage the absolute payment profiles are calculated.

This two-stage approach not only ensures consistency between absolute age-specific payment profiles and the national accounts data but also allows us to circumvent the limitation that we usually have relative payment profiles only for one point in time. Since the relative payment profiles typically change little over time, it is possible to use relative payment profiles which were obtained before (or after) the year under consideration, without this involving a major error.[33] By contrast, the national accounts data needed for calculating the absolute payment profiles (which are subject to stronger fluctuations) are available for all years in the period from 1970 to 2050.

The national accounts figures for the years from 1970 to 2007 for the five age-related expenditure items, the (primary) balance and GDP are available from national statistical institutes. However, the delineation often differs from that used by the AWG. Therefore a scaling factor was used in order to align national

---

31 However, Barro's proposition only holds under certain assumptions and moreover relates to the (marginal) tax rate while here we refer to net taxes (taxes minus transfers).

32 As pointed out above, all other budget categories are distributed evenly over all age classes.

33 While most policy measures leave the relative age-specific payments profiles unaffected, these profiles change, for example in the case of a legislated increase in the retirement age.

accounts figures to the AWG definition.[34] For the period 2008 to 2050 we used the adjusted AWG projections derived in section 1. For the years 2050 to 2150 we held the absolute age-profiles we obtained for 2050 constant (except for an adjustment for inflation and per capita GDP growth) and computed the macroeconomic aggregates by combining these profiles with the population forecast.

The population data are likewise taken from national sources for past years while AWG figures were used for the years up to 2050.[35] After 2050 the population is held constant in the baseline. However, keeping not only overall population size but also population structure at the 2050 level is clearly not realistic for most countries. This is why in a sensitivity analysis we also calculated national accounts on the basis of an explicit population projection that applies the AWG's fertility, mortality and migration assumptions for 2050 to the following years as well.

Concerning the discount rate employed for deriving the present value of lifetime net tax payments, we relied on the AWG's assumption of a real interest rate of 3% and inflation of 2% for future years. For the past we used the yield on long-term bonds issued by the respective government. The absolute payment profiles for the years after 2050 were extrapolated with the growth rate of GDP per capita, while GDP was expected to continue to grow with the rate assumed by the AWG for the period 2040 to 2050. The latter assumption reflects the method chosen by the Commission, and adopted also in section 2 of this paper, for the calculation of sustainability indicators. In order to make lifetime net tax payments of different cohorts comparable, they were discounted by the nominal growth rate of per capita GDP. While other methods are conceivable, this implies that the lifetime net tax payment is adjusted for increases in GDP per capita for successive cohorts. So when cohorts are shown to have the same lifetime net tax payments this does not imply that their absolute net tax payments are equal, but that their lifetime net payments in relation to per capita GDP at birth are similar.

Obviously, all the methodological and data limitations that fully-fledged generational accounting exercises are subject to also apply to our more restricted approach.[36] Moreover, since we follow the AWG's presumption that most revenue and expenditure categories are not age-specific, while in fact generational accounting studies have shown a clear lifecycle pattern for them, the absolute value of our lifetime net tax payments should be interpreted with great caution. The same holds for the differences in the total lifetime burden between countries as well as between males and females. The latter depend on a sometimes arbitrary allocation of payments within households. This is why we chose to show either the lifetime net tax payments for women or for men for a specific country. The comparison between the lifetime net tax payments of different cohorts is, however, more meaningful. Nevertheless, our results should be treated with some caution when drawing policy conclusions. While the basic methodological framework we use is, in our view, adequate for analysing intergenerational distribution issues, we were confronted with considerable deficiencies on the data side. Our results should therefore be taken as an indication for what would be possible with a more complete data set.

3.3 Results: Comparing the lifetime net tax burden of alternative adjustment strategies for different cohorts

3.3.1 Results for the baseline

In the baseline scenario we compare the intergenerational distribution of lifetime net tax payments of different cohorts under the assumption that the required adjustment is accomplished by increasing the

---

34 The scaling factor reflects the difference between national accounts and AWG data for 2004. In the case of Germany, a similar procedure was applied to link east German to west German data for the years before reunification. In addition for Germany some budgetary items like e.g. development aid were assumed not to benefit or burden the resident population. Also therefore results are not fully comparable between countries.

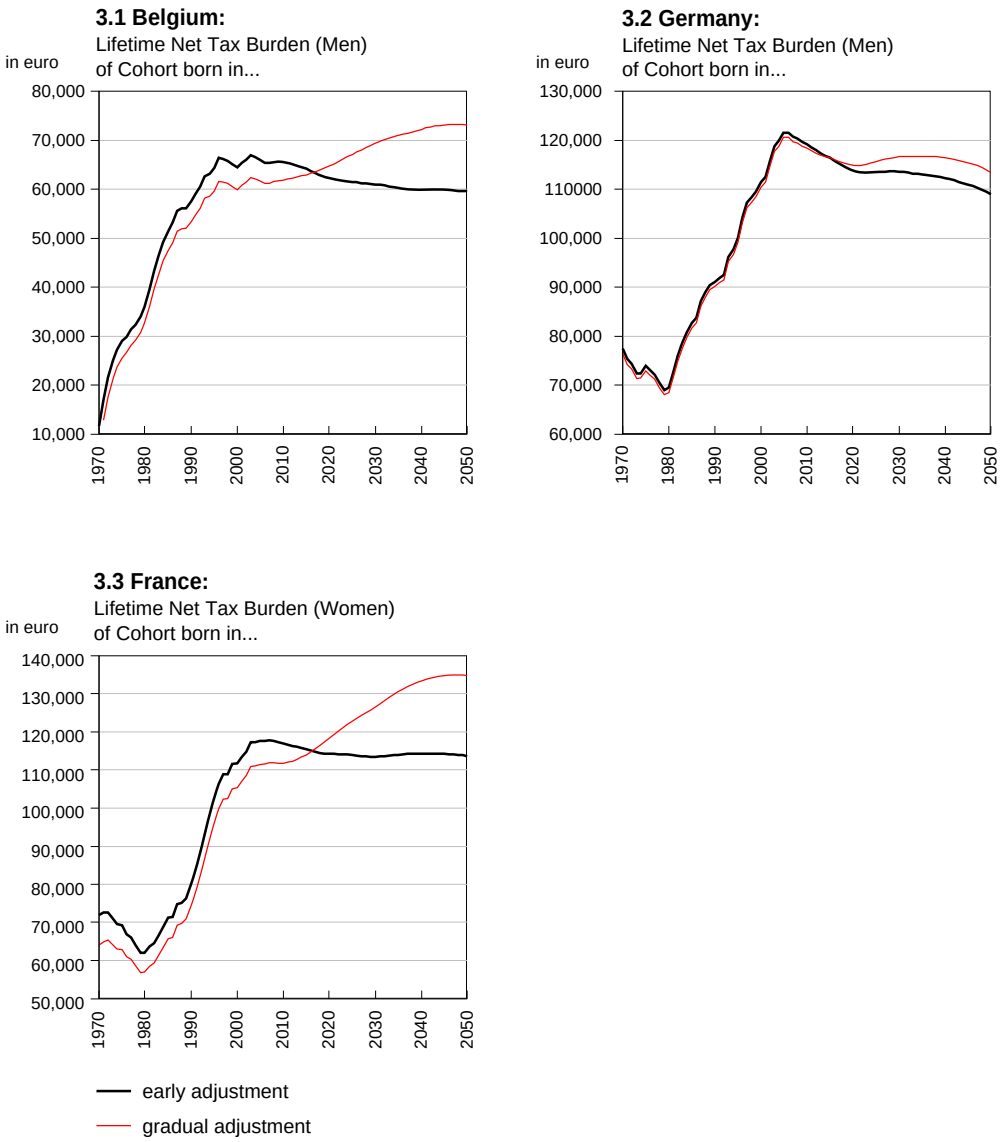
35 Survival probabilities for past years were obtained from the Human Mortality Database, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at http://www.mortality.org or http://www.humanmortality.de. As pointed out in section 1, the data from the AWG relate to the reference scenario and are not fully compatible with the adjusted headline scenario.

36 See Havemann (1994), Raffelhüschen (1999), or Manzke (2002).

primary budget balance through any of the non-ageing related categories. This implies that the adjustment burden is distributed evenly over all age classes. The picture that emerges in this case is quite similar for the three countries considered (compare graphs 3.1 to 3.3). Earlier-born cohorts who have already entered into working age face the lowest burden, while later-born generations have to pay much higher net taxes. The burden increase is very steep between the 1980 cohort and the 2005 cohort (1970 and 1995 for Belgium). For subsequent cohorts, the burden declines slightly under the early adjustment strategy, while it keeps increasing – though less rapidly than between the 1980 and 2005 cohorts – under the gradual adjustment strategy (with the exception of Germany, where the burden declines after the 2005 cohort also under the gradual adjustment strategy). As could be expected, the lines for the early adjustment and the gradual strategy are quite close together in the case of Germany, which has a small sustainability gap, and are wider apart for the other two countries, where larger adjustment efforts are needed. In fact, if sustainability had already been attained and no further adjustments were required, the lines would match exactly. None of the strategies considered would, however, sufficiently burden currently living generations and alleviate future generations to achieve an even intergenerational distribution.[37]

Visual inspection of graphs 3.1 to 3.3 already reveals that the early adjustment strategy leads to more even outcomes than the gradual one. In all three countries considered, it levies a higher burden on earlier-born cohorts who, compared to later-born cohorts, face a lower burden and relieves cohorts born later that face higher net tax payments than older cohorts. The crossing of the two lines, which indicates a lower burden under early adjustment for all later-born cohorts, is reached around the year 2016, while the highest burden under early adjustment is borne by the cohorts born about a decade earlier. For France and Belgium, the burden for generations born close to the middle of the 21st century obtained under the gradual approach would be markedly higher than the peak burden for generations born around 2005 under early adjustment. For Germany, the peak is attained around 2005 under both strategies and is slightly higher under early adjustment.

[37] A higher burden on currently living generations could be attained by concentrating the adjustment effort on the elderly. However, as pointed out earlier, searching for budgetary strategies that lead to an even intergenerational distribution is not the objective of this paper.



The conclusion that the early adjustment strategy leads to a more even intergenerational distribution is confirmed by the range of indicators displayed in table 3.1. The maximum burden, the difference between the maximum and the minimum burden and the standard deviation all point to a more favourable outcome under early adjustment. As already apparent from the graphs, the maximum burden for Germany is the only exception while the difference between the maximum and the minimum burden is about the same for that country. Nevertheless, as shown in table 3.1, even for Germany the standard deviation (and the coefficient of variation) is lower in the case of early adjustment.[38]

38 Indeed, at least for our sample of countries, the intergenerational distribution of the early adjustment strategy seems to be the more even compared to the gradual adjustment strategy the larger the initial sustainability gap.

Table 3.1: Intergenerational distribution indicators (baseline scenario)

	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
Belgium								
Women	58,200	65,100	12,800	15,600	20.4	24.1	76,000	78,800
Men	55,200	65,800	12,900	16,100	23.0	27.9	66,900	73,300
Germany								
Women	56,300	56,300	29,600	30,400	25.7	26.2	140,400	139,600
Men	52,500	52,500	26,500	27,400	26.7	27.3	121,600	120,500
France								
Women	55,800	78,100	19,900	27,000	19.7	25.9	117,700	134,900
Men	49,400	72,600	18,500	25,600	23.9	32.3	92,300	109,400

* In euros, deflated by per capita GDP growth

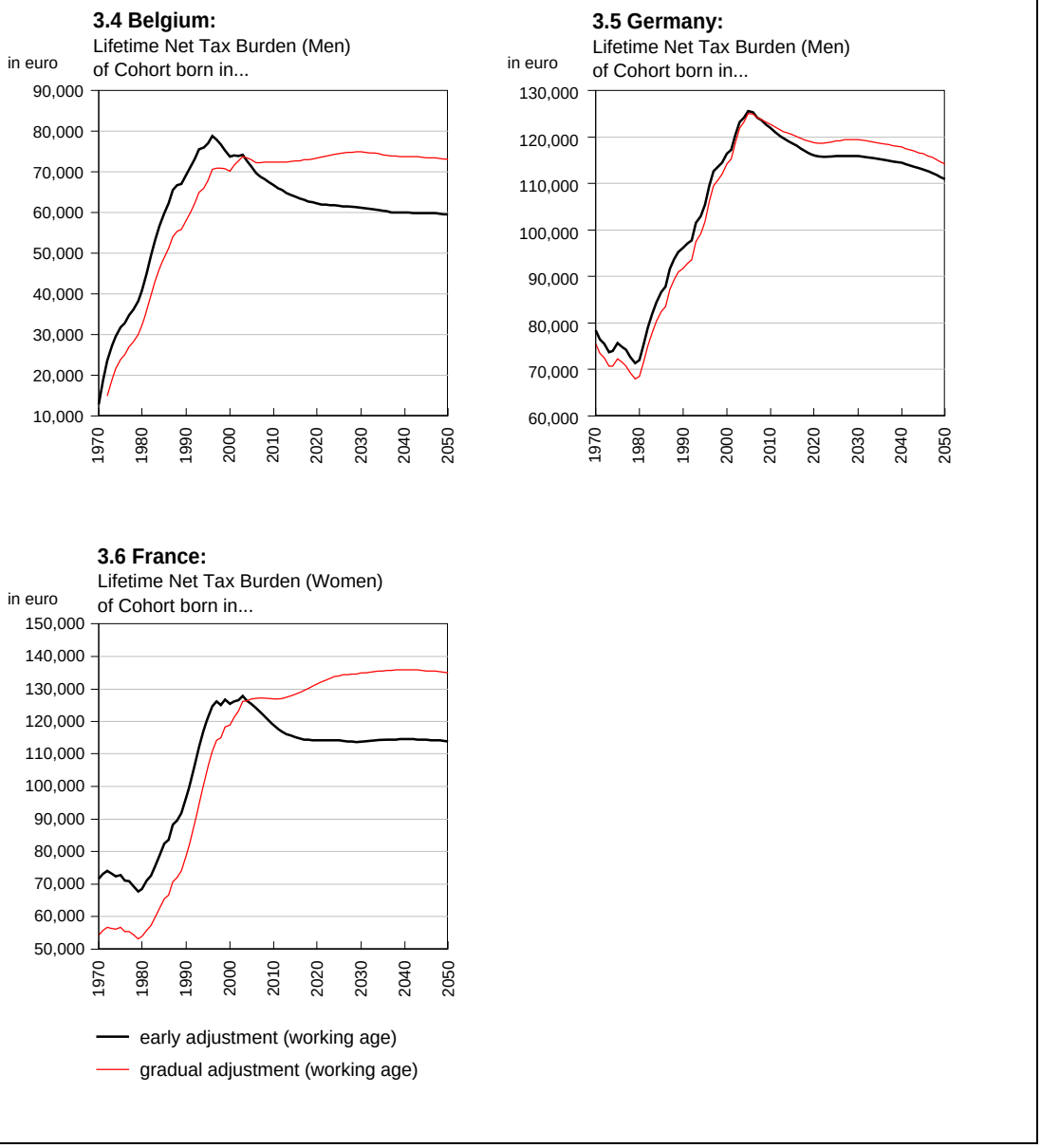
3.3.2 Sensitivity Analysis

In order to test the robustness of our results, we performed several sensitivity analyses. First, we tested the impact of an alternative assumption on the distribution of the adjustment burden over the different age groups. In fact, it seems quite reasonable to expect that the adjustment burden will not be spread out evenly over all age-classes but will be concentrated on the population of working-age. Indeed, it is a well established outcome of fully-fledged generational accounting studies that the working-age population bears the highest net tax burden. We therefore ran a scenario with the adjustment burden only on persons between 20 and 59 years old. The outcome can be taken as an indication of the intergenerational burden distribution when sustainability is achieved e.g. by increasing social security contributions. Graphs 3.4 to 3.6 show that the date after which newborns would prefer the early adjustment to the gradual strategy falls about a decade earlier for all three countries. Moreover, the difference between the two strategies increases for earlier-born cohorts. Nevertheless, the intergenerational distribution indicators depicted in table 3.2 indicate that the basic conclusion that early adjustment entails a more even distribution continues to hold. Indeed, all indicators except for the maximum burden for Belgium and Germany support this finding.

