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Public spending on health and long-term care: a new set of projections

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Public spending on health and long-term care: a new set of projections

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This paper was written by Christine de la Maisonneuve and Joaquim Oliveira Martins

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Abstract / Résumé

Public spending on health and long-term care: a new set of projections

This paper proposes a new set of public health and long-term care expenditure projections till 2060, following up on the previous set of projections published in 2006. It disentangles health from long-term care expenditure as well as the demographic from the non-demographic drivers, and refines the previous methodology, in particular by better identifying the underlying determinants of health and long-term care spending and by extending the country coverage to include BRIICS countries. A cost-containment and a cost-pressure scenario are provided together with sensitivity analysis. On average across OECD countries, total health and long-term care expenditure is projected to increase by 3.3 and 7.7 percentage points of GDP between 2010 and 2060 in the cost-containment and the cost-pressure scenarios respectively. For the BRIICS over the same period, it is projected to increase by 2.8 and 7.3 percentage points of GDP in the cost-containment and the cost-pressure scenarios respectively.

JEL classification codes: H51; I12; J11; J14.
Key words: Public health expenditures; long-term care expenditures; ageing populations; longevity; demographic and non-demographic effects; projection methods.

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Dépenses publiques de soins de santé et de soins de longue durée : une nouvelle série de projections

Ce papier présente une nouvelle série de projections des dépenses publiques de santé et de soins de longue durée jusqu'en 2060, faisant suite à une première série de projections publiées en 2006. Le papier étudie la santé et les soins de longue durée séparément ainsi que les déterminants démographiques et non-démographiques et il affine la méthodologie adoptée précédemment, en particulier, en identifiant de manière plus approfondie les déterminants sous-jacents des dépenses de santé et de soins de longue durée et en augmentant le nombre de pays couverts afin d'inclure les BRIICS. Un scénario de maîtrise des coûts et un scénario de tension sur les coûts sont élaborés ainsi qu'une analyse de sensibilité. En moyenne sur l'ensemble des pays de l'OCDE, entre 2010 et 2060, le total des dépenses de santé et de soins de longue durée devrait augmenter de 3.3 points de pourcentage de PIB dans le scénario de maîtrise des coûts et de 7.7 points de pourcentage de PIB dans un scénario de tension sur les coûts. Pour les BRIICS sur la même période, il devrait augmenter de 2.8 points de pourcentage du PIB dans le scenario de maîtrise des coûts et de 7.3 points de pourcentage dans un scenario de tension sur les coûts.

Classification JEL : H51 ; I12 ; J11 ; J14.
Mots clefs : Dépenses publiques de santé ; Dépenses publiques de soins à long terme ; vieillissement de la population ; longévité ; effets démographiques et non démographiques ; méthodes de projection.

Public spending on health and long-term care: a new set of projections

Key policy messages

- This paper provides new projections of public spending on health and long-term care for OECD countries and the BRIICS countries (Brazil, Russia, India, Indonesia, China and South Africa). Despite the inevitable uncertainty surrounding projections, they suggest a rapidly rising trend over the next 50 years. Starting from around 6% of GDP currently, the combined public health and long-term care expenditure for OECD countries is projected to reach 9.5% in 2060 in a *cost containment* scenario assuming that policies act more strongly than in the past to rein in some of the expenditure growth. In a *cost-pressure* scenario, which assumes no stepped-up policy action spending could reach 14% of GDP. Projected increases are even steeper for some of the BRIICS going on average from the current 2.5% to 5.3% and 9.8% of GDP depending on the scenario.

- Differences in health and long-term care spending emerge across OECD countries partly reflecting differing demographic trends as well as initial levels of income and informal long-term care supply. Korea, Chile, Turkey and Mexico, for example, are projected to experience above average increases in public health expenditures. By contrast, the Nordic countries, as well as the United States and the United Kingdom, display lower than average growth over the next 50 years.

- In all countries, both health and long-term care will be driving up public spending. Focusing on the cost-containment scenario, for OECD countries average public health care expenditure is projected to increase from 5.5% of GDP in 2010 to 8% in 2060; whereas public long-term care expenditure is projected to increase from 0.8% to 1.6% of GDP in 2060. For the BRIICS, average public health care expenditure is projected to increase from 2.4% of GDP in 2010 to more than 4% in 2060; while public long-term care expenditure is projected to increase from 0.1% to 0.9% of GDP in 2060.

- The drivers of expenditure increases will differ between spending categories: health care spending will be pushed up mostly by the combined effect of technology, relative prices and exogenous factors (such as institutions and policies), while pressures on long-term care costs will originate mostly from weaker productivity gains than in the economy as a whole. Under reasonable assumptions about improving health conditions of the elderly in ageing societies (the so-called "healthy ageing" hypothesis) and the response of health spending to rising incomes, pure demographics and income effects will play only a minor role in the projected increase of public health and long-term care expenditures.

- Given the competing pressures from other social spending programmes, these projected trends in public health and long-term care spending are likely to be a major source of concern for most governments. Upside risks related to extension of the typical pre-death period of ill health as longevity increases, higher than expected costs as technical progress makes it possible to meet new demands and increased dependency due to obesity trends or dementia suggest that the projected path of expenditures provides a lower bound in the absence of more ambitious cost containment policies.

1. Introduction

Spending on health and long-term care (henceforth LTC) is a first-order policy issue for most governments in OECD countries. These expenditures are putting pressure on public budgets, adding to that arising from other social spending programmes and, once interest rates normalise, servicing of higher debt levels than in the past. The ratio of public health and LTC expenditure to GDP[1] has been rising steadily for several decades. Since 1970, on average across OECD countries, the expenditure to GDP ratio has increased by 3.5 percentage points to reach around 7 percentage points in 2010. Looking towards the future, the OECD (2006) public health and LTC spending projections highlighted the growing pressures over the next 50 years. In an upside "cost-pressure" scenario, average health and LTC expenditure was projected to almost double again, to reach approximately 13% of GDP by 2050. But, even in the so-called "cost-containment" scenario, spending was still projected to rise to approximately 10% of GDP on average across OECD countries over the next 50 years. Comparing the 2006 OECD projections with actual data up to 2010 (Figure 1, panel A), the observed increase in the ratio of public health and LTC spending to GDP was above even the pessimistic "cost-pressure scenario". On average for OECD countries, these expenditures have represented an increasing share of total public expenditures (Figure 1, panel B).

The projections in this paper update and refine the OECD (2006) analysis by extending the country coverage and improving the method of estimating future developments in health and LTC expenditure. In addition to the 34 OECD countries, health and LTC expenditure is also projected for Brazil, China, India, Indonesia, Russia and South Africa (henceforth BRIICS). Concerning the methodology, as in 2006, the new projections separate health and LTC and, within each type of expenditure, demographic from non-demographic drivers. For health care, the main difference concerns the non-demographic drivers, with an attempt to better understand the residual expenditure growth by determining which share can be explained by the evolution of health prices and technology effects. Regarding LTC, a more precise estimation of the determinants of the number of dependants (people needing help in their daily life activities) is provided. In particular, the current set of projections treats health expenditure itself as a determinant of the dependency ratios (number of dependent people in total population) by age groups. Finally, the new projections extend to 2060.

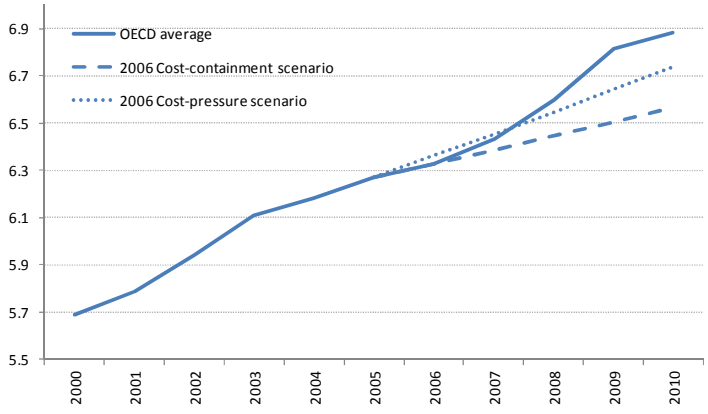
The projections are provided for public expenditure only. Nonetheless, the cross-country differences in treatment of tax expenditures,[2] which can be large in some cases, may introduce serious bias in the split between public and private expenditures. Indeed, countries interpret differently the OECD manual on the System of Health accounts on how to deal with tax expenditures. Australia and Germany, for instance, deduct tax expenditures from private insurance expenditures and report it as public expenditure. But, in the United States, tax expenditures are not considered as public expenditure (OECD, 2010).