Table 3.2: Intergenerational distribution indicators (adjustment burden on persons aged 20-59)

	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
Belgium								
Women	69,500	71,800	14,300	18,400	21.8	26.9	87,400	80,800
Men	66,000	70,600	13,800	18,800	23.2	29.9	78,800	74,900
Germany								
Women	58,000	60,900	30,100	31,400	25.6	26.6	144,300	143,700
Men	54,300	57,100	27,000	28,400	26.5	27.8	125,600	125,000
France								
Women	59,900	82,600	18,600	31,400	17.5	28.6	127,700	135,800
Men	55,900	82,300	17,200	29,900	20.4	34.1	102,700	112,500

* In euros, deflated by per capita GDP growth



We also tested the robustness of our results with respect to the assumption of constant population size and structure after 2050. This assumption is clearly unrealistic. It would involve not only a sudden jump in fertility rates but also high migration for some age groups. As it turns out, explicitly forecasting the population after 2050 actually reinforces our conclusions (see graphs 3.7 and 3.8 as well as table 3.3). For Germany, when the mortality, fertility and migration rates projected by the AWG for 2050 are also applied to the following years,[39] the early adjustment strategy is preferred according to all intergenerational distribution indicators. The true burden of the cohorts born between 1980 and 2040 is overestimated in the constant population scenario. For France, the changes are less pronounced but go in the same direction.[40]

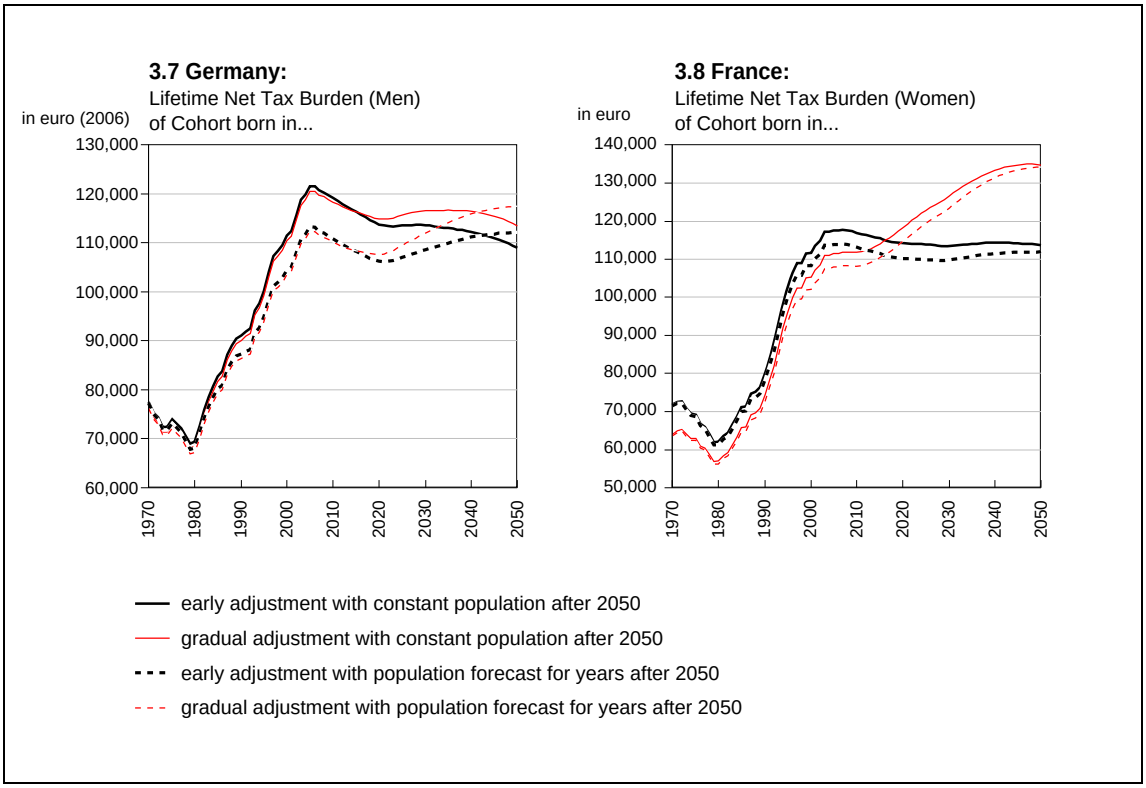
39 With the population forecast the overall population falls to 58.0 million and the dependency ratio to 51.8% by 2100 compared to 75.4 million and 53.1% with a constant population.

40 We did not run this exercise for Belgium.

Table 3.3: Intergenerational distribution indicators (with population forecast for years after 2050)

	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
Germany								
Women	53,100	59,500	30,400	32,100	25.9	27.3	137,800	140,700
Men	47,000	52,200	25,800	27,500	26.2	27.7	117,100	119,000
France								
Women	52,700	78,100	18,800	26,300	19.1	25.9	113,900	134,300
Men	44,800	68,400	16,300	23,700	22.3	31.4	87,200	105,000

* In euros, deflated by per capita GDP growth



As a third sensitivity test, instead of making net tax burdens of different cohorts comparable by adjusting for the increase in GDP per capita between the respective birth years, lifetime net tax rates can be calculated which show the relation between the present value of lifetime net tax payments and the present value of lifetime GDP per capita. The latter was calculated by discounting back to the year of birth GDP per capita observed over the lifetime taking into account survival probabilities. As shown for Germany, in this case the lines are smoother and the shapes also change somewhat. In the 1970s, the burden now increases for later-born cohorts while it falls in the baseline scenario (graph 3.9). This seems to be related to the negative interest growth differential that prevailed for many years of that decade and which distorts the picture somewhat in the baseline. Our basic conclusion, however, again remains untouched (table 3.4).

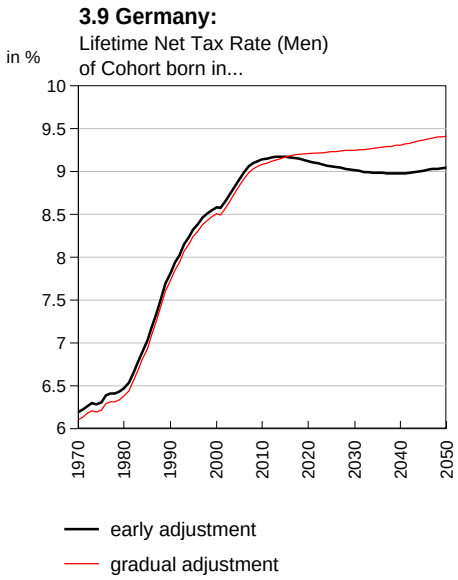


Table 3.4: Intergenerational distribution indicators (lifetime net tax rates)

	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
Germany								
Women	3.0	3.3	2.2	2.2	24.1	24.6	10.2	10.4
Men	3.0	3.3	2.0	2.1	24.8	25.5	9.2	9.4

* In euros, deflated by per capita GDP growth

The choice of the discount rate is a tricky question which has often been discussed in generational accounting studies.[41] In our baseline scenario we used the interest rate assumed by the AWG for future years for discounting (real interest rate of 3% and inflation of 2%). For the past we relied on the yield on long-term bonds issued by the respective government. Thus, the real discount rate is not constant over the whole period. As a first step towards a sensitivity analysis concerning the discount rate it was assumed that the real discount rate was constant from 1970 onwards at 3% while leaving past inflation untouched. In the result, cohorts' burdens are roughly unchanged compared to the baseline, with the largest changes obviously arising for older cohorts, and lines for the two scenarios cross in the same year (see chart 3.10). Moreover, our basic conclusion again remains unchanged (table 3.5). The second step of the discount rate sensitivity analysis was to change the level of the constant discount rate to 5%.[42] This leads to two conclusions. First, cohorts' burden is now lower than in the baseline scenario (or the 'constant 3% scenario'), especially for cohorts born after the 1990s. Thus, assuming a higher discount rate gives the impression that intergenerational distribution is more even (see the direct comparison of the coefficient of variation with 3% and 5% in table 3.5). The second and more important conclusion is that when we assume a constant 5% discount rate the lines cross more or less at the same time as in the baseline scenario (2023 vs. 2016) and early adjustment still entails a more even distribution (see chart 3.11 and table 3.5).

41 See for example Accardo (1998) for France.

42 This implies that for years after 2008 there is no identity anymore between the discount rate and the interest rate which is used to calculate the government interest burden.

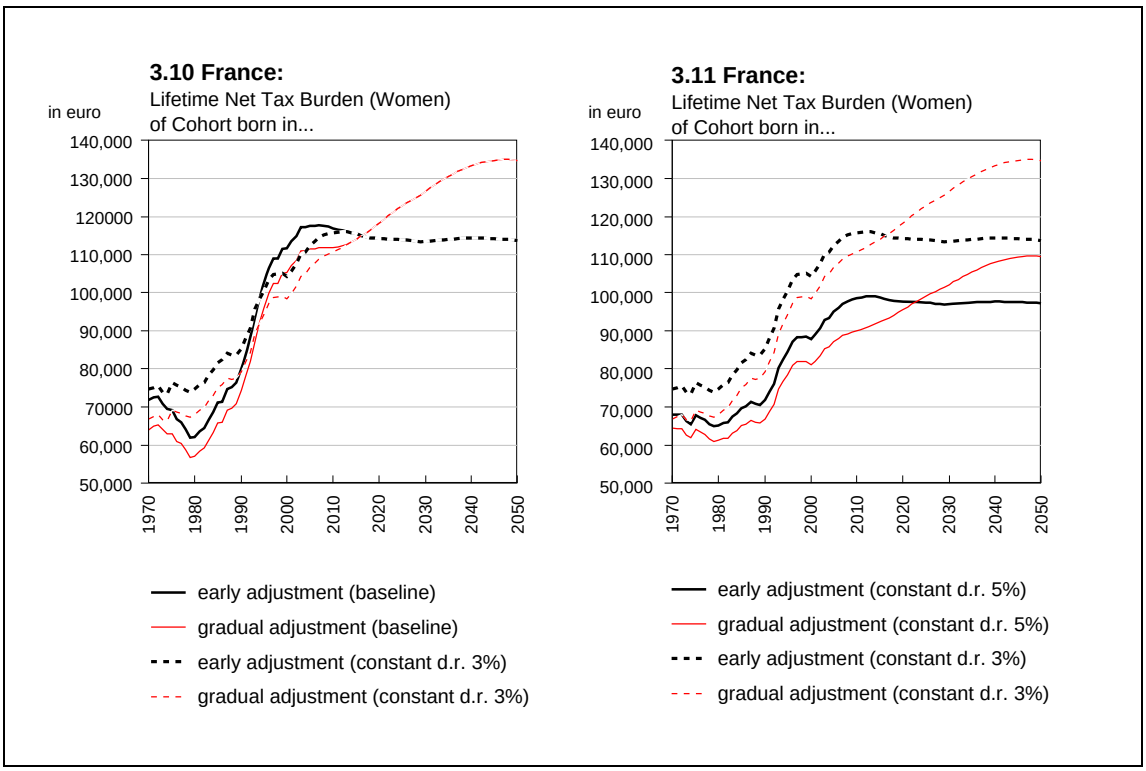


Table 3.5: Intergenerational distribution indicators (constant discount rate from 1970 onwards)

France	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
constant d.r. 3%								
Women	42,600	68,600	15,900	24,000	15.5	22.9	116,000	134,900
Men	43,000	68,800	15,900	23,900	20.3	29.9	91,500	109,400
constant d.r. 5%								
Women	34,200	48,600	12,900	16,900	14.7	19.4	99,100	109,600
Men	34,300	48,600	13,000	17,000	15.7	20.6	94,400	104,800

* In euros, deflated by per capita GDP growth

Finally, a first small step towards the outcome of a fully-fledged generational accounting exercise can be taken by distributing the burden of the sum of all budget categories not considered to be age-specific by the AWG to persons aged between 20 and 99 years in the scenario with an explicit population forecast for the years after 2050. With the impact of old-age expenditure like pensions, health and long-term care and education for the young determined separately, this is more in line with the age-profiles obtained in generational accounting studies. In this scenario the results change substantially, as illustrated by the case of Germany (chart 3.12). The overall burden is much lower now, backing our earlier note of caution on the reliability of absolute numbers. Moreover, the pattern over cohorts also changes somewhat. The increase for cohorts born after 1980 ends earlier and is significantly less steep. Moreover, the crossing of the lines for early and gradual adjustment occurs almost two decades earlier. However, our basic conclusions not only continue to hold but are actually reinforced (table 3.6).

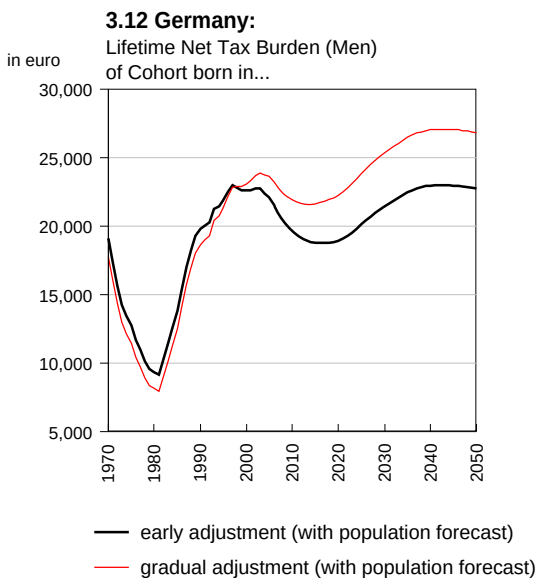


Table 3.6: Intergenerational distribution indicators (budget categories assumed to be non-ageing-related by AWG allocated to persons aged 20-99, with population forecast for years after 2050)

	Maximum burden minus minimum burden*		Standard deviation*		Coefficient of variation		Maximum Burden*	
	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment	Early Adjustment	Gradual Adjustment
Germany								
Women	21,700	27,100	10,600	12,100	26.6	29.0	47,700	52,000
Men	13,800	19,100	5,600	7,100	29.7	34.5	23,000	27,100

* In euros, deflated by per capita GDP growth

Overall, the conclusions derived under the baseline scenario seem to be quite robust with respect to a variety of conceivable variations in underlying parameters and assumptions. From the perspective of intergenerational burden distribution, a rapid adjustment of the primary balance to a sustainable level seems to be preferable to a more gradual approach. Nevertheless, care needs to be exercised when interpreting the results. Data restrictions only allowed us to compare cohorts born since 1970. So a substantial part of the living population could not be included in the analysis.[43] Moreover, even for this period the underlying data are sometimes of poor quality or had to be estimated. Finally, whether a specific intergenerational distribution is preferred depends on normative presumptions that could be questioned.

43 These cohorts might be expected to be less affected by the budgetary consequences of demographic ageing. However, an extension to cohorts born since 1960 for France had little impact on the results.

Conclusion

In this paper we analyse (budgetary policy responses to) fiscal sustainability against the backdrop of population ageing. With respect to the budgetary costs of ageing, the projections carried out by the AWG, which was established within the EU's Economic Policy Committee, can be considered as an important reference point. In its 2006 report (EPC and EC, 2006) the AWG estimates, on the basis of a scenario taken as a reference, that ageing-related changes in five specific expenditure categories – pensions, health care, long-term care, unemployment and education – can work out at an increase of the expenditure ratio of slightly more than 4% of GDP for the EU and close to 4.5% of GDP for the euro area[44] in the 2010-2050 period. However, such long-term projections typically come with a very large degree of uncertainty.

After a detailed assessment of the projections for the ageing-related expenditure increases for individual countries, we illustrate the upside risks to the AWG's headline projections via a harmonised mechanical exercise that is mainly based upon the sensitivities reported for alternative scenarios considered by the AWG. This exercise incorporates, if applicable, more recent estimates for the further increase in life expectancy by 2050; assumes that the income elasticity of health care expenditure would remain constant at 1.1 throughout the projection period rather than converge to 1 by 2050 as in the AWG headline scenario; and takes into account an increasing importance of the formal sector in the provision of elderly care due to changing family structures and rising female participation rates. It shows, in particular, that plausible alternative assumptions on key parameters in the projections could significantly increase the AWG estimates of ageing-related increases in government expenditure in the 2010-2050 period.

We consider a number of quantitative sustainability indicators to assess the sustainability of public finances in euro area countries against the backdrop of population ageing. While there is no clear-cut theoretical benchmark for fiscal sustainability, the 'conventional wisdom' is that continuously rising and/or extremely high debt ratios are unsustainable. Hence, in practice, quantitative indicators of sustainability gaps typically attempt to measure the fiscal effort required by a certain date to bring the debt ratio back to a sustainable path or level taking into account the projected budgetary impact of ageing and a set of assumptions (e.g. concerning the macroeconomic environment, the implicit interest rate on public debt and deficit-debt adjustments). We argue that the two quantitative indicators that are routinely considered by the EC (and that impose a 60% and a stable debt ratio by 2050 respectively) may be complemented by other indicators, e.g. imposing a balanced budget by 2050.

While the exact numbers may differ significantly depending on the sustainability indicator used, the ranking of the countries on the basis of their sustainability gaps is relatively robust. Countries that currently record high fiscal surpluses (e.g. Finland) or have undertaken more important structural reforms to their pensions systems (e.g. Germany, Austria and Italy) tend to experience lower sustainability risks. All indicators confirm that, of the countries considered here (the euro area minus Slovenia, Malta and Cyprus), public finances are currently only sustainable in Finland. All other countries will have to adjust their fiscal policies sooner or later.

Quantitative sustainability indicators such as those considered in this paper typically measure the size of a relatively 'early' adjustment effort aimed at closing the sustainability gap. However, this should not be interpreted as a policy recommendation: the indicators do not imply anything about the appropriateness of such an early adjustment effort to restore fiscal sustainability compared to e.g. that of a more gradual approach. In this connection, it should be stressed that, for many countries, implementing such an early adjustment effort would lead to high surpluses in the coming years and a rapid reduction of public debt ratios (and, in some cases, the building up of net financial asset positions).

---

44 As the Report was published in the beginning of 2006 the EU excludes Romania and Bulgaria while the euro area excludes Slovenia, Cyprus and Malta.

The appropriateness of any specific budgetary strategy needs to be assessed on the basis of pre-defined criteria. If intergenerational equity is considered to be a relevant criterion in this respect, generational accounts or, more specifically, the total lifetime contribution of generations born in different years to the government's primary balance may be an important indicator to assess the relative merits of alternative budgetary strategies. In this connection, the intergenerational implications of an 'early' adjustment strategy (an increase in the primary balance by 2015 that is sufficient to absorb the ageing costs and still end up with a balanced budget in 2050) are compared to those of a corresponding 'gradual' approach (that spreads out the fiscal adjustment over the whole 2008-2050 period) for three countries – Belgium, France and Germany – in this paper.

A number of tentative conclusions can be drawn from the evolution of the total lifetime burden in this empirical exercise. First, a gradual adjustment is typically more favourable for older generations than for generations born after a certain date. Second, this date falls later, i.e. generations that are worse off under the gradual strategy are further away in the future if all generations contribute to the fiscal adjustment than if only generations of working age do. Third, the 'early' adjustment strategy, implying significant government surpluses in the coming years for the three countries considered, generally leads to flatter time profiles of the total lifetime burden – and, hence, may be considered more equitable – than the 'gradual' fiscal adjustment.

While these findings have to be interpreted with caution, not least due to data limitations, they are of particular relevance for the aforementioned upcoming revision of the medium-term objectives for fiscal policy defined in the context of the Stability and Growth Pact. If intergenerational equity is considered to be an important guiding principle in this respect, it could be made operational along the lines suggested above. If our tentative results were confirmed, e.g. with a more complete dataset, and if no further cost-cutting reforms to pensions and care systems are implemented, an upward revision of these medium-term objectives to significant surpluses may then be warranted for many EU Member States.

List of references

Accardo, J (1998), *Une étude de comptabilité générationnelle pour la France en 1996*, Documents de travail de l'INSEE G9802.

Auerbach, H., J. Gokhale and L. J. Kotlikoff (1994), *Generational Accounting: A Meaningful Way to Evaluate Fiscal Policy*, Journal of Economic Perspectives, vol. 8, pp 73-94.

Auerbach, H., J. Gokhale and L. J. Kotlikoff (1995), *Restoring generational balance in US fiscal policy: what will it take?,* Federal reserve bank of Cleveland Economic Review, vol. 31, pp 2-12.

Balassone, Fabrizio and Daniele Franco (2000), *'Assessing fiscal sustainability: a review of methods with a view to EMU' in Banca d'Italia, 'Fiscal sustainability'*, essays presented at the Banca d'Italia workshop held in Perugia, 20-22 January 2000

Barro, R. (1979), *On the Determination of the Public Debt*, Journal of Political Economy, pp 940-971.

Blanchard, O., J.C. Chouraqui, R.P. Hagemann and N. Sartor (1990*), 'The sustainability of fiscal policy: new answers to an old question*', OECD Economic Studies, No. 15,

Bonin, H. (2001), *Generational Accounting, Theory and Application*, Berlin et al.Buiter, W.H., 'A guide to public sector debt and deficits', Economic Policy, No. 1, 1985

Delbecque, Bernard and Henri Bogaert (1994), *'L'incidence de la dette publique et du vieillissement démographique sur la conduite de la politique budgétaire: une étude théorique appliquée au cas de la Belgique*', Bureau du Plan, Planning Paper No. 70, November

Domar, E.D., 'The burden of the debt and the national income', American Economic Review, December 1944

Dormont, B., Oliveira Martins, J., Pelgrin, F. and Suhrcke, M. (2007), *Health expenditures, longevity and growth*, paper presented at the IX FRDB European conference on "Health longevity and productivity", Limone sul Garda (Italy), 26 May

European Commission, 'Public Finances in EMU - 2007', European Economy, Volume 3, June 2007

European Commission, 'Public Finances in EMU - 2008', European Economy, Volume 4, June 2008

European Commission, *'The long-term sustainability of public finances in the European Union'*, European Economy Volume 4, October 2006

Economic Policy Committee and the European Commission (2006), *The Impact of Ageing on Public Expenditure: Projections for the EU25 Member States on Pensions, Health Care, Long-term Care, Education, and Unemployment Transfers*, European Economy – Special Report n°1, Brussels.

Franco, D. and T. Munzi (1997), *Ageing and Fiscal Policies in the European Union*, European Economy - Reports and Studies, No. 4, Brussels.

G10 (1998), *The macroeconomic and financial implications of ageing populations*.

G10 (2005), *Ageing and pension system reform: implications for financial markets and economic policies*, in OECD, Financial markets trends, no. 2.

Hauner, D., D. Leigh, and M. Skaarup, (2007), *Ensuring Fiscal Sustainability in G-7 Countries*, IMF Working Paper 07/187.

Heller, P.S., R. Hemming and P. Kohnert (1986), *Ageing and Social Expenditures in the Major Industrialised Countries, 1980-2025*, IMF Occasional Paper, No. 47.

Haveman, R. (1994), *Should Generational Accounts Replace Public Budgets and Deficits?*, Journal of Economic Perspectives, vol. 8, No. 1, pp. 95-111.

Human Mortality Database, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at http://www.mortality.org or http://www.humanmortality.de.

Kilponen, J. , Kinnunen, H. and Ripatti, A. (2006) *Population ageing in a small open economy – some policy experiments with a tractable general equilibrium model,* Discussion Papers, Bank of Finland 28/2006

Knell, M., W. Köhler-Töglhofer, D. Prammer (2006), *The Austrian Pension System – How recent reforms have changed fiscal sustainability and pension benefits, Monetary Policy and the Economy* Q2/06

Langenus, G. (2006), *Fiscal sustainability indicators and policy design in the face of ageing*, Working Paper, Research Series, National Bank of Belgium, No. 102, October 2006.

Langenus, G. and B. Eugène (2005), *Fiscal policy setting in a forward-looking environment: the case of Belgium, in Les finances publiques: défis à moyen et long termes*, papers presented at the 16th Congress Congrès des Economistes belges de Langue française, CIFOP.

Leibfritz, W., D. Roseveare, D. Fore and E. Wurzel (1995), *Ageing Populations, Pension Systems and Government Budgets: How Do They Affect Saving?*, OECD Working Paper, No. 156, Paris.

Lundback, E., D. Kanda, A. Tieman (2007), *Austria: Selected Issues*, IMF Country Report No. 07/143 (available at: http://www.imf.org/external/pubs/ft/scr/2007/cr07143.pdf).

Manzke, B. (2002), *The long-term sustainability of public finance in Germany – an analysis based on generational accounting*, Economic Research Centre of the Deutsche Bundesbank, Discussion Paper 10/02.

Oliveira Martins, J., C de la Maisonneuve (2006), *The drivers of Public expenditure on health and long-term care: an integrated approach*, OECD Economic Studies, vol. 43 (2), pp. 115-154. . Study Group on Ageing (2007), Annual Report,

Pinheiro, M. and Cunha, V. (2007), *MISS: A model for assessing the sustainability of public social security in Portugal*, Banco de Portugal Occasional Working Paper no. 2.

Raffelhüschen, B. (1999), *Generational Accounting: Method, Data and Limitations*, in: European Commission (ed.), Generational Accounting in Europe, European Economy - Reports and Studies No. 6.

Rawls, J. (1971), *A Theory of Justice*, Cambridge.

Rosen, H.S. (1999), *Public Finance*, 5th ed., Boston et. al.

Visco, I. (2006), *Longevity risk and financial markets*, keynote speech to the 26th SUERF colloquium, Lisbon, 12-14 october.

Werding, M. and A Kaltschütz (2005), *Modellrechnungen zur langfristigen Tragfähigkeit der öffentlichen Finanzen*, ifo Beiträge zur Wirtschaftsforschung, Munich

ANNEX (country fiches)

Fiche on AWG projections for Belgium

1. Description

The AWG projections for Belgium are based upon a projected increase in the old age dependency ratio from 26.2% in 2004 to 47.1% in 2050. Population of working age would decline by some 550,000 units (more than 8%) between 2004 and 2050. However, this decline would be fully 'absorbed' by the projected fall in unemployment and employment would even rise marginally in the period considered. Hence, average yearly activity growth would be very close to the assumed annual increase in labour productivity (some 1.7%).

Against this background, the ageing-related expenditure increase between 2010 and 2050 is estimated at 6.6% of GDP. The bulk of the increase (about 5.1% of GDP) is accounted for by pension outlays. Health care spending is projected to increase only moderately (by around 1.2% of GDP) while long-term care would rise by 0.9% of GDP by 2050. Outlays for both unemployment and education spending would fall by some 0.2% of GDP in the 2010-2050 period.

2. Comparison with alternative projections

In order to assess the risks of the AWG projections, a comparison with the national projections carried out by the Study Group on Ageing (that works under the responsibility of the High Council of Finance) may be useful. According to the most recent annual report of this Study Group (June 2007)[45], ageing costs would amount to some 5.6% of GDP between 2010 and 2050, i.e. significantly lower than estimated by the AWG. The Study Group projects a much lower growth of pension outlays (accounting for a difference of around 0.8% of GDP) and a much steeper fall in unemployment expenditure (accounting for a difference of some 0.6% of GDP) and, unlike the AWG, also explicitly takes account of the projected decline (of 0.4% of GDP in the period considered) in the outlays for family allowances. However, this difference between the AWG and the Study Group estimates is partially offset by more buoyant health care expenditure in the Study Group's projections (some 0.7% of GDP higher than in the AWG scenario) and the fact that the latter projections do not include the projected decline in education expenditure in the ageing costs although they are mentioned *pro memoria* (with the Study Group projecting a roughly similar decline as the AWG).

With respect to the demographic hypotheses, a marked difference pertains to the migration assumptions. While total net immigration is significantly higher in the AWG projections, the age structure is more favourable in the Study Group projections: in the latter, net immigration in the age group from 15 to 39 years is higher but this is more than offset by lower immigration for older age groups. Mainly because of this different view on the age structure of migration, the demographic dependency ratio would rise less in the Study Group projections (to 45.4% by 2050) than in the AWG ones despite the considerably higher 2050 life expectancy assumptions used in the former (a difference of nearly 2 years for men and more than 2 years for women).

In addition, the Study Group projects a much more dramatic fall in the unemployment rate than the AWG: despite a much smaller fall in the population of working age by 2050, the decrease in the number of unemployed would be considerably higher than that projected by the AWG (some 325,000 units compared with 150,000).

Finally, contrary to the AWG, the Study Group incorporates the measures contained in the so-called Generation Pact (adopted in December 2005). The latter primarily aim at discouraging and restricting early retirement. According to the Study Group, they would have a (limited) favourable impact on the employment rate.

All in all, employment growth would be slightly more buoyant in the Study Group scenario. As the assumptions with respect to labour productivity growth are roughly similar in both projections, this would translate into slightly

45 Available at: http://docufin.fgov.be/intersalgfr/hrfcsf/adviezen/PDF/viellissement_2007_06.pdf

higher activity growth in the Study Group projections (more than 1.7% on average in the 2010-2050 period compared to 1.65% in the AWG projections).

With respect to pension expenditure, both projections use the same methodology and social policy assumptions (notably concerning the real increase in pension entitlements by 0.5% a year - in addition to their full indexation to prices - implying a strong relative decline of an individual pension with respect to the average wages through time). The different evolution of pension expenditure relative to GDP can be mainly traced back to the differences in macroeconomic and demographic assumptions, particularly concerning the more favourable demographic dependency ratio and employment rate in the Study Group projections.

The difference between both projections with respect to health care expenditure (including long-term care) is of a methodological nature. The Study Group essentially takes into account a 'mechanical' impact of ageing by assuming that spending profiles by age cohort and sex remain constant while the increased life expectancy in the AWG reference scenario is partly matched by a higher number of years spent in good health. In addition, the impact of non-demographic factors would be more limited in the AWG projections, witnessed by a lower income elasticity of health care spending (declining from 1.1 in 2005 to 1 by 2050). An alternative scenario presented by the AWG (the 'positive income elasticity of demand' case) is methodologically closer to the Study Group's approach as it assumes constant consumption profiles by age cohort (but still takes into account a lower income elasticity than the Study Group) and indicates a slightly more buoyant growth in health care expenditure: the increase in the 2010-2050 period would be about 0.3% of GDP larger than in the AWG reference scenario but still some 0.6% of GDP below that projected by the Study Group.

Finally, the more substantial drop in unemployment expenditure in the Study Group scenario results primarily from the slightly more benign macroeconomic assumptions and to a lesser extent from the fact that the Study Group takes into account a limited fall in the replacement ratio (compared to a constant level in the AWG projections).

3. Risk assessment

Overall, a simple comparison of the AWG projections with a relevant national alternative seems to suggest that projections of ageing costs for Belgium come with a large degree of uncertainty. Choosing the least favourable projection for each expenditure category (i.e. essentially replacing the AWG projection for health care and long-term care by the Study Group alternative and not incorporating education expenditure) would imply that ageing costs could be as high as 7.6% of GDP in the 2010-2050 period. Alternatively, choosing the most favourable projection for each expenditure category would imply an estimate of the ageing costs of around 4.6% of GDP for the same period.

However, the set of both projections does not necessarily reflect the boundaries of uncertainty as even the least favourable of the AWG and Study Group projections for individual expenditure categories may come with upside risks.

In this context, one could question, for instance, whether the steep decline in the ratio between an individual pension and the average wage through time - implied by both the AWG and the Study Group projections - will be socially and politically sustainable, particularly in view of the growing importance of pension beneficiaries in the voting population. In this connection, the 2005 Report of the Study Group on Ageing indicates that an additional increase in real pensions by 0.5% a year would raise total ageing costs by 0.6% of GDP in the 2005-2030 period (no estimate is available for the post-2030 period). Hence, a simple rule of the thumb suggests that indexing pensions to nominal gross wages would raise the estimates of ageing costs by some 1.5% of GDP in the 2005-2030 period alone. The additional expenditure may amount to roughly 2.5% of GDP if the 2010-2050 period is considered.

In addition, both projections do not take into account a potential shift to the formal sector in long-term care due to changes in family size and female labour force participation rates. According to an alternative scenario considered by the AWG, this could push up ageing costs in the 2010-2050 period by 0.2% of GDP.

Finally, the Study Group's projection of health care expenditure may be significantly less favourable than the AWG's but it still implies a more limited impact of non-demographic factors than that observed in the most recent decades. Against that background, the assumption in the AWG reference scenario of a declining income elasticity, from 1.1 in 2005 to 1 by 2050, may seem somewhat optimistic.

Hence, while the AWG estimate of 6.6% of GDP is in the upper half of the aforementioned [4.6;7.6] interval, downside risks are not necessarily predominant. In this context, it should be stressed that the lower estimates for

pension and unemployment expenditure in the Study Group projections - that strongly determine the lower bound of the interval - are mainly driven by more benign macroeconomic assumptions that, for instance, were described as being 'on the sanguine side' by the IMF (2007).[46] In addition, the Study Group explicitly acknowledges that the projected decline in the unemployment rate would require 'an active labour market policy' and may therefore not be consistent with a strict constant policy assumption.

All in all, a cautious alternative headline estimate for ageing costs may be constructed by:

- keeping the AWG macroeconomic projections and expenditure estimates for pensions and unemployment and education expenditure;
- taking into account a shift to the formal sector as in the aforementioned AWG alternative scenario;
- and keeping the income elasticity used in the health care projections constant at 1.1 (rather than the gradual decline to 1 incorporated in the AWG reference scenario)[47].

This would amount to an ageing-related expenditure increase of some 7% of GDP in the 2010-2050 period. Taking into account a full indexation of individual pension entitlements to average wages could push this ageing cost up to around 9.5% of GDP.

46 Belgium: 2006 Art. IV Consultation - Staff Report', IMF, March 2007 (http://www.imf.org/external/pubs/ft/scr/2007/cr0789.pdf).

47 The impact of an increase in the income elasticity from 1.05 (assumed in the reference scenario) to 1.1 on average over the 2010-2050 period can be roughly estimated on the basis of a comparison of the AWG 'pure ageing' and 'positive income elasticity of demand' scenarios that take into account income elasticities of 1 and 1.05 respectively and would work out at around 0.2% of GDP.

Fiche on AWG projections for Germany

1. General description

The latest AWG projections for Germany are based on a demographic scenario which implies a limited decline in the overall population of 6.5% between 2010 and 2050. However, the age structure will change dramatically with the dependency ratio increasing from 30.7% to 51.7%. The population of working age will shrink by 18.0%, while the elderly population will increase by 37.9%. However, the assumed increase in participation rates and the fall in structural unemployment will limit the decline in the number of employed persons to 13.4%. Overall, potential GDP growth should slow down from 1.7% to 1.2% per year despite an expected increase in labour productivity.