1 To focus on the structural factors and eliminate cyclical effects, the ratio is computed using trend instead of actual GDP (from the OECD Economic Outlook, No. 91).

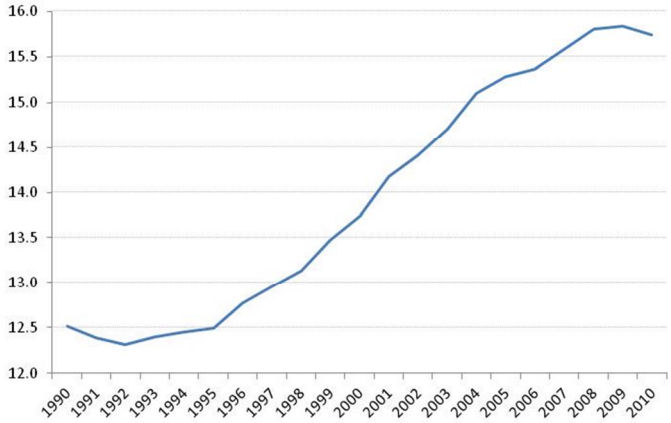
2 Tax expenditure can be of different kinds, *e.g.* exclusion from workers' taxable income of employers' health insurance contributions in the United States, tax credits for medical expenses in Canada or income tax deductions for health care services in Portugal.

Figure 1. Evolution of public health and long-term care expenditures[1]

A. Comparison of actual developments and OECD (2006) projections
(in % of trend GDP[2])



B. Share of health and LTC spending in total public spending
(in % of total public expenditure)



1. Unweighted average of available OECD countries.
2. The trend GDP was derived from the OECD Economic Outlook database.
Source: OECD Health Database (2011), OECD (2006), OECD Economic Outlook database No.91

StatLink http://dx.doi.org/10.1787/888932844163

The paper is set out as follows. In Section 2, the main demographic and non-demographic drivers of public health expenditure are analysed and projected over the next half century. Cost-containment (with implicit policy actions) and cost-pressure (without policy actions) scenarios are presented, followed by a discussion of the sensitivity of the results to key assumptions. In Section 3, the same sequence applies to public LTC expenditures. In Section 4, different health and LTC expenditure scenarios are combined in order to provide a range of estimates for total expenditure. Section 5 concludes.

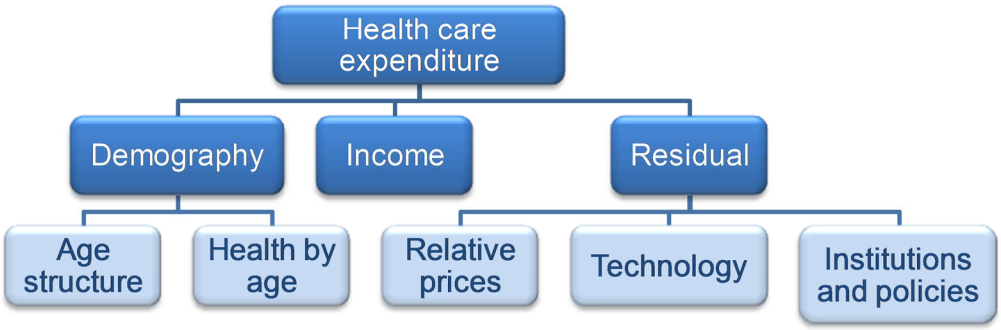
2. Health care

The determinants of public health care expenditure

The drivers of public health care expenditure are demographic and non-demographic (Figure 2). Demographic drivers relate broadly to the age structure of the population and the evolution of its health status, while a non-demographic driver is income. The relationship between health expenditures and income remains an unsettled issue, but independent of the precise income

elasticity (measure of the responsiveness of health expenditure to a change in income) the combination of demographic and income effects fails to explain a large part of the total growth in public health-care expenditure in the past. Thus, a residual unexplained growth remains. Relative prices, technological progress and the underlying health policies and institutions are the most likely candidates for explaining this residual (see Box 3 in de la Maisonneuve and Oliveira Martins, 2013).

Figure 2. The determinants of public health expenditure



To quantify the relative contribution of each driver over the past 15 years, a simple accounting analysis was carried out (for data sources and methodology, see de la Maisonneuve and Oliveira Martins, 2006, 2013). The analysis accounts for changes in the population structure during the period 1995-2009, and assumes an income elasticity of health spending of either 0.8 or 1 (see below for a discussion of this hypothesis). Based on these assumptions an expenditure residual was derived. As can be seen from Table 1, demographic drivers explain relatively little of past developments in health spending. Between 1995 and 2009, public health spending grew on average and in real terms (adjusted for overall inflation) by 4.3% per year in OECD countries, of which only 0.5 percentage points can be attributed to 'pure demographic' developments. Assuming an income elasticity equal to 0.8, income effects add 1.7 percentage points of growth on top of the 0.5 percentage points attributable to demographics. Therefore, a residual growth can be estimated at around 2 percentage points per year on average across OECD countries, with the BRIICS experiencing even more important residual growth effects. With an income elasticity of one, the residual on average for the OECD would still be around 1.5% per year. Only with a somewhat unrealistic income elasticity of 1.8, demographic and income effects could explain most of the observed expenditure growth.

Table 1. Decomposing growth in public health spending (1995-2009)[1]

	Real health spending (per capita in 2005 PPPUS$)	Age effect	Income effect (Income elasticity = 0.8)	Residual[2]	*Memo item*: Residual with unitary income elasticity
	(Average annual % change)	(Average annual % contribution to change in spending)			
Australia	4.1	0.4	1.7	1.8	1.4
Austria	3.3	0.4	1.3	1.5	1.2
Belgium	4.2	0.4	1.2	2.7	2.4
Canada	2.6	0.6	1.3	0.8	0.5
Chile	7.7	0.6	2.2	4.8	4.3
Czech Republic	4.2	0.6	2.3	1.4	0.8
Denmark	3.7	0.2	0.8	2.7	2.5
Estonia	6.1	0.6	3.9	1.8	1.0
Finland	4.1	0.6	2.0	1.5	1.1
France	1.6	0.5	0.9	0.3	0.0
Germany	1.7	0.6	0.8	0.2	0.0
Greece	5.9	0.6	2.7	2.5	1.8
Hungary	2.0	0.5	2.1	-0.6	-1.1
Iceland	3.1	0.4	2.0	0.9	0.4
Ireland	6.5	0.3	2.9	3.3	2.6
Israel	1.6	0.4	2.4	-1.2	-1.7
Italy	3.1	0.6	0.4	2.1	2.0
Japan	2.7	1.2	0.8	0.7	0.5
Korea	11.0	1.1	3.1	6.5	5.7
Luxembourg	1.9	0.1	2.3	-0.5	-1.1
Mexico	2.5	0.5	1.1	1.0	0.7
Netherlands	5.2	0.5	1.4	3.3	2.9
New Zealand	6.3	0.4	0.3	5.5	5.5
Norway	3.5	0.1	1.3	2.1	1.7
Poland	6.9	0.7	3.6	2.6	1.7
Portugal	4.6	0.6	1.5	2.4	2.0
Slovak Republic	6.3	0.6	3.6	2.1	1.3
Slovenia	3.0	0.8	2.1	0.2	-0.3
Spain	3.4	0.5	1.5	1.4	1.0
Sweden	3.2	0.2	1.6	1.4	1.0
Switzerland	2.9	0.4	0.9	1.6	1.4
Turkey	7.7	0.5	2.6	4.5	3.9
United Kingdom	4.6	0.2	1.5	2.8	2.5
United States	3.6	0.3	1.1	2.3	2.0
Brazil	4.8	0.6	1.2	2.9	2.6
China	11.2	0.6	7.3	3.0	1.3
India	6.6	0.3	4.2	2.0	1.0
Indonesia	8.0	0.5	1.9	5.5	5.0
Russia	3.7	0.4	3.3	0.1	-0.6
South Africa	3.1	0.4	1.6	1.2	0.8
OECD total average	4.3	0.5	1.8	2.0	1.5
BRIICS average	6.2	0.5	3.2	2.5	1.7
Total average	4.6	0.5	2.0	2.0	1.5