It is projected that the ratio of ageing-related expenditure to GDP will increase by 3.9 percentage points between 2010 and 2050, about the average for the EU and the euro area. While pension, health care and long-term care expenditure will increase by 2.6 percentage points, 0.9 percentage point and 1.0 percentage point respectively, expenditure for unemployment benefits and education is actually expected to fall by 0.2 and 0.3 percentage point.

2. Comparison with alternative projections and risk assessment

In order to assess the sensitivity and reliability of the results obtained by the AWG, the underlying assumptions as well as the outcome are compared with other available studies, especially a national study conducted by the Ifo Institute.[48] With regard to the underlying *demographic development*, the projection employed by the AWG assumes a slower increase in life expectancy than the latest official population projection by the Federal Statistical Office.[49] This seems to be one of the main reasons why the AWG scenario shows a significantly lower dependency ratio in 2050. According to a sensitivity test performed by the AWG, a further increase in life expectancy at birth by 1.6 years for men and 1.3 years for women between 2010 and 2050 – which would largely match the Federal Statistical Office's assumptions – would imply an additional increase in ageing-related expenditure of approximately 0.5 percentage point in 2050 (0.2 percentage point for pensions, 0.2 percentage point for health care and 0.1 percentage point for long-term care). Even this scenario might still underestimate the decline in mortality rates as it implies an increase in life expectancy which is considerably lower than the almost linear increase of 2½ months per year observed in past decades. Moreover, there is a risk that net migration, which is anticipated to alleviate the decline in the population, might turn out to be considerably lower than expected.

Concerning *macroeconomic assumptions*, the AWG projections regarding the participation rate are similar to those in the Ifo study with a somewhat higher starting level assumed for 2010 being offset by a slower increase afterwards. In any case, the impact of changes in the assumed employment rate on pension expenditure would be limited, according to the sensitivity analyses performed by the AWG.[50] Labour productivity is anticipated to grow at a similar rate in both studies. The baseline assumptions on unemployment by the Ifo study deviate markedly from those by the AWG. However, the Ifo study authors themselves regard the baseline assumption, which is taken from a report by the Rürup Commission, as being potentially too optimistic. In their risk scenario, they therefore use a long-term unemployment rate quite similar to that used by the AWG.

Turning to individual expenditure items, the increase in *pension expenditure* between 2010 and 2050 projected in the Ifo study (3.0 percentage points) is slightly higher than the increase in the AWG reference scenario. Numerous differences in the assumptions and the methodology of the two studies make it difficult, however, to trace the driving factors behind this discrepancy. Disregarding convergence of currently comparatively high pensions in East Germany to western levels as in the Ifo study should, for example, lead to an upward bias for pension expenditure increases. Risks related to already enacted legislation changes not taken into account in the AWG calculations

48 See M. Werding and A. Kaltschütz (2005), Modellrechnungen zur langfristigen Tragfähigkeit der öffentlichen Finanzen, ifo Beiträge zur Wirtschaftsforschung, Munich.

49 Benefiting from higher net migration assumptions for the initial years, total population nevertheless is higher in the AWG scenario. See Statistisches Bundesamt (2006), Bevölkerung Deutschlands bis 2050, Wiesbaden. Reference is made here to the 1-W2 variant. The Ifo study is based on an older projection by the Federal Statistical Office.

50 With a lower employment rate, GDP would be lower than in the baseline, but pension expenditure would also be dampened in the long run as fewer people would accrue pension rights. Moreover, the sustainability factor included in the pension adjustment formula leads to lower pension increases if employment falls. The effect of lower employment on other ageing-related expenditure has not been calculated by the AWG. The results of the risk variant of the Ifo study nevertheless suggest limited effects.

appear to be slightly on the downward side, according to the current perspective. A gradual increase in the statutory retirement age from 65 to 67 by the year 2029 – subject to a possible revision in future years – has now been enacted. This could lower pension expenditure by roughly ¼% of GDP in 2050.[51] While the assumption that the dampening factors built into the pension adjustment formula would always be effective and never subject to escape clauses presented a clear upward risk to the AWG expenditure projections at the time, legislation has now been enacted which ensures that any skipped adjustment will be made up for in later years.

Concerning health care and long-term care expenditure, non-ageing-related cost drivers can potentially play a large role in the future trend. Scenarios and sensitivity analyses performed by the AWG itself as well as in the Ifo study and by the OECD[52] suggest substantial uncertainty in this respect. In the AWG reference scenario, the increase in the *health expenditure* ratio (without the special scheme for civil servants) projected by the AWG for the 2005 to 2050 period is 0.6 percentage point and 0.5 percentage point lower than the increases anticipated by the OECD (cost containment scenario) and the Ifo study respectively. In the AWG reference scenario, an income elasticity of demand of 1.1 in the base year is assumed, converging to 1 in 2050. If income elasticity were to remain at 1.1 over the whole projection period, the increase in health expenditure would rise by 0.3 percentage point to 1.2 percentage points over the 2010-2050 period in the AWG projections.[53] The health reform of 2006, which has not been taken into account in the latest AWG calculations, will probably not have a pronounced effect on long-term expenditure developments.

For *long-term care*, the expenditure increase in the OECD projections is 0.2 percentage point higher than in the AWG reference scenario while there is almost no difference with respect to the Ifo study. A shift towards more formal long-term care would imply an increase in expenditure of 1.4 percentage points (2010-2050) according to AWG figures[54] and of 2.2 percentage points (2005-2050) according to the OECD's "increased participation" scenario compared to 1.0 percentage point in the AWG baseline. While the AWG calculations are based on a dynamic increase in long-term care expenditure per nursing case, unit costs so far were nominally fixed by law. However, legislation raising benefits has recently being enacted. In any case, it appears unlikely that expenditure per nursing case will remain unchanged until 2050.

3. Conclusions

All in all, a cautious alternative headline estimate for the increase in ageing costs may be obtained by adjusting the assumption on future life expectancy in the AWG reference scenario to that in the AWG high life-expectancy scenario. Health expenditure projections could be further adjusted to reflect a constant income elasticity of demand of 1.1. This also suggests an increase in health expenditure that is more in line with alternative studies. For long-term care expenditure, the AWG's increase in formal care assumption could be adopted. On the other hand, the estimated increase in pension expenditure could be reduced to take account of recent legislation changes. Adjusted in this way, the increase in the ageing-related expenditure ratio would amount to some 4.8 percentage points in the 2010-2050 period.

51 This estimate is based on policy simulations of an increase in the legal retirement age included in the November 2006 pension insurance report (Rentenversicherungsbericht), the Ifo study (additionally taking into account agreed exemptions) and calculations in German Council of Economic Experts, Jahresgutachten 2007/2008, p 180.

52 See J. Oliveira Martins, C. de la Maisonneuve, and S. Bjornerud, "Projections of OECD health and long-term care public expenditures", in Banca d'Italia (ed.), Fiscal Indicators, 2006. No figures are provided for 2010.

53 This increase is approximated by adding the difference between the increase in the AWG's positive income elasticity of demand and pure ageing scenario to the AWG's reference scenario.

54 This rise is approximated by adding the difference between the increase in the AWG's 'increase in formal care' and 'pure ageing' scenarios to the AWG's reference scenario.

Fiche on AWG projections for Greece

1. Description

According to the latest AWG projections for Greece, the overall population will decrease by 5.3% between 2010 and 2050. In contrast to this moderate decline, population of working age will shrink by some 1.7 million units (about 23%) over the same period, while the elderly population will grow by 66%. Due to this change in the age structure, the old-age dependency ratio will more than double from 28.0% in 2010 to 60.4% in 2050. As the decline in working age population is partly compensated by an increase in the labour force participation rate (by 1.4 percentage points, to 70%) and the fall in the unemployment rate (-1.6 percentage points, to 7.0%), the decrease in the number of employed persons is limited to 17.7%. Given that labour productivity is expected to slow down substantially, overall potential GDP growth is projected to fall from 2.9% to 0.8%.

Against this background, the AWG estimates that expenditure on health care will increase by 1.4percentage points between 2010 and 2050, while spending on education and unemployment benefits is expected to remain broadly stable. There are no AWG projections available for either pensions or long-term care.

2. Comparison with alternative projections

In order to give a rough idea of possible future expenditure on pension and long-term care in Greece, alternative projections are used, in particular those included in the Stability Programme Updates.

Projections for pension expenditure were included in Greek Stability Programmes up to the 2004/2005 Update. These figures were identical to the projections included in the 2002 Update of the Stability Programme, which were provided by the Hellenic Actuarial Unit. These projections mainly used the assumptions from the AWG 2001 Ageing Report[55] but took the effects of the 2002 pension reform into account. They showed an increase of 10.4percentage points over the period 2010-2050. The same document foresaw an increase in health care expenditure of 1.4% of GDP over 2010-2050. These forecasts assumed a smaller increase in the old age dependency ratio than the 2006 AWG projections (28 percentage points against 34percentage points, as a result of both lower life expectancy for women – almost a year – and a higher fertility rate – 1.6 versus 1.5). Moreover, the 2002 projections assumed a large increase in the overall participation rate (from 69.4% in 2010 to 77.1% in 2050, reflecting higher female participation) and a sharp reduction in the unemployment rate (from 11% in 2000 to 7% in 2010, further dropping to 5.5% in 2050). Both assumptions are much more favourable than the reference scenario adopted by the 2006 AWG.

Estimates for health and long-term care expenditure are provided by a recent OECD study[56]: and for health expenditure also by the 2006 AWG.

a) Under comparable assumptions concerning the quality of extra life years, income elasticity of health expenditure, and the evolution of health costs, OECD projections for health care are slightly more conservative than those made by the AWG. For instance, assuming healthy ageing, a unit income elasticity, and no cost effect, both the AWG and the OECD project an increase in the spending ratio of, respectively, 1.0 of GDP over the period 2004-2050 and 0.6% of GDP from 2005 to 2050. However, the slightly different AWG reference scenario points to an increase in health costs of 1.4percentage points over the period 2010-2050 (1.7% over 2004-2050), and different OECD scenarios point to expenditure increases of up to 2.8% of GDP over 2005-2050.

b) Baseline OECD projections assuming healthy ageing, zero income elasticity and a partial "Baumol effect" (i.e. that long-term costs per dependent increase by half of average labour productivity) indicate an increase of long-

---

55 Report by the Economic Policy Committee on budgetary challenges posed by ageing populations: the impact on public spending on pensions, health and long-term care for the elderly and possible indicators of the long-term sustainability of public finances (October 2001).

56 Oliveira Martins, Joaquim, Christine de la Maisonneuve and Simen Bjornerud, Projections of OECD Health and Long-term Care Public Expenditures, in Banca d'Italia, ed., Fiscal Indicators, 2006.

term care spending by 0.8 percentage points over 2005-2050. In the same scenario, an increase in older workers' participation rate to 70% (in line with the AWG assumptions) - and hence an increase in formal long-term care - results in extra spending amounting to as much as 2% of GDP over the projection period.

3. Risk assessment and summing up

The 10.4% of GDP increase over 2010-2050 projected by the Greek authorities in 2002 can only be taken as a lower bound due to the favourable demographic and macroeconomic assumptions. An IMF study following the 2005 Art. IV consultation, drawing also on earlier projection exercises by the Greek authorities, suggests that more realistic estimates would put the increase at 12% of GDP.57 This is largely in line with the result of the 2001 AWG Ageing Report and forecasts in the recent OECD Economic Survey of Greece (Paris, 2007)[58]. The OECD used the 2006 AWG updated projections for the dependency ratio and the employment rate for a revision of the Greek pension expenditure projections, while keeping the same profile for the pension benefit ratio as in the 2002 official Greek projections.

Although AWG health care projections do not appear over-conservative when compared to the OECD alternative, the underlying income elasticity of expenditure is rather low (1.1, declining to 1.0 over 2010-2050) compared to available estimates over different time spans (2.1 for 19972-2002; 1.6 for 1982-2002; 1.8 for 1992-2002). If, as a minimum, the elasticity were kept constant at 1.1 throughout the projection exercise, based on sensitivity provided by the AWG report, the spending ratio would increase by an extra 0.1 percentage point between 2010 and 2050.

Putting together all available information, age-related expenditure on pensions, health and long-term care may be expected to rise by close to 15.4% of GDP over the period 2010-2050, 12% of which for pensions, 1.5% for health care (correcting the AWG reference scenario for a constant income elasticity of 1.1) and 1.8%[59] for long-term care.

---

57 Christiane .L. Roehler, Greece: Issues in Pension Reform, in IMF (2006), Greece: Selected Issues, www.imf.org.

58 Summary available at www.oecd.org/eco/surveys/greece

59 Linear intrapolation of available data.

Fiche on AWG projections for Spain[60]

1. Description

The AWG projects that the old age dependency ratio for Spain will increase from 24.6%. in 2004 to 65.6% in 2050. However, the projected increase in the effective economic old age dependency ratio is even bigger, from 40% in 2004 to 88% at the end of the projection period. Population of working age would decline by around 6.2 million (more than 21%) between 2004 and 2050, which would be only partially offset by the projected fall in unemployment and higher labour market participation rates. As a result, the total labour force would contract by 1.6 million people and total employment would decline by some 646,000 units in the period considered. Hence, the average annual GDP growth rate would be 1.6%, slightly below the average labour productivity growth rate. However, average GDP growth would be well below that figure between 2030 and 2050, with growth rates at around 0.8%.

Against this background, age-related expenditure is expected to increase by some 8.9% of GDP between 2010 and 2050. The bulk of the increase is due to pensions (6.8% of GDP) and, to a lower extent, health care (2% of GDP). Long-term care expenditure would increase to a much lesser extent, by 0.3% of GDP, over the 2010-2050 period, while both unemployment benefits and expenditure on education are projected to decline marginally.

2. Comparison with alternative projections

No alternative national projections for total age-related expenditure are available for the AWG ones to be matched against. However, the Ministry of Labour and Social Affairs (MTAS) carries out projections on pension expenditure that can be used for comparison purposes. The last ones date back to July 2005. According to these projections, which only cover contributory pensions, outlays on pensions are expected to increase by 6.8% of GDP over the period 2010-2050.

By contrast, the AWG projections comprise both the contributory system and the system for military and central government employees (CPE), who have their own pension scheme administered by the State. Netting out the pension outlays for the latter system - that would go down by 0.4% of GDP between 2010 and 2050 - the contributory pension expenditure increase projected by the AWG amounts to 7.1% of GDP, 0.3%. higher than projected by the MTAS.

As regards the demographic scenario, the official national projections appear slightly more favourable. Total population is projected to increase by 2.7 million, compared to a 1.5 million rise in the AWG baseline demographic scenario. This difference stems mainly from higher net migration inflows in the national projections, especially until 2010. By contrast, life expectancy and, therefore, the elderly population aged 65 and above is projected to expand faster in the AWG demographic scenario.

The macroeconomic scenarios do not seem to be substantially different. Except for the period 2005-2010, when the MTAS projects higher real output growth, GDP growth turns out to be similar in both sets of projections. In addition, employment rates evolve in parallel until 2020 (from 2020 onwards, the MTAS does not make explicit the projection of this variable).

The higher pension expenditure in the AWG projections can be traced back to the behaviour of disability, widowhood, orphan and surviving relatives' pensions. However, old-age pension expenditure is higher in the MTAS projections - despite lower growth in the number of pensions - which suggests higher average pension benefits than in the AWG projections.

It is difficult to compare both projections from a methodological point of view in that the MTAS does not offer detailed information on its model. In principle, both use broadly the same social policy assumptions. Consequently, the main differences seem to be due to the different demographic scenarios.

---

60 Co-authored by Francisco de Castro Fernndez.

3. Risk assessment

Despite their high degree of uncertainty, the comparison with the MTAS ones might suggest that risks on AWG projections concerning pension expenditure would be broadly balanced. However, although more moderate than in other Member States, the decline in the benefit ratio (the ratio between the average pension and the average wage) might unveil an upward risk for the current pension projections. In this connection, any worsening of retirees' living standards together with their increasing share in the voting population might be socially and politically unsustainable.

Unfortunately, it is not possible to extend such a comparison to the other age-related expenditure items since there are no official projections. In any case, insofar as AWG health care expenditure projections reflect merely demographic factors and neglect the non-demographic drivers, the most important ones for explaining developments in this area in the recent decades, they may paint an optimistic picture. In this connection, it should be stressed that an alternative scenario presented by the AWG suggests that the increase in health care expenditure over the 2010-2050 period may be 0.2% of GDP higher than in the reference scenario if the elasticity of health care expenditure remains constant at 1.1 (instead of converging to 1 by 2050 as assumed in the reference scenario).

Upside risks may also prevail for the AWG projection of long-term care expenditure. In this respect, the AWG does not take into account the possible implications of the recently approved Dependency Law which establishes an obligation, under certain criteria, to provide formal care services to dependants. An alternative scenario presented by the AWG indicates that an increase in formal care could raise long-term care expenditure by 0.8% of GDP over the 2010-2050 period.