1. Or latest available year. Figures may not add up due to rounding.

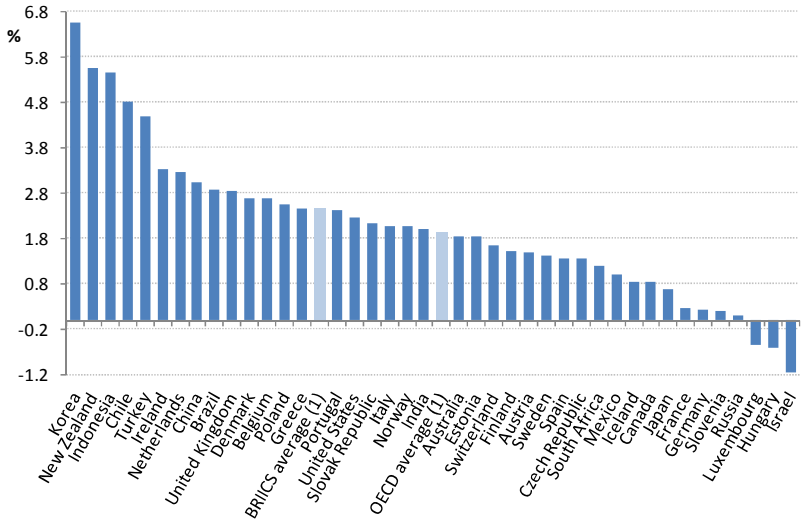
2. The residual expenditure growth is computed by subtracting the age effect and the increase in income (using an elasticity of 0.8) from the increase in real health spending. Accordingly, denoting *he*, the real health spending, *Age*, the age effect, and *Y/N*, the real income per capita, the residual expenditure growth ($\dot{Res}$) is expressed as follows:

$$\dot{Res} = \dot{he} - \dot{Age} - 0.8 * \dot{Y/N}$$

The calculated expenditure residual growth displays large differences across countries (Figure 3). It ranges from above 5% per year for countries such as Korea and New Zealand, to values well below 0.5% for France, Germany, Slovenia and Russia, and is even negative for Israel. Extrapolating these country-specific idiosyncrasies over the next 50 years may generate unreliable results as most of them would lead to unsustainable expenditure ratios. For this reason, in this study, it was preferred to use a common average residual growth (see below).

Figure 3. Health care residual expenditure growth by country (1995-2009)

(Annual average growth rates in %)



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1. Unweighted average.
Source: OECD Health Database (2011) and authors' calculations

Projection framework

The framework used to project public health expenditure combines both the demographic and non-demographic drivers described above. The evolution of each driver is first projected separately, and subsequently combined to compute the future growth of total health expenditure. Thus the evolution of the future share of public health care spending in GDP depends on demographic and real income per capita projections, as well as on the extrapolated residual growth component. The demographic driver includes three elements -- death-related costs, pure age effects based on population projections drawn from different sources and a healthy-ageing effect -- which are described below. Future GDP is based on projections published in the *OECD Economic Outlook*, No. 91.[3] As in the historical accounting exercise, the income effects are captured by an elasticity of health expenditures that can take the value of 0.8 or 1 depending on the scenario.

The growth rates in spending ratios are first projected for each country and they are then adjusted to allow for a certain convergence across countries towards a common target level. *Ceteris paribus*, countries having a below average initial level of public health expenditure to GDP ratios are projected to experience higher growth rates than those close to the average. This makes the projections more comparable across countries, as the effects of the different mechanisms at work during the projection period are isolated from the impact of the initial conditions. In order to smooth out the impact of the recent crisis on expenditure, the base year spending ratios are computed as the

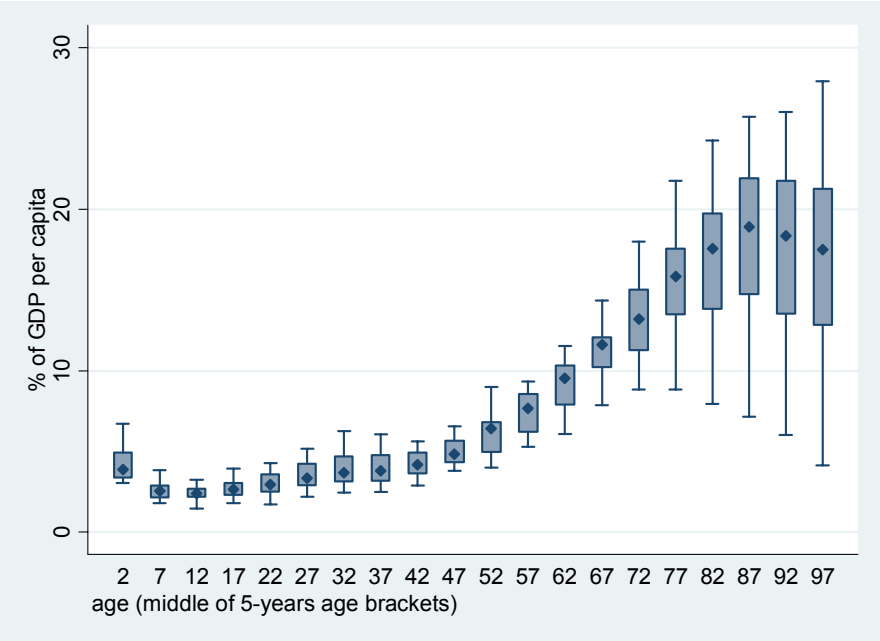
3. For more details see Johansson *et al.,* (2012).

average shares of public health care spending in GDP over 2006-2010. This framework is used to project public health care expenditures over the period 2010-60.

The base information used to construct the health expenditure projection framework is the average health expenditure profile by age group (Figure 4). Average health expenditures are relatively high for young children; they decrease and remain stable for most of the prime-age period, and then start to increase rapidly in older age, the health care cost of people aged 90 and over being six times that of young people. Until the age of 65, health expenditure profiles are rather similar across countries, but from 65 onwards they display a large heterogeneity. The standard deviation by age group increases from 1.8% for the 65-69 age group to more than 5% for people aged 90 and over.

From Figure 4 it could be expected *a priori* that an ageing population would be associated with increasing aggregate *per capita* public health care expenditures: the fact that the share of older people in the population is growing faster than that of any other age group, both as a result of longer lives and a lower birth rate, should generate an automatic increase in the average. However, this intuition finds little support in the data and assessing the effect of population ageing on health and health care has proved to be far from straightforward (Breyer *et al.*, 2011).

Figure 4. Public health care expenditure by age groups[1]
(% of GDP per capita)



StatLink http://dx.doi.org/10.1787/888932844201

1. The graph shows the dispersion of health care expenditure across countries by age groups. The diamonds represent the median. The boxes are the 2nd and 3rd quartiles of the distribution of expenditure across countries. The whiskers are the 1st and 4th quartiles.

Source: European Commission, 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060)

Consistent with a large number of previous studies (Felder *et al.*, (2000), Seshamani and Gray (2004); Breyer and Felder (2006); and Werblow *et al.*, (2007), etc.), this paper assumes that what matters for health spending is not ageing but rather the proximity to death, *i.e.* the so-called "death-related costs" (DRC) hypothesis. This interpretation is consistent with the observed facts that health-care expenditure tends to increase in a disproportionate way when individuals are close to death, and mortality rates are obviously higher for older people. When the projected increase in life expectancy is accompanied by an equivalent gain in the number of years spent in good health, the health care

spending is only driven by the proximity to death and not by an increase in the average age of the population. In other words, it is not ageing *per se* that pushes up average health expenditures, but rather the fact that mortality rates increase with age. The death-related costs hypothesis is, therefore, consistent with a so-called *healthy-ageing* regime, where longevity gains are all translated into years in good health (Box 1).

To account for the dominance of death-related costs and the healthy-ageing regime, the expenditure curve by age group needs to be split for each period into two segments of the population: *survivors* and *non-survivors*. The *non-survivors'* expenditure curve can be estimated by multiplying the estimated health costs in the proximity to death by age group by the number of deaths per age group. The "cost of death" was proxied here by the health expenditure per capita for the oldest age group (95+) multiplied by a factor that captures the tendency for the costs of death to be higher at younger ages. This factor is kept constant at 4 for people aged between 0 and 59 years and declines linearly (towards unity) afterwards.[4]

As regards *non-survivors*, two different demographic effects are at play. On the one hand, the number of deaths is set to rise due to the *transitory* effect of the post-War baby-boom. On the other hand, if mortality falls over time due to an ongoing increase in longevity, fewer will be at the very end of life in each given year, thus mitigating health care costs.[5] The impact of demographic developments on public health care expenditures will depend on the relative size of these effects.

In principle, the *survivors'* expenditure curve for each country could be derived from the difference between the total cost curve and that of the non-survivor. However, given the uncertainties surrounding these data, it seemed preferable to estimate an average expenditure curve for survivors, to be then used for all countries. In this way, the projections are less sensitive to initial conditions and to country-specific data idiosyncrasies. This expenditure curve for *survivors* was estimated econometrically as a non-linear function of age. Each country-specific curve is then calibrated in order to fit the base year of the projections.