All in all, upside risks seem to dominate AWG projections, mainly on health and long-term care expenditure items. A cautious alternative headline estimate could consist of:

- keeping the AWG macroeconomic projections and expenditure estimates for pensions and unemployment and education expenditure;
- taking into account a shift to the formal sector as in the aforementioned AWG alternative scenario; and
- keeping the income elasticity used in the health care projections constant at 1.1 (rather than the gradual decline to 1 incorporated in the AWG reference scenario).

This would amount to an ageing-related expenditure increase of some 9.9% of GDP in the 2010-2050 period.

Fiche on AWG projections for France

1. Description

According to the latest AWG demographic projections, the French population is expected to continue its upward trend, increasing by 6% between 2010 and 2050 (+3.6 million inhabitants). In the meantime, the old-age dependency ratio[61] would climb from 25.8% in 2010 to 46.4% in 2050. Conversely, the share of working age population would decrease from 65.0% in 2010 to 57.5% in 2050. Nevertheless, the labour force would contract only slightly thanks to a rise in the participation rate and a fall in unemployment. Thus, GDP growth would be close to the growth of labour productivity.

Against this background, the increase in ageing-related expenditure ratio between 2010 and 2050 is estimated at 3.1 percentage points (pp), which is less than the average for the Euro area. Pension, health, long-term care outlays would respectively increase by 1.9 pp, 1.5 pp and 0.2 pp. Unemployment benefits and education spending would both slightly fall by 0.2 pp.

2. Comparison with alternative projections

2.1 The COR projections

The COR (Conseil d'Orientation des Retraites[62]) carries out its own pension projections on a national basis. The AWG projections and the COR projections rely on the same model but the economic and demographic assumptions are different. In particular, the COR demographic projections are issued from the national statistics institute (INSEE).

Comparison of different demographic projections used in pension expenditure forecasts

(central scenarios)	AWG (2006)		COR (2007)
Fertility rates	24:01.9	10:01.8	1.9
Annual migratory balance	2004: 63,882	2050: 58,718	100,000
Life expectancy at birth for men in 2050	82.3		83.8
Life expectancy at birth for women in 2050	87.9		89

The last COR forecast was released in November 2007. Compared to demographic projections used by the AWG, the fertility index and migratory balance assumed by the COR-INSEE are more favourable for working-age population and pension expenditure. Nevertheless, the higher life expectancy assumed by the COR raises the pension burden, all other things being equal.

Comparison of macroeconomic and labour force assumptions used in pension expenditure projections

(central scenarios)	AWG (2006)		COR (2007)	
Labour productivity growth	2005:1.2 ⇨2020:1.8	2025-2050:1.7	1.8 (from 2012 on)	
Real growth rate	2005:2.2 ⇨2025:1.8	2030-2050:1.6	2005-2015:2.5	2030-2050:1.8
Unemployment rate	7 (2015 onwards)		4.5 (2015 onwards)	
Elderly (55-64) participation rate	25:42.3	10:54.1	25:43.8	10:51.5

Economic assumptions are also different. Firstly, the COR suggests that the unemployment rate would fall to 4.5% of the working age population from 2015 onwards, compared to 7% in the AWG projections. All other things being equal, with a lower unemployment rate, pension outlays are the same but the level of GDP is higher so the expenditure ratio is lower. Secondly, according to the COR, labour productivity would grow each year at a constant

61 Defined as the number of people aged 65 and above relative to those between 15 and 64.

62 The COR was set up in 2000 and is the French pensions policy council. It is in charge of the assessment of pension scheme sustainability. The COR can draw up reform proposals.

rate (+1.8%), whereas, according to the AWG, it would gradually accelerate from a yearly rate of +1.2% in 2004 to + 1.7%[63] from 2025 onwards. This higher labour productivity growth assumption leads to a lower pension burden[64]. Thirdly, the elderly participation rates in COR and AWG projections are different. According to AWG, the participation rate of older people (55-64) would increase by 11.8 pp, against 7.7 pp according to the COR. Thus, AWG projection assumes longer careers; the longer employees work, the higher pensions are. **All in all, the COR assumptions lead to a more favourable financial requirement. According to the COR, the pension outlays would increase by 1 pp in 2020 and 1.6 pp in 2050, compared to 2006[65].**

2.2 Alternative health projections

Many scenarios exist for public health projections; they are produced by the OECD[66] and AWG, etc. Direct comparisons are not easy and, without being any more relevant[67], the 'pure ageing' scenario is the easiest one to be considered as a benchmark. It assumes that age-related spending per capita on health care remains constant and that costs evolve in line with GDP per capita.

Comparison of a 'pure ageing' scenario in health outlays projections

(% of GDP)	2004/2005	2050	change
AWG (scenario I)	7.7	9.5	1.8
OECD ('demographic effect' without the assumption of healthy ageing adjustments)	7	8.4	1.4
OFCE[68]	7.7	9.7	2

We compare the AWG pure ageing scenario with the projections of the OECD and of a French independent research institute OFCE[69]. The OFCE projections relied on the most recent demographic projections produced by INSEE and lead to a higher ageing gap. Nevertheless, direct causality can not be shown. Although the three projections are roughly based on the same logic, they can differ both in demographic and age-related spending profile assumptions. Eventually, the impacts of each assumption are very difficult to separate from one another.

It should be noted that the AWG projection is average. Nevertheless, the pure ageing scenario is only one possible scenario. According to experts, it might not be the likeliest. Thus, both the OECD and AWG have produced several alternative scenarios: the overall increase in health expenditure respectively ranges from 0.3 pp to 3.8 pp and 1.1 pp to 2.4 pp over 2005-2050. The central AWG scenario forecasts an increase in health expenditure ratio by 1.8 pp between 2005 and 2010, which only slightly differs from the pure ageing scenario and from the reference scenario of OCDE (cost containment scenario, +1.7 pp).

2.3 Long-term care projections

According to the AWG, the French long-term care expenditure ratio is quite low[70] compared to the average level in the euro area or in the European Union (0.3 % of GDP in 2004, against respectively 0.8 and 0.9). In the AWG baseline scenario, long-term outlays would increase by 0.2 pp between 2005 and 2050. A shift towards more formal long-term care would imply an increase in expenditure of 0.7 pp according to the AWG 'increase in formal care' scenario and of 2.6 pp according to the OECD's 'increased participation' scenario. OECD scenarios are generally

63 The labour productivity trend assumption (1.7) comes from the assumption of a TPF growth equal to 1.1 divided by the labour share equal to 0.65.

64 See the AWG or COR alternative scenarios for higher/lower labour productivity.

65 Compared to 2015, the pension outlays would increase by 1 pp.

66 See J Oliveira Martins, C de la Maisonneuve, and S Bjornerud, "Projections of OECD health and long-term care public expenditures", in Banca d'Italia (ed.), Fiscal Indicators, 2006.

67 Holding age-specific spending on health care constant over the projection period at the base year level implied that a large share of projected gains in life expectancy would be spent in poor health condition.

68 Rigorously, the OFCE projections encompass both public and private health spending. Then we assume that public share remains constant, equal to 73% of total expenditure.

69 Observatoire Français de la Conjoncture Economique, Lettre de l'OFCE n°281, 5 mars 2007, "La démographie à la rescousse de la protection sociale en France", Mathieu Plane.

70 Nevertheless, part of expenditure on dependants has been included by the AWG in heath care expenditure.

more pessimistic as the increase in long-term care expenditure over 2005-2050 ranges from 0.9 to 2.9 pp while it only ranges from 0.3 to 0.7 pp under AWG scenarios.

3.Risks assessment

Demographic assumptions. A key feature for AWG projections is life expectancy at birth. An unexpected lengthening of the average lifespan would entail additional pension, health and long-term care expenditure. The AWG provides sensitivity tests of an additional increase in life expectancy at birth of 1.3 years for women (i.e. 89.2) and 1.6 years (i.e. 83.9) for men until 2050, which would largely match the INSEE-COR assumptions. Thus, according to AWG, a higher expectancy would lead to an additional increase in pension outlays of 0.6 pp in 2050. The impact of a higher life expectancy on health expenditure is estimated at 0.15 pp in 2050 compared to the central AWG scenario. Lastly, the impact of expectancy gains on long-term care would be nil according to AWG projections.

On the other hand, the fertility index assumed by the AWG might appear slightly too low (from 1.89 in 2004 to 1.85 in 2050). Indeed, the fertility index (1.9) assumed by INSEE is the mean of the index between 2000 and 2005. Yet, no alternative AWG scenario is based on higher fertility rates[71]. Besides, the annual migratory balance assumed by the AWG is lower than that assumed by COR (resp. + 60,000, +100,000). The migratory balance can have a potentially high impact on forecasts but no alternative scenario is produced by the AWG[72].

Macroeconomic assumptions. For the EU 15, the AWG group assumes labour productivity would grow yearly by 1.7% from 2030 onwards. For France, this figure fits the long-term average (1975-2003). Nevertheless, labour productivity has been growing more slowly since the beginning of the 1990s. A lower productivity growth is not unlikely: the AWG estimates that 0.25 pp less labour productivity growth lower from 2015 onwards would lead to a 0.5 pp larger financial requirement over the 2004-2050 period for pension outlays.

The participation rate of older workers (up 55 to 64 years old) is very low in France (38.3% in 2003) compared with the EU-25 average (42.7% in 2003). Nevertheless, the AWG assumes a high increase in older workers' participation rate: +11.8 pp between 2005 and 2050, against +7.7 pp according to the COR. Yet, the effectiveness of measures adopted by the Government to prevent early retirement (deduction/premium, etc.) is still uncertain.

Non-demographic drivers. Public health care spending is determined by a complex combination of supply and demand factors, which may vary in the short and long term. In basic health care projections, spending is connected to the age structure of the population, the revenue per capita elasticity being assumed as unitary (see the 'pure ageing' scenario above). Yet, the age effect and the revenue effect fail to fully explain the growth of public health spending during the past 30 years (see OECD). Yet, in the AWG central scenario, elasticity is assumed to decrease from 1.1 in 2004 to 1 in 2050. This elasticity value seems even lower as policy implementation risks mainly arise in the health care expenditure field. Indeed, in the past, successive reforms have scarcely reduced their dynamism. Yet, no structural reform able to curb the expansion of health expenditure has been planned so far.

Concerning education spending, the expected decline due to ageing is hardly likely. In particular, additional expenditure is planned for universities in order to improve tertiary education and research, both singled out in the Lisbon Strategy.

4. Conclusion

All in all, since the COR macroeconomic assumptions are too optimistic, we keep the AWG pension projections, using the higher life expectancy scenario. This leads to an increase in pension outlays by +2.4 pp between 2010 and 2050. Health expenditure projections are adjusted to reflect a constant income elasticity of demand of 1.1 and a higher life expectancy, which leads to an increase in health expenditure of +1.8 pp between 2010 and 2050. For long-term care expenditure, the AWG 'increase in formal care' scenario is adopted (+0.4 pp). Lastly, the AWG computations for unemployment and education outlays are kept the same. Then the increase in the ageing-related expenditure ratio would be 4.1 pp in the 2010-2050 period.

---

71 According to the sensitivity analysis carried out by the COR and compared to the central scenario (i.e 1.9), a drop in the fertility rate to 1.8 after 2010 increases pension expenditure by 0.8 pp by 2050.

72 According to the sensitivity analysis carried out by the COR and compared to the central scenario (i.e +100,000), an annual migratory balance of 50,000 adults increases pension expenditure by 0.7 pp by 2050.

Fiche on AWG projections for Ireland[73]

1. Description

According to the AWG projections, the Irish population is expected to increase to 5.5 million in 2050 from just over 4 million at present. Within this total, the elderly population cohort (those aged 65 and over) is projected to more than treble over the period. As a result, a very large increase in the old-age dependency ratio is projected, from 16.5% currently to 45.2% in 2050.

In total, ageing-related expenditure in Ireland is expected to increase by 8.1% of GDP between 2005 and 2050. The bulk of this (approximately three-quarters) is accounted for by higher pension outlays, which are projected to more than double, to reach 11.1% of GDP in 2050. Health care and long-term care spending are projected to rise by 2.0% and 0.6% of GDP, respectively, over the same period. These increases are expected to be offset to a small degree by a reduction in education spending by 0.9% of GDP together with a decline in unemployment related expenditures of 0.1%.

2. Comparison with alternative projections

In order to assess the results of the AWG projections, it is useful to examine other studies on population ageing carried out for Ireland. There have been a number of reports on population ageing, many of which have focused on particular aspects relating to ageing. In addition, on the purely demographic side, in 2004, the national statistical agency in Ireland, the Central Statistics Office (CSO), produced population and labour force projections to 2036. Perhaps the most relevant in terms of the AWG projections, however, is a recent paper produced by the Economic and Social Research Institute[74] (ESRI), which specifically examined the effects on public finances of ageing over the period to 2050. It is from this paper that the most direct comparisons and contrasts with the AWG report can be disseminated.

In terms of demographic projections, there is quite a marked difference between the AWG projections and those contained in the ESRI report. The ESRI projects that the population will increase by just over one million persons to reach 5.2 million in 2050, whereas the AWG study projects that the population will reach 5.5 million. This appears to be mainly explained by differing assumptions on migration, with the AWG projecting much higher net migration over the period to 2050 than the ESRI, although in contrast, the AWG figures for net migration in 2004 and 2005 were significantly below actual flows. Of particular interest, however, is the changing age structure of the population, with the ESRI painting a more pessimistic picture than the AWG study. The ESRI estimates that the proportion of the population aged 65 and over will increase from 11% in 2005 to 29% by 2050, which is higher than the AWG projections. As a result, the ESRI projects that the old-age dependency ratio will increase from 16.5% in 2005 to 51.5% in 2050, which is significantly above the AWG projection (45%). This is partly due to differing assumptions on mortality rates, with the ESRI expecting men and women to live longer than in the AWG study.

As regards economic assumptions, the unemployment projections by the AWG appear overly optimistic, with an average rate of just 3.4% throughout the entire projection period. This would in effect constitute a near full employment situation between now and 2050. In contrast, the ESRI assumes a higher unemployment rate of 4% per annum, which appears more plausible. Similarly, the AWG projections for average GDP growth over the next decade or so appear somewhat high when compared with other medium-term growth projections for Ireland.

The ESRI report estimates the costs of population ageing relative to GNP, whereas the AWG study is measured relative to GDP.[75] According to the ESRI, old-age social welfare spending (i.e. pensions) is projected to treble from 3.2% of GNP in 2010 to 9.3% of GNP in 2050. Long-term care costs over the same period are projected to increase from 0.8% of GNP to 2.4% by 2050. Health care costs are projected to rise from 7.4% of GNP in 2010 to

---

73 Co-authored by Diarmaid Smyth.

74 'Assessing Age-Related Pressures on The Public Finances, 2005 to 2050', by Alan Barrett and Adele Bergin, in 'Budget Perspectives 2006', ESRI, October 2005.

75 In Ireland, GDP typically exceeds GNP due to the open nature of the Irish economy and the presence of a large multinational sector. However for purposes of comparison, this difference is not likely to be significant.

11.2% in 2050. These three factors combined result in ageing-related costs rising by 11.5% of GNP between 2010 and 2050. Although not directly comparable, these projections are higher than the rate of increase projected in the AWG report, which might lend support to the view that there are upside risks to the AWG projection.

3.Risk assessment

The AWG study shows that the effects of population ageing are likely to be quite marked in Ireland, with age-related public spending projected to rise by 7.9% of GDP between 2010 and 2050. This increase is well above the EU average, although this partly reflects the fact that Ireland is starting from a relatively low base given its current young population profile. It must be recognised, however, that such projections are subject to much uncertainty, particularly for smaller and more open economies like Ireland. This is also evident from a study conducted by the ESRI, which has differing long-term demographic and economic projections. This latter report showed higher estimated costs from population ageing.

An alternative headline estimate for ageing costs using the AWG scenarios would involve:

- taking the AWG assumptions on demographics and macroeconomic estimates as given;
- increasing the AWG projections for health care spending by taking the assumption of a constant income elasticity of 1.1 throughout the period, which raises health care costs by 0.4%;
- raising the AWG projections for long-term care by allowing for an increase in formal care provision, which pushes up ageing costs by a further 0.3%.

This alternative scenario would result in an increase in ageing costs by 8.6% of GDP between 2010 and 2050 and would be closer to the ESRI estimates.

In conclusion, it must be borne in mind that, despite the AWG projections, Ireland is relatively well placed to deal with the effects of population ageing. This is based firstly on the premise that Ireland has more time to prepare for population ageing given the current age structure. Secondly, Ireland has a low level of debt (the second lowest debt-to-GDP ratio in the euro area) as well as being a relatively lightly taxed economy. Thirdly, Ireland has already begun to prepare for population ageing, through the National Pension Reserve Fund (NPRF).[76] That said, such studies do highlight the need for more to be done to combat the challenges posed by population ageing as the NPRF in itself will not be sufficient to insure against the likely future costs of population ageing.