Box 1. Healthy ageing hypothesis

To take into account the "healthy ageing" hypothesis, the survivor expenditure curve is allowed to shift rightwards according to longevity gains, progressively postponing the age-related increases in expenditure. First, the curve by five-year age groups is interpolated in order to derive a yearly age profile. In this way, the expenditure curve can be shifted smoothly over time, in line with life expectancy gains.

Subsequently the shift of the curve can be simulated by subtracting the increase in life expectancy at birth according to national projections from each current age. For example, a 70-year old person in Germany is projected to have the health status of a 67-year old person by 2025 and that of a 64-year old person by 2050.

By contrast, in a "pure demographic" scenario, the expenditure curves would not shift rightwards with ageing, reflecting the implicit assumption of unchanged health status at any given age. When these curves stay put in the presence of longevity gains, the share of life lived in 'bad health' increases with life expectancy.

It could be noted that the population projections used in the analysis are pre-determined and do not take into account the effect of health spending on health status and longevity. Making population projections dependent on the level of health spending is beyond the scope of this project and could be the object of further research.

4 While the probability of dying increases with age, the costs of death tend to decline steadily after young and prime age (Aprile, 2004). Other estimates of DRC are coherent with this order of magnitude (*e.g.* Yang *et al.,* (2003)).

5. See, for example Fuchs (1984); Zweifel *et al.,* (1999); Jacobzone (2003); and Gray (2004).

Non-demographic drivers

As mentioned above, overall demographic drivers explain relatively little of past developments in health spending, even assuming that the expenditure curve by age remains constant (or abstracting from "healthy ageing" effects). Therefore, the non-demographic drivers must play an important role: these are the growth in income and a residual growth component.

The effect of real income growth on public health expenditures has been the subject of a vast debate, but the precise value of the income elasticity is still uncertain. Empirical estimates tend to increase with the degree of income aggregation, implying that health care could be "an individual necessity and a national luxury" (Getzen, 2000). However, a high aggregate income elasticity (above unity) often found in macro studies may result from biases in estimates originating from a number of sources, such as failure to appropriately control for quality effects and account for the peculiar statistical properties of some of the variables. Based on the most recent findings from this literature (*e.g.* Acemoglu *et al.*, 2009 and Holly *et al.*, 2011), as well as estimations carried out by the authors, a real income elasticity equal to 0.8 has been used (a middle point across those estimates) and the sensitivity of the projections to this assumption was subsequently tested (by contrast, OECD (2006) assumed a unitary income elasticity throughout).

Once income growth has been accounted for, several factors may explain the residual growth observed in the past: developments in relative prices, technological progress and the features of health institutions and policies. Nonetheless, it is not feasible at this stage to project these drivers individually. Thus the residual is projected as a whole (as in OECD, 2006) and sensitivity to different assumptions is subsequently tested. Furthermore, a common residual growth is assumed for all countries in order not to extrapolate country-specific idiosyncrasies over a long period. Based on estimates provided in de la Maisonneuve and Oliveira Martins (2013), the projections are based on a benchmark residual expenditure growth of 1.7% per year. Residual growth over the 2010-2060 period, reflecting non-demographic, non-income pressures on public health care spending is then assumed to vary around this benchmark across the different projection scenarios (See Table 2 below for details).

Summing up

To summarise graphically the way in which demographic and non-demographic drivers contribute to health care spending (Figure 5), the mechanical effect of population ageing on expenditures can be displayed as moving up along the expenditure curve, assuming that the age profile of expenditures remains constant over time (Panel 1). This age factor is then adjusted by incorporating the healthy ageing hypothesis, corresponding to a rightward shift of the curve (Panel 2). This shift implies that older people still cost more than the young, but at progressively older ages. Finally, the expenditure curve may shift upwards[6] (Panel 3) due to non-demographic drivers (income, the quality-adjusted relative health prices and other unexplained factors, such as policies and institutions).

Projection results: public health expenditures, 2010-2060

This section applies the analytical framework to project public health care expenditures in different scenarios over 2010-2060. The main assumptions underlying each scenario are listed in Table 2. The section looks first at the demographic and income effects on expenditures and, subsequently, two scenarios regarding the evolution of drivers other than income and demographics (*i.e.,* the residual growth) are analysed. In the "cost pressure scenario" no policy action is undertaken to curb pressures on expenditure whereas the "cost-containment scenario" assumes some policy action to rein in these pressures on expenditures. Even though the nature of such policies is not made explicit, they can be thought of as actions to limit the pressures arising from excessive growth of

6 It has to be noted that depending on the type of expenditure this upward shift may be non-homothetic across ages. For example, expenditure at older ages may be more affected by such an upward shift than at younger ones.

quality-adjusted relative health prices, *e.g.,* by monitoring more closely the adoption of new technologies or modifying incentives via changes in the governance of health institutions. All these scenarios assume healthy ageing and an income elasticity of 0.8. Finally, sensitivity analysis is carried out in the context of the cost-containment scenario. More specifically, sensitivity analysis is carried out regarding the value of the income elasticity, the evolution of residual spending growth (*i.e.* unrelated to income and demographics) and the "healthy ageing" hypothesis. Concerning the latter, results are obtained also in the case of no healthy ageing (*i.e.* morbidity expands with gains in longevity) and for a more optimistic hypothesis under which each year increase in life expectancy is translated into two years spent in good health.

Figure 5. Shifts in expenditure profiles, ageing and non-ageing effects

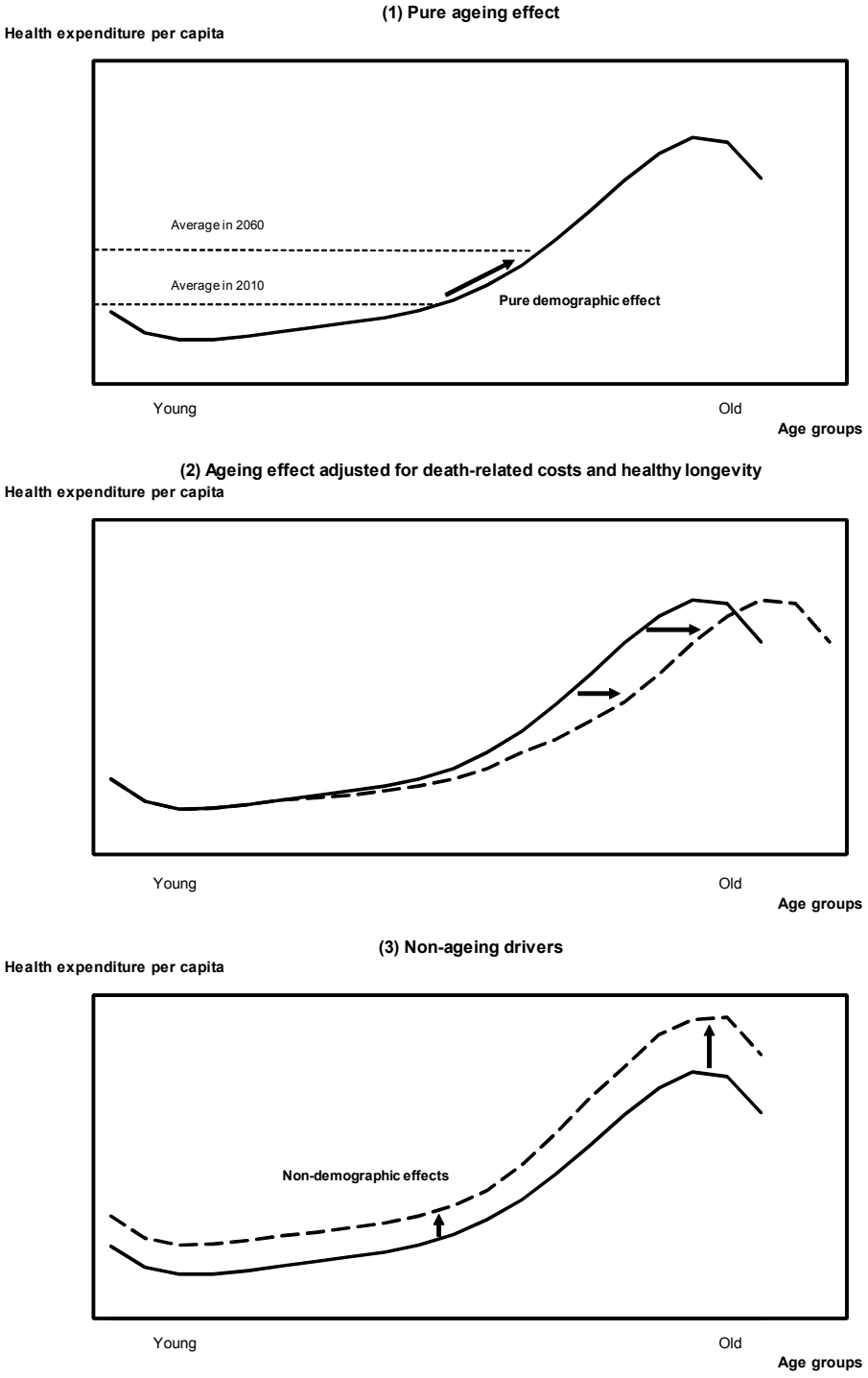


Table 2. Assumptions underlying the alternative projection scenarios: public health care

Scenarios	Health status	Income elasticity	Non-demographic, non-income drivers
Demographic effect	Healthy ageing: longevity gains are translated into equivalent additional years in good health	n.a	n.a
Cost-pressure scenario	Healthy ageing: longevity gains are translated into equivalent additional years in good health	Income elasticity = 0.8	**The residual is assumed to grow at 1.7% over the projection period**
Cost-containment scenario	Healthy ageing: longevity gains are translated into equivalent additional years in good health	Income elasticity = 0.8	The residual growth is 1.7% in the starting period and then converges to 0 in 2060
Sensitivity analysis based on the cost-containment scenario			
Compression of morbidity	**Longevity gains are doubled into additional years in good health**	Income elasticity = 0.8	The residual growth is 1.7% in the starting period and then converges to 0 in 2060
Expansion of morbidity	**No health ageing adjustment, i.e longevity gains do not translate into additional years in good health**	Income elasticity = 0.8	The residual growth is 1.7% in the starting period and then converges to 0 in 2060
Country-specific quality adjusted relative prices	Healthy ageing: longevity gains are translated into equivalent additional years in good health	Income elasticity = 0.8	**The residual growth is country specific and converges to 0 in 2060**
Income elasticity = 0.6	Healthy ageing: longevity gains are translated into equivalent additional years in good health	**Income elasticity = 0.6**	The residual growth is 1.7% in the starting period and then converges to 0 in 2060
Income elasticity = 1	Healthy ageing: longevity gains are translated into equivalent additional years in good health	**Income elasticity = 1**	The residual growth is 1.7% in the starting period and then converges to 0 in 2060

Note: The key assumption changed in each scenario is in bold.

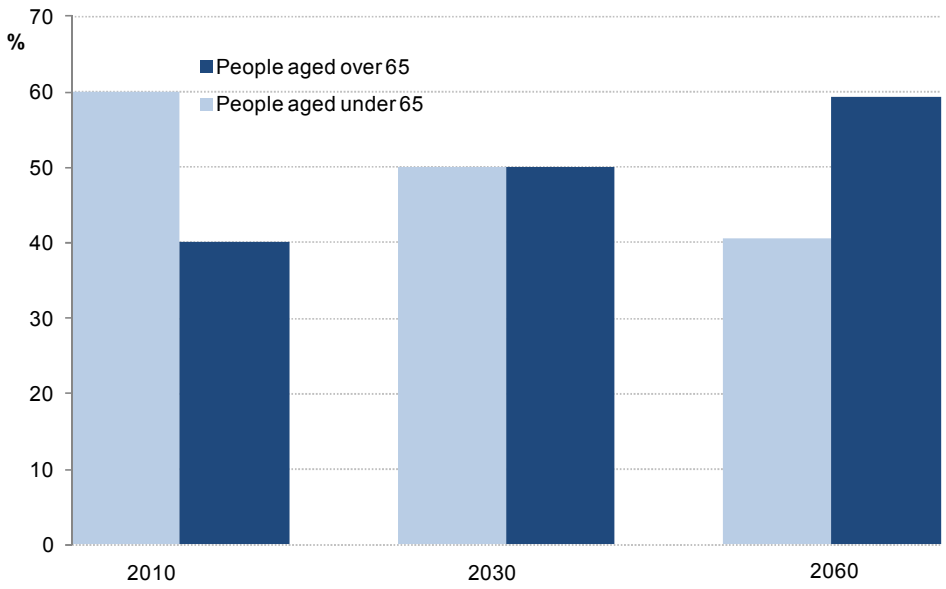
Demographic and income effects

As discussed above, demographic effects on public health care expenditures can be decomposed into health care costs for survivors, the adjustment for "healthy ageing" and death-related costs. The pure ageing effect can be quite large in some countries, but tends to be compensated by better health status. Whereas on a per capita basis death-related costs account for the largest part of lifetime expenditures, for the population as a whole they account for only a small fraction of the increase in expenditures as a share of GDP since they concern only the non-survivors.

On average, the demographic effect only accounts for a small increase in expenditure. In OECD countries and on its own, it pushes spending from 5.5% of GDP on average to 6.2% in 2060. In non-OECD countries the demographic effect on its own increases spending from 2.4% of GDP to 3.4% in 2060. While the "healthy ageing" assumption may render the simulation of demographic effects relatively optimistic, this is in line with observed patterns of health status regimes in many OECD countries. It is assumed that the same pattern will apply to non-OECD countries. The effect is projected to apply evenly before and after 2030 for both OECD and non-OECD countries.

It is noteworthy that while demography is not a main driver of health care spending growth, it will induce a significant change in the structure of spending over time. In 2010, 60% of health care expenditures were directed to people below 65 years old. In 2060, roughly the same percentage of expenditures will be directed to people aged above 65, reflecting an increase from 15% to 30% of their share in total population (Figure 6). This evolution is only the consequence of demographic effects as non-demographic effects are assumed to affect all age groups in the same proportion. In other words, while demography is not a main driver of health spending growth, it will induce a significant change in the structure of the spending.

Figure 6. Shares of health care expenditure by age in total health care expenditure



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The total effect of demographics and income on the increase in public health care expenditures by 2060 is very different across countries (Table 3). In OECD countries, the demographic effect ranges from 0.2 percentage points of GDP in Belgium, Iceland and the United Kingdom to more than 1.8 points in Chile, Korea and Turkey. For non-OECD countries it varies from zero in South Africa to 1.7 percentage points of GDP in Brazil and China, reflecting more rapid ageing in the latter two countries.

With an assumed less than unitary real income elasticity, the underlying increase in income would imply *ceteris paribus* a decline in the health expenditure to GDP ratio. As the GDP projections embody a degree of convergence towards living standards of high-income countries, this downward income effect on spending ratios is more important for rapidly catching-up low-income countries. Indeed on average for OECD countries the decline in expenditure ratios due to income growth will amount to -0.8 percentage points while in non-OECD countries it will be -1.4 percentage points.

The cost pressure scenario

As mentioned earlier, in the "cost pressure scenario" it is assumed that on top of the demographic and income effects, health expenditure will grow by a residual 1.7% per year over the whole projection period. In this scenario, the OECD average health expenditure to GDP ratio is projected to increase by more than 6 percentage points, reaching close to 12% in 2060 from a starting value of 5.5% in 2006-2010. The largest increases (above 7 percentage points of GDP) are found in Chile, Korea and Turkey, while the lowest (below 6 percentage points of GDP) are found in Belgium, Denmark, Estonia, Finland, Hungary, Iceland, Sweden and the United Kingdom. Starting from a much lower ratio of health expenditure to GDP at 2.4%, the BRIICS will experience a larger increase as the ratio is set to more than triple, to reach 8.3%. The most important part of these increases is due to the residual component. For both OECD and non-OECD countries, the increase, on average, will be slightly higher in the second part of the projections period.