[76] The NPRF was set up to pre-fund future pension costs, with 1% of GNP invested per annum up to 2055, with withdrawals from the fund permitted from 2025 onwards.

Fiche on AWG projections for Italy

1. Description

According to the demographic projections underlying long-term fiscal forecasts by the AWG, the old-age dependency ratio[77] will rise from 28.9% in 2004 to 62.2% in 2050. Population of working age is expected to decline by some 9.2 million units (about 24%) over the same period. The decline in employment will be less pronounced (about 12.0%, 2.6 million units[78]) thanks to the projected increase in the job market participation rate (from 62.6% to 70.2%) and fall in the unemployment rate (from 8.4% to 6.5%). As a result, the average yearly growth of GDP would be lower than that of labour productivity (by about 1.3% and 1.6%, respectively).

Against this background, in its 'reference scenario', the AWG estimates that age-related expenditure will increase by 2.3% of GDP between 2010 and 2050, to 28.0%. Almost half of the increase (1.1%) is accounted for by health care. Spending for both long-term care and pensions is projected to increase by 0.7%. The increase in expenditure would peak in 2040 at 3.3% (1.9% of which would be for pensions).

2. Comparison to alternative projections

There are no truly alternative national projections of the costs of ageing for the public budget: the sole producer of national projections, Ragioneria Generale dello Stato (RGS, the State Accounting Office within the Ministry of Economy and Finance), participates in the AWG.

However, RGS also publishes annual projections concerning some age-related expenditure items based on an alternative demographic and macroeconomic scenario provided by Istat (the national statistical institute).[79] According to the latest Istat release (autumn 2005), in the long run the fertility rate will be equal to 1.6 children per woman instead of 1.4, while life expectancy will be about one year higher. Average yearly growth is also 0.1-0.2% higher. As a result, over the 2005-2050 period, pension expenditure decreases by 0.3 percentage point of GDP, whereas under the AWG baseline scenario, it rises by 0.4 percentage point of GDP. The dynamics of the other expenditure items considered in the exercise (health care and long-term care) are instead basically the same under both scenarios.

Alternative projections for health and long-term care are provided by a recent OECD study.[80] Under comparable assumptions about the quality of extra life years, income elasticity of expenditure, and the evolution of costs, OECD projections for health care are broadly in line with those by the AWG. For instance, assuming healthy ageing, unit income elasticity, and no cost effect, the AWG and the OECD project an increase in the spending ratio of, respectively, three-quarters and one half of a percentage point of GDP over 2004-2050. Due to differences in the way assumptions are framed, a similar comparison for long-term care is not feasible.

3. Risk assessment

Higher life expectancy. The AWG has performed a sensitivity analysis, using more optimistic assumptions concerning life expectancy. In particular, a further 15% decrease in mortality rates at all ages is assumed to materialise gradually over the projection period. For Italy, this entails an increase in life expectancy in 2050 with respect to the baseline AWG scenario of 1.6 and 1.3 years for men and women, respectively. In turn, this translates into an increase in age-related expenditure of 0.6 percentage point of GDP due to pensions (0.3%), health care (0.2%) and long-term care (0.1%). As mentioned above, the most recent Istat projections have already forecast for 2050 a life expectancy 1.0 years above the baseline AWG scenario for men and 0.8 years for women. As a result, it can be estimated that the

77 Defined as the ratio between the population of 65 years or more and the population from 15 to 65 years old.

78 The change is calculated with respect to 2003.

79 Ragioneria generale dello stato, "Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario", 2006.

80 Oliveira Martins, J. and de la Maisonneuve, C. (2006), "The drivers of public expenditure ion health and long term care: an integrated approach", OECD Economic Studies, vol. 43 (2).

most up-to-date demographic projections entail age-related expenditure almost 0.4 percentage point of GDP higher than the baseline AWG estimates.[81]

Income elasticity of health care expenditure. Another risk to AWG projections comes from the assumption of a rather low (and declining) income elasticity of health care expenditure (from 1.1 to 1 over 2005-2050, as against an average of 1.22 over 1982-2002). Although an even lower elasticity of 0.84 was observed over 1992-2002, this mostly reflected policy measures taken between 1992 and 1997 which cannot be taken to have had a permanent effect. In fact, after going down by about 1 p.p. of GDP over the 1992-1997 period, health spending rose by 1.5% over 1997-2006 (about 60% of the overall increase in public spending over the same period).

Based on the sensitivity analysis provided by the AWG report, dropping the assumption that elasticity declines over time, and assuming it stays constant at 1.1 over 2010-2050, entails an extra increase of 0.3% of GDP in health expenditure over the period considered.

Long-term care. Increases in life expectancy and changes in family structure could require more public support than currently provided. According to AWG projections, in an alternative scenario with increased provision of formal care, spending would increase by a further 0.9% of GDP compared to the reference scenario.[82]

Political risks. Forecasts concerning Italian pensions assume a timely and complete phase-in of the pension reforms decreed in the previous years. In particular, the 1995 pension reform introduced a notional defined contribution system, in which benefits also depend negatively on life expectancy at retirement. Due to the increases in life expectancy, implementation of the regular actuarial updates will significantly affect the amount of benefits. These adjustments are estimated to contain the projected increase in expenditure by almost 2% of GDP. Together with the indexation of post-retirement benefits to prices instead of wages, introduced by the 1992 reform, the new NDC rules entail a sharp reduction in the ratio of the average benefit to per capita GDP, which could prove socially unsustainable. The first adjustment, due in 2005, was indeed postponed.[83]

4. Summing up

Modification of the AWG reference scenario projections to take into account (a) more recent estimates of future increases in life expectancy, (b) higher income elasticity of health spending, and (c) the impact of ageing and changes in family structure on the provision of formal long-term care entails an additional increase in age-related public spending of about 1.5% of GDP over 2010-2050, taking the total to about 3.5 percentage points.

Finally, policy implementation risks arise with respect to pensions. They are especially difficult to quantify as, by their very nature, they reflect entirely discretionary decisions.

---

81 Forecasts by the RGS do not show such an increase since the budgetary and macroeconomic effects of higher life expectancy are more than offset by the effects of higher fertility.

82 In OECD estimates, an increase in older workers' participation rate to 70% (in line with the AWG assumptions) results in extra long-term care spending of as much as 4% of GDP over and above the baseline.

83 Based on a recent agreement between the Government and trade unions, the update is now expected to take place in 2010. At the same time, updates should from now on be made every 3 years. Moreover, already decreed increases in the minimum retirement age have been partly postponed. The combined impact on expenditure of such policy changes is expected to be negligible by the Government (Italy's stability programme, 2007 update). The Government has also announced that a technical commission will examine the issue of the adequacy of the replacement rate of pensions, with a focus on workers with a discontinuous working history.

Fiche on AWG projections for Luxembourg[84]

1. Description of AWG projections

The AWG projections for Luxembourg are based upon a projected increase in the old age dependency ratio from 21.0% in 2004 to 36.1 p.c. in 2050. At the same time, population of working age would increase by 30.9% between 2004 and 2050 due to buoyant net immigration, equal to 3,000 persons a year throughout the projection period. Total employment would increase even more sharply, by 1.2% a year on average over the 2010-2050 period owing to higher participation rates (positive impact equal to 0.1% a year) and especially to a big increase in the number of cross-border workers (positive annual impact equal to 0.4% on average). As labour productivity would by assumption expand by about 1.8% a year over the same period, average yearly GDP growth would reach 3% from 2010 to 2050.

Against this background, the ageing-related expenditure increase between 2010 and 2050 is estimated at 8.4% of GDP. The bulk of the increase (some 7.6% of GDP) is accounted for by pension outlays. Health care spending is projected to increase by some 1.0 p.c. of GDP while long-term care would rise by 0.5% of GDP from 2010 to 2050. Outlays for unemployment and education spending would fall by 0.1% and 0.7% of GDP, respectively, in the 2010-2050 period.

2. Comparison with alternative projections

Projections carried out by Banque Centrale du Luxembourg (BCL)[85] are a convenient benchmark to assess the risks inherent in the AWG forecasts[86], although systematic comparison with the AWG is complicated by the use of different sources, methodologies and assumptions.

A marked difference between the AWG and BCL projections is the assumed number of immigrants, with respectively 3,000 and 4,000 persons on average over the entire projection horizon. The impact on the projection results is difficult to assess, but it should not be overestimated. The number of cross-border workers is actually calculated in a residual way in the two sets of projections, in order to close the gap between the employment level compatible with the selected rates of economic and productivity growth on the one hand and the evolution of the resident labour force on the other hand. A decrease in the assumed number of immigrants is automatically matched by an increase in the number of cross-border workers in such a framework. Demographic assumptions other than immigration (in particular, birth rates and life expectancy) are very close in the two sets of projections.

Macroeconomic variables are quite similar in the two sets of projections. For instance, the rate of economic growth observed over the long term is 3% by assumption both in the AWG projections and in the baseline BCL scenario. Productivity growth would reach 1.8% a year on average in the AWG projections and 2% in the BCL baseline scenario. On the other hand, the AWG projections rest on a steeper increase in the labour force participation rate of women over the 2003-2050 horizon (female participation rate in 2050 higher than the 2003 rate by 7.5% in the AWG projections and by 5% only in the BCL baseline).

As far as **pensions** are concerned, the AWG projections seem uncontroversial. According to the AWG, total pension expenditure would increase by 7.6% of GDP over the 2010-2050 horizon, compared to 5.6% in the BCL baseline. Most of this discrepancy probably stems from the different coverage in the two sets of projections. The coverage of the AWG projections is larger, to the extent that they include the pension systems of public sector employees ("special pension regimes"), whereas BCL projections are confined to the private sector segment of the pension regime. In 2005, the special regimes accounted for about 23% of total pension expenditure (source: IGSS).

---

84 Co-authored by Muriel Bouchet.

85 See BCL Working Paper n°23, available on the Internet site www.bcl.lu, for a description of the BCL model and its underlying assumptions.

86 The Inspection Générale de la Sécurité Sociale also carries out pension projections, but the latter were used as an input in the AWG report and are therefore not independent from the AWG projections.

Another difference between the two sets of projections is that the AWG confined itself to the 2004-2050 horizon, which may be deemed too short in the specific case of Luxembourg, where short-term fiscal indicators are distorted by the large inflow of cross-border and foreign workers recorded over the last decade. This trend gave way to a steep increase in social contributions not matched by commensurate developments on the expenditure side. This mismatch explains most of the significant budgetary surpluses, which are bound to fade away unless high economic growth and the correlative inflow of cross-border workers are sustained throughout the projection horizon. All these developments will unfold over a long period of time, hence the need for a long projection horizon that will encompass the life-cycle of all the cross-border workers currently employed. The BCL projections extend to 2085 and illustrate that fiscal deterioration would continue between 2050 and 2085. Total pension expenditure would increase by 1.2% of GDP over this sub-period, on top of the aforementioned 5.6% projected over the 2010-2050 period in the BCL model.

Health care expenditure would go up by 1.0% of GDP from 2010 to 2050, according to the AWG reference scenario, where the income elasticity of demand is equal to 1.1 in the base year and will converge to 1.0 by 2050. The BCL baseline projection points to a larger expenditure increase, equal to 1.6% of GDP over the same period. In this respect, the BCL baseline is quite close to an alternative scenario, namely the AWG reference projection adjusted in order to keep the income elasticity equal to 1.1 throughout the 2010-2050 period. Under this alternative scenario, health care expenditure would actually increase by 1.4% of GDP from 2010 to 2050[87], which is quite close to the BCL estimate. Based on past developments, the latter estimate implicitly assumes that the income elasticity of demand would be higher than 1.1 for the two segments of the insured population, namely residents and cross-border workers (as well as their relatives). However, this higher elasticity in BCL projections is compensated to a large extent by an additional, "dampening" effect. BCL projections do actually take into account the dampening effect on average health expenditure per capita of the higher number of cross-border workers projected in the future, which is not the case in the AWG projections. Average expenditure per capita of the cross-border population and of their relatives is structurally below the corresponding figures for the resident population (about 40% less in 2006).

The AWG expects **long-term care** expenditure to increase by 0.5% of GDP between 2010 and 2050, namely by about 6% a year in nominal terms. This rate of growth seems quite limited compared to the trend observed since the inception of the system in 1998. In particular, spending pressures may be higher than estimated if there is a shift towards more formal care due to changes in family size and female labour force participation rates. According to an alternative scenario considered by the AWG, this could raise ageing costs in the 2010-2050 period by 0.3%of GDP.

As regards **education**, expenditure would decline by 0.7% of GDP between 2010 and 2050, according to the AWG. The latter figure seems overestimated for three reasons: (i) expenditure – mostly compensation of employees – may prove very sticky; (ii) Luxembourg does not perform well in international comparisons (e.g. in the OECD PISA rankings), which may induce Luxembourg to increase in a sustained way expenditure per pupil; (iii) the University of Luxembourg is still a young institution. The number of students may grow steeply in the future.

Unemployment expenditure as a percentage of GDP should be relatively stable over the projection horizon.

3. Risk assessment

Long-term projections are even more uncertain in the case of Luxembourg than for most other EU countries. The AWG and BCL projections are vulnerable to several common risks on top of the risks observed in other countries (such as forecast errors related to life expectancy assumptions):

- macro-economic variables are quite volatile. It is therefore more difficult than in other countries to pinpoint the "appropriate" long-term rate of real GDP growth. The latter is set equal to 3% a year in the two sets of projections, which is quite high by EU standards. Should the rate of growth

87 The average income elasticity of demand reaches 1.05 in the AWG reference scenario. The impact of an increase in this average elasticity over the 2010-2050 period from 1.05 to 1.1 can be estimated on the basis of a comparison between the AWG "pure ageing" and "positive income elasticity of demand" scenarios that take into account income elasticities equal to 1.0 and 1.05 respectively.

decline to 2.2% a year on average over the projection horizon, pension expenditure in the private sector would increase by 7.8% of GDP from 2010 to 2050 according to the BCL model, instead of 5.6% under the baseline BCL scenario.

- the very large inflows of immigrants and cross-border workers further complicate long-term projections. The future inflows and their age composition are difficult to apprehend and the future behaviour of the large inflows observed in the recent past is also quite uncertain (e.g. duration of the average careers of cross-border workers, average incomes, etc.).

- the reserves of the private sector pension regime account for 22% of GDP for the moment. Therefore, the way they are invested has a significant impact on future budgetary indicators. It is assumed in the BCL baseline that the nominal, implicit yield on reserves will reach 4.5% a year on average. Should this return increase by 1% a year, the total revenue of the pension regime would be 0.4% of GDP above the baseline in 2050. This would represent 7% of the expenditure increase projected in the BCL baseline over the 2010-2050 period.

- in line with the current legislation in Luxembourg, both the AWG and the BCL projections presuppose that pensions are adjusted to real wage developments (in addition to being indexed to prices). Should this adjustment be suspended over the 2010-2020 period, the increase in expenditure over the 2010-2050 horizon would drop from 5.6 to 3.7% of GDP in the BCL model (1.9% of GDP less). Such a suspension would imply a 16% decline in pensions compared to the baseline figure. A suspension of indexation over the entire projection period does not seem reasonable, as pensions would be 56% below the baseline in 2050 in such a case.

In this context, a cautious alternative headline projection of the ageing cost could consist of:

- keeping the AWG's projections for pension expenditure (+7.6% of GDP from 2010 to 2050) and unemployment and education spending (-0.1% and -0.7% of GDP respectively);

- increasing the AWG projections for health and long-term care expenditure by taking into account a constant income elasticity of 1.1 for the 2010-2050 period and a gradual shift to the formal sector in the provision of long-term care as assumed in an alternative scenario presented by the AWG.

This would amount to additional expenditure of around 9.1% of GDP over the 2010-2050 period, i.e. more than the AWG headline estimate (+8.4% of GDP). The 9.1% of GDP estimate is very tentative. For instance, it presupposes that two aforementioned risk factors (upside or downside), namely (i) lower GDP growth than 3% a year and (ii) suspension of the indexation of pensions to real wages, will either not materialise over the projection period or will cancel each other out.

Fiche on AWG projections for the Netherlands

1. Description

The AWG projections for the Netherlands are based upon a projected increase in the old-age dependency ratio from some 21% in 2004 to 41% in 2050. Population of working age would decline by some 400,000 units (close to 4%) between 2004 and 2050. However, this decline would be offset by the projected increase in the employment rate: employment would rise by some 0.1 p.c. a year in the period considered. Hence, average yearly activity growth would be marginally higher than the assumed annual increase in labour productivity (some 1.6%) and work out at 1.7%.

Against this background, the ageing-related expenditure increase between 2010 and 2050 is estimated at 5.2% of GDP. The bulk of the increase (some 3.6% of GDP) is accounted for by pension outlays. Health care spending is projected to increase only moderately (some 1.1% of GDP between 2010 and 2050), while expenditure on long-term care would rise by 0.6% of GDP by 2050. Outlays for education spending would fall slightly by some 0.1% of GDP, while unemployment expenditure would remain constant with respect to GDP in the 2010-2050 period.