Table 3. Projection scenarios for public health care expenditure

		Percentage point deviations from starting period in 2030				Percentage point deviations from starting period in 2060			
		Contributions of demographic and income effects		Total increase in spending ratio		Contributions of demographic and income effects		Total increase in spending ratio	
	Average 2006-2010	Demographic effect	Income effect	Cost-pressure	Cost-containment	Demographic effect	Income effect	Cost-pressure	Cost-containment
Australia	5.6	0.4	-0.4	2.0	1.5	0.8	-0.8	6.3	2.5
Austria	6.6	0.4	-0.2	2.1	1.7	0.6	-0.6	6.3	2.4
Belgium	5.8	0.2	-0.3	1.8	1.4	0.2	-0.7	5.8	1.9
Canada	5.8	0.6	-0.3	2.2	1.8	0.7	-0.7	6.3	2.5
Chile	3.1	0.9	-0.6	2.3	1.8	1.8	-1.1	7.1	3.2
Czech Republic	5.5	0.4	-0.5	1.9	1.4	0.7	-0.9	6.1	2.2
Denmark	6.3	0.4	-0.2	2.1	1.6	0.3	-0.7	5.9	2.0
Estonia	4.3	0.2	-0.5	1.6	1.1	0.6	-1.1	5.8	2.0
Finland	5.2	0.4	-0.3	2.0	1.5	0.3	-0.7	5.9	2.0
France	7.4	0.3	-0.3	1.9	1.4	0.3	-0.6	6.1	2.2
Germany	7.3	0.5	-0.3	2.1	1.6	0.6	-0.7	6.2	2.3
Greece	5.4	0.3	-0.3	1.9	1.4	0.7	-0.6	6.4	2.5
Hungary	4.8	0.2	-0.5	1.6	1.2	0.4	-1.0	5.8	1.9
Iceland	5.8	0.3	-0.2	2.0	1.5	0.2	-0.7	5.9	2.0
Israel	4.0	0.3	-0.2	2.0	1.5	0.7	-0.7	6.4	2.5
Ireland	5.5	0.3	-0.2	2.1	1.6	0.5	-0.5	6.4	2.5
Italy	6.1	0.3	-0.2	2.1	1.6	0.7	-0.6	6.4	2.6
Japan	6.1	0.6	-0.3	2.3	1.8	0.8	-0.8	6.3	2.5
Korea	3.3	1.1	-0.5	2.6	2.1	2.0	-0.8	7.6	3.7
Luxembourg	4.4	0.4	-0.1	2.2	1.7	0.7	-0.2	6.9	3.0
Mexico	2.5	0.6	-0.5	2.1	1.6	1.6	-1.1	6.9	3.0
Netherlands	6.4	0.6	-0.3	2.2	1.8	0.7	-0.7	6.3	2.4
New Zealand	6.4	0.5	-0.3	2.1	1.6	0.8	-0.9	6.3	2.4
Norway	5.1	0.3	-0.4	1.9	1.4	0.5	-0.7	6.1	2.2
Poland	4.1	0.4	-0.5	1.9	1.4	1.0	-0.9	6.4	2.6
Portugal	6.5	0.4	-0.2	2.0	1.6	0.8	-0.7	6.5	2.6
Slovak Republic	5.4	0.5	-0.5	1.9	1.5	1.1	-0.9	6.5	2.6
Slovenia	5.2	0.5	-0.3	2.1	1.7	1.0	-0.8	6.6	2.7
Spain	5.6	0.4	-0.3	2.0	1.6	1.0	-0.6	6.7	2.8
Sweden	6.6	0.2	-0.3	1.8	1.3	0.3	-0.7	5.9	2.0
Switzerland	5.7	0.4	-0.3	2.1	1.6	0.9	-0.8	6.5	2.6
Turkey	3.8	0.7	-0.6	2.0	1.5	1.8	-1.1	7.0	3.1
United Kingdom	6.5	0.2	-0.2	1.9	1.4	0.2	-0.7	5.9	2.0
United States	7.1	0.4	-0.3	2.0	1.5	0.5	-0.7	6.1	2.2
OECD average [1]	***5.5***	***0.4***	***-0.3***	***2.0***	***1.6***	***0.8***	***-0.8***	***6.3***	***2.5***
Brazil	3.7	0.8	-0.6	2.1	1.6	1.7	-1.1	7.0	3.1
China	1.9	0.9	-1.1	1.7	1.3	1.7	-1.7	6.4	2.5
India	1.2	0.3	-1.0	1.3	0.8	0.9	-1.7	5.5	1.6
Indonesia	1.2	0.6	-0.8	1.7	1.3	1.3	-1.5	6.2	2.3
Russia	3.1	0.1	-0.6	1.5	1.0	0.2	-1.0	5.5	1.6
South Africa	3.2	0.0	-0.6	1.4	0.9	0.0	-1.2	5.2	1.3
Non-OECD average [1]	***2.4***	***0.5***	***-0.8***	***1.6***	***1.2***	***1.0***	***-1.4***	***5.9***	***2.1***
Total average [1]	***5.0***	***0.4***	***-0.4***	***2.0***	***1.5***	***0.8***	***-0.8***	***6.3***	***2.4***

1. Unweighted average.

Source: Authors' calculations.

The cost-containment scenario

While the cost-pressure projections may be useful as a benchmark, they do not seem very plausible. It is unlikely that public health-care expenditures to GDP could continue to grow at such rates, without limit. For instance, regarding drugs, the following policies can help containing the costs: a more intense use of generics, a revision of re-imbursement practices for drugs with low medical service (and more stringent restrictions on exemptions to this rule), a more frequent re-evaluation of prices of new drugs (in general a more transparent and dynamic pricing of new drugs),

centralised bargaining for the purchase of drugs and medical goods in public hospitals, reduction in excessive consumption of specific drugs. Regarding in-patient care, shorter length of stay, development of ambulatory hospitalisation or more user choice among health providers could help reining in the expenditure growth. Regarding out-patient care, a more stringent health monitoring of patients affected by long-term diseases in order to reduce costly complications; financial incentives set on general practitioners to reduce prescription inflation and enhance prevention could also help maintaining the health expenditure on a sustainable path.

Accordingly, a long-run convergence condition is considered in the cost-containment scenario. Specifically, the growth contribution of the spending residual, whose past growth was partly attributable to technology and relative price effects, is assumed to converge to zero in 2060, implicitly representing the assumption that policies are more effective than in the past in controlling the expenditure growth driven by non-demographic non-income related factors.

In this scenario (Table 3), the health expenditure to GDP ratio for OECD countries would increase by 2.5 percentage points, to reach close to 8% on average by 2060. The largest increases (above 3 percentage points of GDP) are found in Chile, Korea, Luxembourg, Mexico and Turkey. The lowest increases (below 2 percentage points of GDP) are found in Estonia, Hungary, Sweden and the United Kingdom. The increase in non-OECD countries averages around 2 percentage points, to reach 4.5% of GDP by 2060. The effect of non-demographic non-income factors is higher before 2030 than after for all countries, as the residual growth is assumed to converge to zero over the projection period. The difference between cost-pressure and cost-containment scenarios increases over time due to compounding effect of the residual.

Sensitivity analysis

In the sensitivity analysis, a number of parameters were changed in the context of the "cost-containment scenario": the income elasticity, the residual spending growth, as well as factors underlying health status at old age (Table 4). Overall, the previous results seem relatively robust. Specifically, these alternative simulations do not change qualitatively the picture emerging from the comparison of the "cost-pressure" and "cost-containment" scenarios discussed above.

First, given that assumptions on the future evolution of the residual are necessarily arbitrary, their impact on projections was checked by computing a cost-containment scenario in line with the assumptions behind such a scenario in the previous 2006 OECD projections. In this variant (not shown in the table), on top of the demographic and income effects, the residual component is assumed to contribute 1% per year, tending towards 0% in 2060. On average, the health expenditure to GDP ratio across OECD countries reaches 6.8% instead of 7.9% in this new exercise. For non-OECD countries, the ratio will reach 3.3% instead of 4.4%. As the assumption underlying this scenario is common for all countries, the percentage point deviation from cost-containment scenario is the same for all countries (-1.1). However, the assumptions behind this scenario may be overly optimistic: the lower value of the residual growth contribution in the 2006 exercise reflected in part a higher income elasticity which arithmetically left less of historical spending growth to be explained by the residual. Assuming both lower income elasticity than in the 2006 exercise and a similar residual spending component may be too much to hope for.

Table 4. Sensitivity analysis on public health care projections

(Performed on the cost-containment scenario)

	Income elasticity=0.6	Income elasticity=1	Country specific residual growth (non-income, non-demographic effect)	Compression of morbidity[1]	Expansion of morbidity[2]
	Percentage point deviations from cost-contaiment scenario in 2060				
Australia	-0.7	0.8	9.9	-0.6	0.6
Austria	-0.5	0.6	6.4	-0.7	0.9
Belgium	-0.6	0.7	0.2	-0.6	0.8
Canada	-0.6	0.7	1.0	-0.5	0.7
Chile	-0.8	1.1	0.0	-0.6	0.7
Czech Republic	-0.8	0.9	-4.0	-0.8	1.0
Denmark	-0.6	0.7	5.4	-0.7	0.8
Estonia	-0.9	1.1	0.0	-0.7	0.8
Finland	-0.6	0.7	4.0	-0.7	0.7
France	-0.5	0.6	-2.4	-0.6	0.8
Germany	-0.6	0.7	-0.7	-0.7	0.9
Greece	-0.5	0.6	2.9	-0.6	0.8
Hungary	-0.8	1.0	-1.9	-0.9	1.3
Iceland	-0.6	0.7	15.7	-0.5	0.6
Israel	-0.6	0.7	0.0	-0.5	0.7
Ireland	-0.4	0.5	0.0	-0.7	0.8
Italy	-0.5	0.6	-1.8	-0.6	0.7
Japan	-0.6	0.8	0.0	-0.6	0.7
Korea	-0.7	0.8	0.5	-0.7	0.8
Luxembourg	-0.2	0.2	-0.9	-0.7	0.9
Mexico	-0.8	1.1	0.0	-0.7	0.9
Netherlands	-0.6	0.7	-2.7	-0.6	0.8
New Zealand	-0.7	0.9	2.0	-0.6	0.6
Norway	-0.6	0.7	-1.6	-0.6	0.7
Poland	-0.7	0.9	-5.3	-1.0	1.3
Portugal	-0.6	0.7	8.7	-0.8	0.9
Slovak Republic	-0.8	0.9	-6.5	-1.0	1.4
Slovenia	-0.6	0.8	0.0	-0.7	0.7
Spain	-0.5	0.6	5.8	-0.7	0.8
Sweden	-0.6	0.7	-0.4	-0.6	0.7
Switzerland	-0.6	0.8	1.1	-0.6	0.8
Turkey	-0.8	1.1	0.0	-0.8	1.0
United Kingdom	-0.6	0.7	-2.3	-0.6	0.7
United States	-0.6	0.7	-1.6	-0.6	0.6
OECD average [3]	***-0.6***	***0.8***	***0.9***	***-0.7***	***0.8***
Brazil	-0.9	1.1	0.0	-0.8	1.0
China	-1.1	1.7	0.0	-0.8	1.1
India	-1.1	1.7	0.0	-0.8	1.2
Indonesia	-1.0	1.5	0.0	-0.9	1.3
Russia	-0.8	1.0	0.0	-0.7	1.0
South Africa	-0.9	1.2	0.0	-0.6	1.4
Non-OECD average [3]	***-1.0***	***1.4***	***0.0***	***-0.8***	***1.2***
Total average [3]	***-0.7***	***0.8***	***0.8***	***-0.7***	***0.9***

1. Longevity gains are doubled into additional years in good health.
2. No healthy ageing adjustment, *i.e.* longevity gains do not translate into additional years in good health.
3. Unweighted average.
Source: Authors' calculations.

There is considerable uncertainty concerning the income elasticity of health spending. The sensitivity analysis is carried out taking plus and minus two standard deviations from the value estimated in the benchmark regressions, corresponding to an income elasticity equal to 0.6 and 1 respectively. When the income elasticity is set to one, on average for OECD countries the health expenditure deviation from base case will be 0.8 percentage points of GDP to reach 8.7%. It is slightly higher for non-OECD countries at 1.4 percentage points of GDP. In both groups of countries, those with the largest projected GDP per capita growth are obviously the most affected by changes in the income elasticity. When the income elasticity is set to 0.6, health expenditure deviates from base case by -0.6 percentage points of GDP on average in OECD countries, to reach 7.3%. This deviation is much higher in non-OECD countries, amounting to -1 percentage point of GDP.

Sensitivity to alternative health status was also explored. In an "expansion of morbidity" scenario, the share of life spent in ill health would increase as life expectancy increases (*e.g.* an increase in the survival rates of sick people), while a "compression of morbidity" scenario would mean the opposite (*e.g.* an improvement in the health status and health behaviour of the new cohorts of old people). Under these scenarios, by 2060 average health expenditures in OECD countries range from 7.2 to 8.7% of GDP. In non-OECD countries, they range from 3.7% to 5.6%. Thus, while alternative health regimes matter for projecting future expenditure trends, their impact on projections is smaller than that of non-demographic effects.

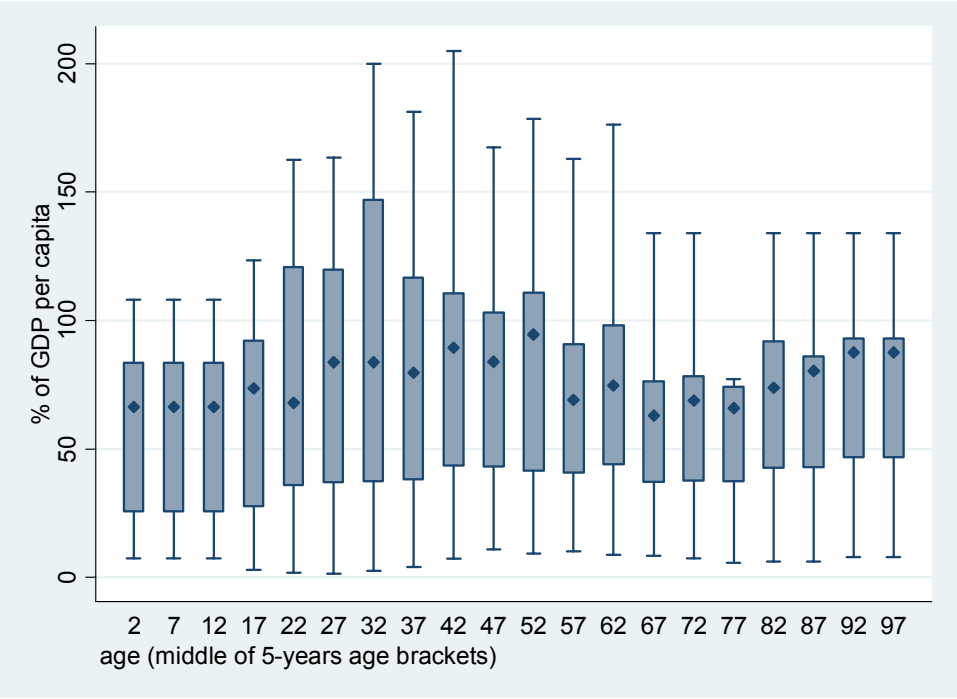
3. Long-term care

Long-term care differs radically from health care. While health care services aim at changing the health condition (from unwell to well), LTC merely aims at making the current condition (unwell) more bearable. Individuals need LTC due to disability, chronic condition, trauma, or illness, which limit their ability to carry out basic self-care or personal tasks that must be performed each day. Such activities are defined as activities of daily living (ADLs), which embrace eating, dressing, bathing, getting in and out of bed, toileting and continence or instrumental activities of daily living (IADLs), which include preparing own meals, cleaning, laundry, taking medication, getting to places beyond walking distance, shopping, managing money affairs and using the telephone/internet. A person is dependent if he or she has limitations in ADLs or IADLs.

It should be noted that LTC also includes a small part of health services that are thus not accounted for in health care. Indeed, total LTC spending is calculated as the sum of health care and social services for those in LTC (Colombo *et al.*, 2011)). Health-related LTC spending includes palliative care, long-term nursing care, personal care services, and health services in support of family care. Social services provided for LTC include home help (*e.g.*, domestic services) and care assistance, residential care services, and other social services. In other words, the health component of LTC spending includes episodes of care where the main need is either medical or personal care services (ADL support), while services whose dominant feature is help with IADL are considered outside the health-spending boundaries.

A striking difference between spending on health and LTC is that the cost of LTC per beneficiary is roughly independent of age (Figure 7). Indeed, the cost of helping one person in ADLs or IADLs could be more or less the same, irrespective of their age. Moreover, while potentially the entire population may benefit from health care, only dependent persons will benefit from LTC. Therefore, while the age-specific cost curve for health care was expressed per capita for each age group, that for LTC is expressed per dependant.