2. Comparison with alternative projections

In March 2006, the Dutch Central Planning Bureau (CPB) published a study on 'Ageing and the sustainability of Dutch public finances'. This study uses a general equilibrium approach, implying, for instance, that private savings and labour supply are determined endogenously. However, the macroeconomic parameters used in this study are, all in all, relatively similar to those in the AWG projections, while the demographic projections appear to rely on a smaller projected increase in life expectancy up to 2050.

While a detailed comparison with the AWG projections is complicated by the fact that the base year differs (2006 in the CPB study) and the exact definition of age-related expenditure categories does not always seem to match that of the AWG equivalents, the CPB appears to project a much higher increase in age-related expenditure than the AWG. For the 2010-2050 period[88], for instance, total age-related expenditure would rise by around 6% of GDP according to the CPB, i.e. significantly more than what the AWG anticipates.

Turning to individual expenditure categories, the biggest difference between both sets of projections appears to concern health care spending. This expenditure category (that includes long-term care in the CPB study) would expand by 3.8% of GDP in the 2010-2050 period according to the CPB, while the AWG anticipates a much smaller increase for that period. This difference can be traced back to a broader definition of long-term care (included in the CPB's concept of health care) and different projection methodologies. With respect to the latter, the CPB mechanically accounts for population ageing by keeping age profiles for health care expenditure constant and using a unitary income elasticity. The AWG reference scenario is based upon the assumption that half of the increase in life expectancy is spent 'in good health' (implying a flattening of the curve measuring health care expenditure by age cohort) while the income elasticity would converge from 1.1 to 1 by 2050. An alternative scenario for health care expenditure presented by the AWG, the so-called pure ageing scenario, may be methodologically closer to the CPB projections as it is based upon constant consumption profiles by age cohort, but also indicates a much smaller increase in health care spending than that projected by the CPB.

With respect to pensions, the CPB projections appear to indicate a significantly smaller increase (of some 2.5% of GDP) than that projected by the AWG (3.6% of GDP). It should be stressed that both projections assume that individual pension entitlements will continue to be indexed to gross wages (as pensions are defined as a fraction of the minimum wage). Hence, the difference may be primarily due to the different demographic assumptions: according to the sensitivity analysis performed by the AWG, an upward revision of the life expectancy assumption by 1 to 1.5 years by 2050 would increase pension expenditure by 0.5% of GDP by that year; and the difference in life expectancy in 2050 between both studies is 1.5 years for men and 2.6 years for women. In this connection, it should be mentioned that the CBS (the Dutch Statistics Bureau) has recently published new demographic

88 Projections for 2010 and 2050 are not published in the aforementioned study but were kindly provided by the CPB.

projections that, in terms of the projected change in life expectancy, are closer to the AWG assumptions (even though the latter still point to higher life expectancy in 2050, especially for women). In a February 2007 memo[89], the CPB estimates that adjusting the fiscal projections to these new demographic assumptions would widen the sustainability gap in the Netherlands considerably.

Education expenditure would rise by 0.2% of GDP while unemployment benefits would remain constant to GDP in the CPB projections.

Apart from the expenditure projections, the CPB also looks at the revenue side of the government budget. Total revenue is projected to rise by close to 1% of GDP in the 2010-2050 period. This increase is driven by both income taxes (including social security contributions) and indirect taxes. A large part of this increase is explicitly attributed to the 'older' population. Income tax on pensions (including second-pillar ones) would rise by 1.6% of GDP, while the age cohorts of 65 years old or more would account for some 1.7% of GDP of the rise in indirect taxes in the period considered. The CPB projections indicate, however, that the increase in the tax to GDP ratio would be partly offset by a fall in other government revenue (such as the disappearance of natural gas revenue). As higher tax revenue from pensions/retired people may simply crowd out taxes on other income or from younger generations, it is difficult to correctly assess the impact of population ageing on government revenue.

All in all, the budget balance would worsen by some 6.4% of GDP between 2010 and 2050 under the CPB projections.

3. Risk assessment

A comparison with the alternative study by the CPB suggests that the AWG estimates of ageing-related expenditure pressures in the Netherlands come with significant upside risks. However, the CPB projections indicate that government revenue would rise in the coming decades, which would partly offset the expenditure increase in the 2006-2050 period.

While ageing may in principle have a beneficial impact on government revenue, e.g. through the taxation of second-pillar pensions, the increase in government revenue projected by the CPB for the 2006-2050 period should in our view not be entirely attributed to ageing but is likely to result largely from tax elasticities that are higher than one.

Against this background, the net budgetary impact of population ageing for the 2010-2050 period may still be higher than the 5.2% of GDP estimated by the AWG.

A cautious alternative headline projection of the ageing cost could consist of:

- keeping the AWG's projections for pension expenditure (that seem to be more consistent with more recent projections for life expectancy) and unemployment and education spending;
- increasing the AWG projections for health and long-term care expenditure by taking into account a constant income elasticity of 1.1 for the 2010-2050 period (which would raise health care costs by some 0.2% of GDP by 2050[90]) and a gradual shift to the formal sector in the provision of long-term care as assumed in an alternative scenario presented by the AWG (which would raise long-term care expenditure by some 0.8% of GDP by 2050).

This would amount to an ageing cost of around 6.2% of GDP in the 2010-2050 period.

---

89 'Indicatie van effecten Financieel kader 2008-2011', CPB Notitie, 7 February 2007.

90 The impact of an increase of the income elasticity from 1.05 (assumed in the reference scenario) to 1.1 on average over the 2010-2050 period can be roughly estimated on the basis of a comparison of the AWG 'pure ageing' and 'positive income elasticity of demand' scenarios that take into account income elasticities of 1 and 1.05 respectively.

Fiche on AWG projections for Austria

1.General description

The latest AWG projections for Austria are based on a demographic scenario which implies an almost constant overall population of 8.3 and 8.2 million between 2010 and 2050. However, the age structure will change dramatically with the dependency ratio increasing from 26.3% in 2010 to 52.4% in 2050. The population of working age will shrink by 16%, while the elderly population will increase by 67%. However, the assumed increase in labour force participation rates should limit the decline in the number of employed persons to 8.8%. Structural unemployment is expected to remain unchanged at 3.4%. As labour productivity is expected to increase only slightly, the growth rates of GDP per capita will fall and overall potential GDP growth is likely to slow down from 2.2% to 1.3% per year.

It is projected that the ratio of ageing-related expenditure to GDP will increase by 1.1 percentage points between 2010 and 2050, considerably less than the average for the EU and the euro area. While spending on health care and long-term care is set to increase by 1.3 and 0.8 percentage points respectively, expenditure for pensions and education is actually expected to fall (by 0.6 and 0.5 percentage point respectively). Expenditure on unemployment benefits should remain constant.

2. Comparison with alternative projections and risk assessment

To our knowledge, there is no recent comprehensive study on the future development of ageing-related expenditure for Austria besides the AWG projections. However, as far as the underlying *demographic assumptions* are concerned, an updated population projection was published by Statistics Austria in 2006.[91] It assumes a somewhat higher net migration for the initial years and especially a more pronounced increase in life expectancy.[92] While the AWG calculations are based on an increase in life expectancy at birth by 4 (5.4) years for females (males) between 2010 and 2050, Statistics Austria predicts an increase by 5.3 (6.6) years. According to a sensitivity test performed by the AWG, a further increase in life expectancy at birth by 1.3 years for men and 1.1 years for women in 2050 – which would largely match the assumptions of the Statistical Office – would imply an additional increase in ageing-related expenditure of 0.5 percentage point in 2050 (0.4 percentage point pensions, 0.1 percentage point health care and 0.0 percentage point long-term care).

For *pension expenditure,* Austria is the only euro area country for which the AWG projects a decline in relation to GDP. This is the result of a succession of pension reforms in the years 2000 to 2004 that raise the average effective retirement age and substantially reduce the generosity of the state pension system. A good part of the difference from the 2001 AWG projections for pension expenditure (4.8 percentage points in 2050) can be attributed to these reforms. However, it is unclear whether the price indexation adopted for the adjustment of existing pensions will be socially and politically sustainable. In connection with increasing longevity and depending on real wage growth, it will lead to a substantial decline in benefit ratios between the start and the end of the retirement period.[93] In addition, restrictions on early retirement have been eased again as of mid-2007. Moreover, the assumed increase in the participation rate could prove to be somewhat optimistic. Quantifying these three risks, the IMF arrives at an increase in pension expenditure to almost 15% of GDP in 2050, about 2 ½ percentage points higher than the AWG baseline figure.[94] Finally, the AWG projections do not include expenditure for means-tested benefits supplementing very low pensions (currently approximately 0.4% of GDP) which could increase in the future not only because of the ageing population but also because of the lower benefit level.[95]

---

91 See Statistik Austria (2006), Bevölkerungsvorausschätzung 2006 – 2050, Wien (available at www.statistik.at).

92 Overall, the old-age dependency ratio is nevertheless somewhat lower in the projections by Statistics Austria. With similar assumptions on fertility, the factors driving this result are, however, difficult to disentangle.

93 See M. Knell, W. Köhler-Töglhofer, D. Prammer (2006), The Austrian Pension System – How recent reforms have changed fiscal sustainability and pension benefits, Monetary Policy and the Economy Q2/06.

94 See E. Lundback, D. Kanda, A. Tieman (2007), Austria: Selected Issues, IMF Country Report No. 07/143 (available at: http://www.imf.org/external/pubs/ft/scr/2007/cr07143.pdf).

95 See M. Knell, W. Köhler-Töglhofer, D. Prammer (2006), "The Austrian Pension System – How recent reforms have changed fiscal sustainability and pension benefits", Monetary Policy and the Economy Q2/06.

Concerning *health expenditure,* (and also long-term care expenditure) alternative projections are provided by a recent OECD study.[96] Under a comparable scenario assuming healthy ageing, a unit income elasticity, and no cost effect, the AWG (constant health scenario) and the OECD (demographic effect scenario) project an increase in the health spending ratio of, respectively, 1.0 and 0.6 percentage points over the 2005-2050 period.[97] None of the scenarios provided in the OECD study is, however, fully comparable to the AWG reference scenario. With respect to age-related expenditure profiles, the latter is based on an intermediate evolution between the pure ageing and the constant health scenario, that is, the initial age profile shifts by half the change in age-specific life expectancy. Moreover, in the AWG reference scenario, an income elasticity of demand of 1.1 in the base year is assumed that converges to 1 in 2050. The cost-containment scenario in the OECD study is instead based on the presumption of healthy ageing. While the income elasticity is 1, a residual growth of one percent in the base year converging to zero in 2050 is postulated. Under these assumptions, the increase in health expenditure is somewhat larger in the OECD study than in the AWG projections (1.9 percentage points compared to 1.5 percentage points between 2005 and 2050). If income elasticity were to remain at 1.1 over the whole projection period, the increase in health expenditure would rise to 1.8 percentage points in the AWG projections as well (1.6 percentage points in the 2010-2050 period).[98]

In the OECD projections (demographic effects scenario), *long-term care spending* increases by 0.8 percentage point over 2005-2050, almost identical to the 0.9 percentage point increase in the AWG reference scenario. The OECD scenario assumes healthy ageing, zero income elasticity and a partial Baumol effect (i.e. that long-term costs per dependent increase by half of average labour productivity). In the same scenario, an increase in older workers' participation rate to 70% (not too far away from the AWG assumptions) results in a rise in the long-term care spending ratio of as much as 4.1 percentage points. This is driven by the presumption that an increase in labour force participation will reduce the availability of informal care.[99] An AWG scenario with an increase in formal care is not available for Austria. Approximating the impact of increased formal care by adding the difference between the AWG increase in formal care and pure ageing scenarios to the AWG reference scenario for the average of euro area countries for which data are available would, however, result in an increase in long-term care expenditure by 1.3 percentage points in the 2010-2050 period.

3. Conclusions

As in other countries, the future evolution of age-related public expenditure in Austria is highly uncertain. The IMF quantifies the spread between the lower and upper bound for pension expenditure projections alone at 8% of GDP in 2050. A cautious alternative headline projection could take into account the higher life expectancy assumed in the latest population projection by Statistics Austria, the health care projection in the AWG reference scenario adjusted for an income elasticity of 1.1 and the additional rise in long-term care expenditure implied in the AWG's increase in formal care scenario for the euro area average. This would work out roughly at an increase in ageing-related costs in relation to GDP of 2.4 percentage points between 2010 and 2050.

---

96 See J. Oliveira Martins, C. de la Maisonneuve, and S. Bjornerud, "Projections of OECD health and long-term care public expenditures", in Banca d'Italia (ed.), Fiscal Indicators, 2006.

97 Demographic assumptions and the health expenditure taken into account are also not fully comparable. For instance, in 2005 the health expenditure amounts to 5.3% of GDP in the AWG projections, while it is limited to 3.8% in the OECD study. With a similar relative increase, this might explain the obtained differences in the rise of the health expenditure ratio until 2050 in absolute terms. In the OECD study, no figures for 2010 are provided.

98 This increase is approximated by adding the difference between the increase in the AWG's 'positive income elasticity of demand' and 'pure ageing' scenarios to the AWG's reference scenario.

99 In the AWG reference scenario, the probability of receiving formal care is held constant at the 2004 level despite a substantial increase in the labour force participation of older workers.

Fiche on AWG projections for Portugal[100]

1. Description

The 2006 AWG projections for Portugal are based on a demographic scenario which implies a 4 per cent decrease in the overall population between 2004 and 2050. However, the demographic structure of the population is expected to change dramatically. In particular, an increase in the old-age dependency ratio[101] from 25.4 per cent in 2004 to 58.2 per cent in 2050 is forecast, reaching one of the highest levels among European Union countries. Working age population would decline by 1.6 million over the same period, corresponding to a change of around -22%. This effect would be partially offset by the assumed rise in participation rates, in particular among females in the older age cohort (55 to 64 years old), and a decline in unemployment, limiting the fall in employment to approximately 0.7 million. Hence, average annual GDP growth would still be above the labour productivity growth rate in the 2004-2010 period, at around 1.9%, but below that figure afterwards, reaching 2.1 and 0.8% in the 2011-2030 and 2031-2050 periods, respectively. It is worth noting that these projected potential GDP growth rates would remain below the European Union average over the whole period.

Against this background, ageing-related expenditure was expected to increase by 9.7 percentage points (p.p.) of GDP between 2004 and 2050.[102] The bulk of the increase would stem from pension outlays (+9.7 p.p. of GDP), since the small rise in health care expenditure (+0.5 p.p. of GDP) should be compensated by the declines in both unemployment benefits and education spending (-0.1 and -0.4 p.p. of GDP, respectively).

At the beginning of 2007, a reform of the general social security system was approved. The main changes introduced by this reform were the following:

- New rule for the annual update of pensions depending on inflation, real GDP growth and the amount of the pension;
- Increase in the financial penalty for early retirement from 4.5 to 6% per each year relative to the statutory age of retirement (only possible for contributors with at least 30 years of contributory career and 55 years old);
- Introduction, from 2008 onwards, of a 'sustainability factor' which will reduce new pensions in accordance with the increase in life expectancy at the age of 65 years;
- The transition to a new formula for the calculation of the initial pension based on earnings from all the years of contributory career, introduced in 2002, will be faster.

This package justified an update of the former projections of pension expenditure, which was peer-reviewed in the AWG and approved by the EPC in October 2007. Accordingly, in the context of the 2006 AWG exercise, pension expenditure in Portugal in now forecast to increase by 5.5 p.p. of GDP from 2004 to 2050. The figures for other ageing-related expenditure were kept unchanged.

2. Comparison with alternative projections

In order to assess the risks of the AWG projections, a comparison with pension expenditure projections published in May 2007 in a Banco de Portugal occasional paper may be useful.[103] The approach followed by the authors is similar to the one used in the AWG projections: a predominantly accounting model was built and, on the basis of

---

100 Co-authored by Cláudia Rodrigues Braz.

101 Defined as the ratio between the population of 65 years old or more and the working age population (from 15 to 64 years old).

102 This figure does not include an estimate of the change in long-term care costs in the case of Portugal. The Commission services used a figure implying an increase in long-term care expenditure from 2004 to 2050 of 0.4 p.p. of GDP in the calculation of sustainability indicators.

103 For more details, see Pinheiro, M. and Cunha, V. (2007), 'MISS: A model for assessing the sustainability of public social security in Portugal', Banco de Portugal Occasional Working Paper no. 2.

demographic, labour market and macroeconomic assumptions, the financial evolution of the public pension systems in Portugal was projected for the 2005-2080 period.

Regarding the demographic scenario, contrary to the results of the AWG projections, the authors foresee an increase in overall population of approximately 16% between 2004 and 2050. This outcome stems both from a smaller reduction in working age population and a higher increase in the over-65 cohort, and is mainly related to the assumptions on migration flows. Indeed, while the AWG considers a significant reduction in the migration flows to around one-third of the current figures, the authors of the paper assume their stabilisation at a level close to the average of recent years.

As far as labour market assumptions are concerned, there is an important difference in the projections for the participation rates. Albeit with a more marked decline in working age population, AWG projections assume a larger increase in participation rates.[104] As a result, the growth rates for employment are quite similar. However, the time profiles of projected GDP growth rates are different due to the assumptions on productivity. While the AWG projections consider a gradual rise in productivity growth, from 1.5% in 2010 to 2.5% in 2050, the authors assumed a constant 2.0% growth from 2010 onwards.

The differences in the above-mentioned assumptions, as well as those concerning the specifications and the inputs of the models, do not entail a sizeable divergence in the outcome. Indeed, according to the Pinheiro and Cunha (2007) paper, prior to the social security reform, pension expenditure was forecast to rise by 9.5 p.p. of GDP between 2005 and 2050, a figure quite similar to the 9.3% resulting from the 2006 AWG projections. In addition, the authors also tested a proxy to the AWG assumptions in their model, and obtained an 8.5 p.p.-of-GDP rise in pension expenditure in the same horizon, which illustrates a possible magnitude for the impact of the different specification of the models.

According to Pinheiro and Cunha (2007) calculations, on the basis of the AWG assumptions, the reform of the general security system would limit the increase in pension expenditure in the 2005-2050 period to a figure between 1.0 and 4.4 p.p. of GDP. The upper bound is comparable with the result of the revised AWG projection, which, as already mentioned, forecasts a rise in public pension expenditure of 5.5 p.p. of GDP from 2004 to 2050.[105]

As regards health expenditure, the AWG reference scenario projects an increase of 0.5 p.p. of GDP between 2005 and 2050 in Portugal. This scenario assumes an income elasticity of demand equal to 1.1 in the base year, converging to 1 by 2050. However, team members generally felt that an income elasticity of demand on average around 1.05 in the 2005-2050 period was on the low side, either because the convergence to 1 by 2050 may not be realistic or because econometric estimates for the past, on which this assumption may be based, may be biased by consolidation measures.[106] In order to approximate a constant elasticity of 1.1, the difference between the AWG's 'positive income elasticity of demand' scenario (average elasticity of 1.05) and the 'pure ageing' scenario (elasticity of 1) can be added to the reference scenario results (average elasticity of 1.05), which in the case of Portugal amounts to +0.3 p.p. of GDP. Even after this adjustment, it is still worth highlighting the difference between the AWG projections and the results presented by Martins et al. (2006).[107] According to these authors, health expenditure in Portugal in the 2005-2050 period is expected to rise by 2.4 or 4.2 p.p. of GDP in the two scenarios presented. Most of this difference apparently stems from the fact that they consider, beyond the demographic and income effects, a residual expenditure that, in the first scenario, is equal to 1% in 2005 and converges to zero by 2050 and, in the

104 The ageing of the working age population should, ceteris paribus, lead to a decline in participation rates as these tend to be higher in the so-called 'prime ages', that is, between 25 and 50 years old.

105 The range of results depends on the reaction of individuals to the introduction of the 'sustainability factor': they may opt for the postponement of retirement in order to avoid the financial penalty or they may choose to retire at the statutory age and have their pension reduced. The second option, retained in the revised AWG projection for Portugal, is less favourable in terms of the system's sustainability.

106 In the case of Portugal, the AWG presents an elasticity of public health care spending per capita with respect to GDP per capita equal to 4.72, 2.29 and 3.49 in the periods 1992-2002, 1982-2002 and 1972-2002, respectively. Following the recent policy measures implemented in the public health sector, this elasticity is expected to decline significantly.

107 Martins et al. (2006), 'Projections of OECD health and long-term care public expenditures', OECD Economic Department Working Papers no. 477.

second scenario, grows at 1% per year in the projection period.[108] In the case of Portugal, these two scenarios may prove to be optimistic or require the reinforcement of cost-containment policies in the future as the past behaviour of health expenditure in Portugal shows one of the highest residuals among OECD countries.

For unemployment benefits and education spending projections, there is no recent alternative study worth comparing AWG projections with. However, it should be highlighted that the substantial room for improvement in the efficiency of public education and the increase in participation rates by age cohort will also affect the evolution of education expenditure in the coming years. The net impact of these factors may imply a bigger reduction in spending on education than that assumed in the AWG projections.

Overall, beyond the non-quantifiable risks, AWG projections for ageing-related expenditure, without long-term care costs, could be adjusted, leading to an expected increase of between 1.3 and 4.7 p.p. of GDP between 2005 and 2050 disaggregated as follows: between 1.0 and 4.4 p.p. of GDP in pension outlays, 0.8 p.p. of GDP in health care expenditure; -0.1 p.p. of GDP in unemployment benefits and -0.4 p.p. of GDP in education spending.

3. Conclusions

The choice of assumptions and specifications of the models required for drawing up long-term projections for ageing-related expenditure necessarily involve some degree of arbitrariness. As such, the range of plausible outcomes may be quite wide and they have to be assessed carefully. Bearing these caveats in mind, it is clear anyway that the paper by Pinheiro and Cunha (2007) basically confirms the main messages resulting from the initial and revised AWG projections. In fact, prior to the reform of the general social security system, it was clear that Portugal would have a high risk of unsustainability of public finances as a consequence of ageing-related expenditure developments, in particular pension expenditure. Additionally, the authors of the paper show that consistent implementation of the 2007 social security reform will have a sizeable impact on the sustainability of public finances. The magnitude of this impact is, however, conditional on individual workers' reaction to the introduction of the 'sustainability factor'. For other ageing-related expenditure items, the AWG projections involve a clear upward risk regarding health expenditure and a possible downward risk in education spending.

---

[108] It should also be noted that although Martins et al. (2006) use more favourable assumptions for the demographic and income effects – longevity gains are fully translated into equivalent additional years in good health and income elasticity is equal to one in every year of the projection period – the rise in health expenditure due to these factors (1.0 p.p. of GDP) is higher than that obtained by the AWG reference or 'adjusted' scenarios (0.5 and 0.8 p.p. of GDP, respectively).

Fiche on AWG projections for Finland[109]

1. Description

The latest AWG projections for Finland are based on a demographic scenario with a constant overall population between 2010 and 2050 and a drastically changing age structure. The working age population is projected to decline by 13% and the old-age dependency ratio will almost double to 46.7% in 2050. With rising life expectancy, the labour market participation rate would increase, which, along with the projected decline in the unemployment rate, is projected to give rise to an increase in the employment rate of 55-64 year olds by nearly 15 percentage points to about 65% between 2004 and 2050 and to a rise in the overall employment rate by some 7 percentage points to 74% in 2050. Although this will partly soften the impact of the demographic changes on total employment, the latter would still drop by more than 0.1% a year on average in the 2004-2050 period and real GDP growth is expected to fall significantly from 2.2% in 2010 to 1.4% in 2050.

Against this background, the AWG projections point to an increase in total age-related expenditure of some 5.0% of GDP between 2010 and 2050. Pension expenditure would rise by 2.5% of GDP while outlays for health care and long-term care would increase by 1.2 and 1.6% of GDP respectively. Both education costs and unemployment spending would fall slightly in the 2010-2050 period (by 0.3 and 0.1% of GDP respectively).

2. Comparison with alternative projections

In order to assess the possible risks pertaining to the AWG results, the projected ageing-related expenditure increases as well as the underlying macroeconomic assumptions, can be compared with alternative national and international projections. Concerning health care and social care spending, a large number of national projections have been made by the Finnish authorities and research institutions. Most recently, for example, the Ministry of Health and Social Affairs, the National Research and Development Centre for Welfare and Health (STAKES), the Government Institute for Economic Research (VATT), as well as the Research Institute of the Finnish Economy (ETLA) and Prime Minister's Office (PMO), have published long-term projections for public spending. The Bank of Finland has also estimated the increase in the ageing-related spending items in the long term. The OECD and the Central Planning Bureau of the Netherlands (CPB) have also published some projections for the age-related expenditure in Finland.

The estimated increase in health and long-term care expenditure varies significantly across studies, from 2 to 4.2% of GDP for the period 2004/2005 to 2050. However, most of these estimates are not comparable with AWG projections because of differences in data sources, the definition of expenditure items and underlying assumptions. A particular problem is associated with expenditure on day care for children, which is high in Finland in comparison to other EU countries and can not be separated from other age-related spending items. The PMO and Bank of Finland estimates are most comparable to the AWG projections and suggest an increase of 2.8 and 4.2% of GDP up to 2050 respectively. OECD and CPB projections for health and long-term care and pensions in Finland are close to AWG projections.

Macroeconomic assumptions explain part of the difference between the highest and lowest projections for the increase in spending on health and long-term care. The highest estimated increase - by the Bank of Finland - is based on slower employment growth than the AWG projections. It should be stressed that the AWG's assumptions on the evolution of employment would imply an increase in the employment rate of prime age cohorts (of between 25 and 55 years old) to more than 90% by 2050, which would seem somewhat optimistic. However, the difference in the projected ageing costs is also due to the Baumol effect: in the Bank of Finland projections prices of public services continue to increase at a faster pace than the price of GDP, thereby increasing the share of public spending to GDP.

---

109 Co-authored by Helvi Kinnunen and Nadine Leiner-Killinger.

For long-term care in particular, the headline AWG estimates may also underestimate spending pressures by not taking sufficient account of a potential shift towards increased formal care provision. An alternative scenario presented by the AWG suggests that such a shift may raise long-term care spending by an additional 0.5% of GDP in the 2010-2050 period.

For pension spending, long-term projections are produced by ETLA, using an OLG-model, and by the Finnish Centre for Pensions (ETK), using a micro simulation framework. The PMO ageing project also includes some estimates on the growth of pension expenditure. In addition, the OECD and CPB projections include estimates for Finland. The Bank of Finland has made calculations by using an intertemporal accounting framework as well as its own DSGE model. The estimates of all institutions except the PMO are fairly close to each other and are somewhat higher than those of the AWG. The PMO estimate of a 2.4 percentage point increase in pension expenditure by 2050 is clearly an outlier. This stems from a more optimistic view on productivity growth than in the other projections. Fast productivity growth will lower the average pension-wage ratio because past earnings have only a limited effect on pension entitlements. The highest estimate of a 3.9 percentage point increase by ETLA results from an assumption that there would be a change in the rule of indexation for non-wage-related national pension insurance benefits.

3.Risk assessment

The available information suggests that the most important specific upside risks pertain to the AWG estimates on the increase in expenditure on health and long-term care.

All in all, a more cautious alternative headline estimate for ageing costs may be constructed by:

- keeping the AWG macroeconomic projections and expenditure estimates for pensions and unemployment and education expenditure;
- taking into account a shift to more long-term care provision as in the aforementioned AWG alternative scenario;
- and keeping the income elasticity used in the health care projections constant at 1.1 (rather than the gradual decline to 1 incorporated in the AWG reference scenario)[110].

This would amount to an ageing-related expenditure increase of some 5.7% of GDP in the 2010-2050 period.

110 The impact of an increase in the income elasticity from 1.05 (assumed in the reference scenario) to 1.1 on average over the 2010-2050 period can be roughly estimated on the basis of a comparison of the AWG 'pure ageing' and 'positive income elasticity of demand' scenarios that take into account income elasticities of 1 and 1.05 respectively and would work out at around 0.2% of GDP.

Contents

Notes d'Études et de Recherche

191. V. Chauvin and A. Devulder, “An Inflation Forecasting Model For The Euro Area,” January 2008.

192. J. Coffinet, « La prévision des taux d’intérêt à partir de contrats futures : l’apport de variables économiques et financières », Janvier 2008.

193. A. Barbier de la Serre, S. Frappa, J. Montornès et M. Murez, « La transmission des taux de marché aux taux bancaires : une estimation sur données individuelles françaises », Janvier 2008.

194. S. Guilloux and E. Kharroubi, “Some Preliminary Evidence on the Globalization-Inflation nexus,” January 2008.

195. H. Kempf and L. von Thadden, “On policy interactions among nations: when do cooperation and commitment matter?,” January 2008.

196. P. Askenazy, C. Cahn and D. Irac “On “Competition, R&D, and the Cost of Innovation, February 2008.

197. P. Aghion, P. Askenazy, N. Berman, G. Cette and L. Eymard, “Credit Constraints and the Cyclicality of R&D Investment: Evidence from France,” February 2008.

199. C. Poilly and J.-G. Sahuc, “Welfare Implications of Heterogeneous Labor Markets in a Currency Area,” February 2008.

200. P. Fève, J. Matheron et J.-G. Sahuc, « Chocs d’offre et optimalité de la politique monétaire dans la zone euro », Février 2008.

201. N. Million, « Test simultané de la non-stationnarité et de la non-linéarité : une application au taux d’intérêt réel américain », Février 2008.

202. V. Hajivassiliou and F. Savignac, “Financing Constraints and a Firm’s Decision and Ability to Innovate: Establishing Direct and Reverse Effects,” February 2008.

203. O. de Bandt, C. Bruneau and W. El Amri, “Stress Testing and Corporate Finance,” March 2008.

204. D. Irac, “Access to New Imported Varieties and Total Factor Productivity: Firm level Evidence From France,” April 2008.

205. D. Irac, “Total Factor Productivity and the Decision to Serve Foreign Markets: Firm Level Evidence From France,” April 2008.

206. R. Lacroix, “Assessing the shape of the distribution of interest rates: lessons from French individual data,” April 2008.

207. R. Lacroix et Laurent Maurin, « Désaisonnalisation des agrégats monétaires : Mise en place d'une chaîne rénovée », Avril 2008.

208. T. Heckel, H. Le Bihan and J. Montornès, "Sticky Wages. Evidence from Quarterly Microeconomic Data," April 2008.

209. R. Lacroix, « Analyse conjoncturelle de données brutes et estimation de cycles. Partie 1 : estimation de tests »," Avril 2008.

210. R. Lacroix, « Analyse conjoncturelle de données brutes et estimation de cycles. Partie 2 : mise en œuvre empirique »," Avril 2008.

211. E. Gautier, « Les ajustements microéconomiques des prix : une synthèse des modèles théoriques et résultats empiriques »," Avril 2008.

212. E. Kharroubi, "Domestic Savings and Foreign Capital: the Complementarity Channel," April 2008.

213. K. Barhoumi and J. Jouini, "Revisiting the Decline in the Exchange Rate Pass-Through: Further Evidence from Developing Countries," July 2008

214. P. Diev and W. Hichri, "Dynamic voluntary contributions to a discrete public good: Experimental evidence," July 2008

215. K. Barhoumi, G. Rünstler, R. Cristadoro, A. Den Reijer, A. Jakaitiene, P. Jelonek, A. Rua, K. Ruth, S. Benk and C. Van Nieuwenhuyze, "Short-term forecasting of GDP using large monthly datasets: a pseudo real-time forecast evaluation exercise," July 2008

216. D. Fougère, E. Gautier and H. Le Bihan, "Restaurant Prices and the Minimum Wage," July 2008

217. R. Krainer, "Portfolio and financing adjustements for US banks: some empirical evidence," July 2008

218. J. Idier, "Long term vs. short term comovements in stock markets: the use of Markov-switching multifractal models," July 2008.

219. J. Barthélemy, L. Clerc and M. Marx, "A Two-Pillar DSGE Monetary Policy Model for the Euro Area," July 2008.

220. J. Coffinet and S. Frappa, "Macroeconomic Surprises and the Inflation Compensation Curve in the Euro Area," July 2008.

221. R. Krainer, "On the Role of a Stock Market: A Study of France, Germany, and thez Euro Area," July 2008.

222. K. Barhoumi, V. Brunhes-Lesage, O. Darné, L. Ferrara, B. Pluyaud and B. Rouvreau, "Monthly forecasting of French GDP: A revised version of the OPTIM model," September 2008.

223. H. Bertholon, A. Monfort and F. Pegoraro, “Econometric Asset Pricing Modelling,” September 2008.

224. L. Ferrara and D. Guégan, “Business surveys modelling with Seasonal-Cyclical Long Memory models,” October 2008

225. F. Balassone, J. Cunha, G. Langenus, B. Manzke, J. Pavot, D. Prammer and P. Tommasino, “Fiscal sustainability and policy implications for the euro area,” December 2008

Pour accéder à la liste complète des Notes d’Études et de Recherche publiées par la Banque de France veuillez consulter le site : http://www.banque-france.fr/fr/publications/ner/ner.htm

For a complete list of Working Papers published by the Banque de France, please visit the website: http://www.banque-france.fr/gb/publications/ner/ner.htm

Pour tous commentaires ou demandes sur les Notes d'Études et de Recherche, contacter la bibliothèque de la direction de la recherche à l'adresse suivante :

For any comment or enquiries on the Working Papers, contact the library of the Research Directorate at the following address :

BANQUE DE FRANCE
41- 1404 Labolog
75049 Paris Cedex 01
tél : 0033 (0)1 42 92 49 55 ou 62 65
fax :0033 (0)1 42 92 62 92
email : thierry.demoulin@banque-france.fr
jeannine.agoutin@banque-france.fr