Figure 7. Public long-term care expenditure per beneficiary as a % of GDP per capita[1]



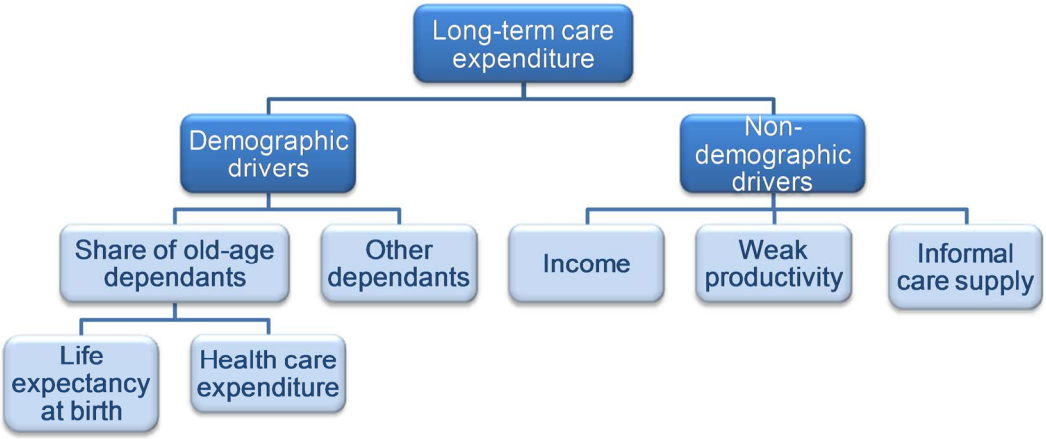
StatLink http://dx.doi.org/10.1787/888932844239

1. The graph shows the dispersion of long-term care expenditure across countries by age groups. The diamonds represent the median. The boxes are the 2nd and 3rd quartiles of the distribution of expenditure across countries. The whiskers are the 1st and 4th quartiles.

Source: European Commission, 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060).

As for health care, two kinds of determinants drive LTC expenditure, demographic and non-demographic (Figure 8). The demographic driver is related to the number of dependent people in the population. The evolution of this factor depends on the evolution of life expectancy and health expenditure. The non-demographic drivers are related to income developments and changes in the demand for public-financed LTC services. Income is assumed to have a direct effect via increases in living standards (GDP per capita) and an indirect effect via cost-disease (relative productivity or Baumol) effects. Given the importance of home production of LTC services, the demand for public spending on LTC is assumed to depend on developments in formal labour force participation.

Figure 8. The determinants of long-term care expenditure



Projection framework

The framework used to project public LTC expenditure distinguishes between demographic and non-demographic drivers. The evolution of each driver is projected separately. They are then combined to compute the future growth of total LTC expenditure. The basic projection equation can be interpreted as a reduced form combining demand and supply factors that determine equilibrium LTC expenditures. More details on these assumptions and the corresponding variable definitions are provided below. They combine a demographic effect which in the case of LTC stand for the number of dependent people; a *Baumol* effect captured by the labour productivity differential between the LTC sector and the rest of the economy with an elasticity that can take the value of 1 or 0.5 depending on the scenario (0.5 or 0.25 for the BRIICS); an *income effect* with an elasticity of LTC expenditures that can take the value of 1 or 2; and, the changes in the provision of informal care proxied by the of evolution of labour force participation of women 50-64 aged with an elasticity of 0.7.

The growth rates are first projected for each country. Applying the same methodology as for health care, those growth rates are then adjusted to allow for a certain convergence of LTC expenditure to GDP ratio across countries. In order to smooth out the impact of the recent crisis on expenditure, the starting point for each country is computed as the average share of public LTC spending in GDP over 2006-2010.

Demographic drivers of expenditure

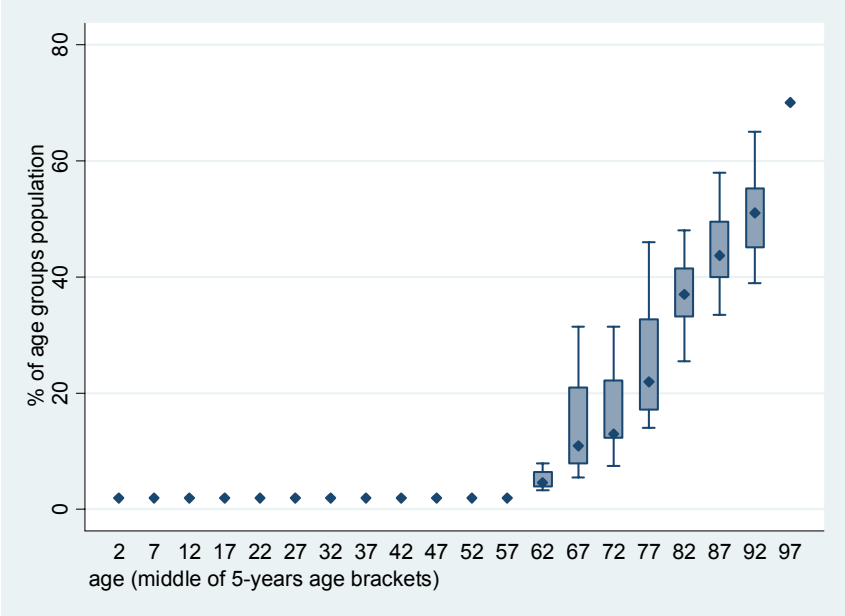
Whereas health care projections distinguished between survivors and non-survivors, the LTC projections split each age group into dependants and non-dependants. The age-specific dependency ratios have been estimated by the European Commission for 22 European countries (Ageing Report 2009). Even if the shape of the dependency ratios by age differs across countries, the dispersion remains relatively limited (Figure 9). Thus, as a first approximation, dependency ratios (number of dependants by age group) are assumed to be broadly uniform across countries. For the purpose of projecting expenditure, this also has the advantage of eliminating current differences in the prevalence of dependency across countries as a possible cause for future differential increases in LTC expenditures. In other words, the projections become less sensitive to initial conditions. Noteworthy, this assumption therefore abstracts from the influence of differences in policy settings on these initial conditions.

For the calculation of the pure demographic effect, it is assumed that the LTC spending per dependant remains constant. Thus, the variation in LTC expenditure resulting from the pure demographic effect is only driven by the increase in the number of dependants by age group. The latter is derived from the average age-specific dependency ratio (see above) multiplied by the population by age group.

The number of dependent people in the population depends on the evolution of longevity and spending on health care. As the age-specific dependency ratio rises sharply after the age of 75, any increase in life expectancy above that threshold can increase significantly the number of old-age dependants, thereby putting pressure on LTC spending. Moreover, as health care spending improves the probability of survival at old-age, it can also push up LTC spending. This will be the case, for instance, if survival at older ages translates into an increase in the prevalence of chronic diseases. However, if improvements in life expectancy at birth translate into additional years in good health, the increase in dependency occurs later in life. Therefore the initial spending pressures from higher longevity are mitigated by such healthy ageing.

Figure 9. Dependency ratios by age[1]

(Number of dependants as a % of population by age groups)



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1. The graph shows the dispersion of dependency ratio across countries by age groups. The diamonds represent the median. The boxes are the 2nd and 3rd quartiles of the distribution of expenditure across countries. The whiskers are the 1st and 4th quartiles.

Source: European Commission, 2009 Ageing Report: Economic and Budgetary Projections for the EU-27 Member States (2008-2060).

In order to project the evolution of dependency until 2060 taking into account the possible link between dependency and health-care expenditures, the age-specific dependency ratios have been estimated based on historical data as a function of age, age-specific per capita health-care expenditures and life expectancy at birth (see Box 2). Consistent with the healthy-ageing hypothesis, dependency at old age is found to decline over time. But the decline of the dependency ratio by age

group depends in turn on the evolution of life expectancy at birth and per capita public health care expenditures (as projected in the cost-containment scenario for health care).

Accounting for the influence of health-care expenditure on the dependency ratio generates a link between the health-care and LTC projections even though the two spending items are projected separately. Clearly, this link may materialise with a lag, which is however difficult to ascertain empirically, especially in the context of the mostly cross-section data used in this paper. Therefore, a contemporaneous link is assumed for simplicity.

Box 2. Dependency ratio estimates

In order to gauge the evolution of the dependency ratio, its past determinants have been investigated by means of panel regression techniques. Defining $Depr_{i,a}$ as the dependency ratio (number of dependent people for country *i* and age *a*), *Age* as the central point in each age bracket (2,7,12,...,97), $he_{i,a}$ the real public health care expenditure per capita for country *i* and age *a* and LE_i life expectancy at birth for country *i*, the following equation was estimated:

$$\log(Depr_{i,a}) = \propto + \varphi * \log(Age_i) + \beta * \log(\mathrm{he})_{\mathrm{i,a}} + \gamma * \log(\mathrm{LE_i}) + u_{i,a}$$

The equation was estimated for the population aged 52 and above, as the dependency ratio for people below 52 is small and roughly constant over time. As expected, the age variable has a highly significant, positive impact (see de la Maisonneuve and Oliveira Martins, 2013). Public health expenditure per capita also has a significant positive effect, though much smaller. Conversely, increased life expectancy *at birth* delays the prevalence of dependency.

Including life expectancy at birth minimises the possibility that this effect could be driven by health expenditures themselves, thereby avoiding multicollinearity problems between health expenditure and life expectancy.

Non-demographic drivers of expenditure

Apart from the evolution of the number of dependants in the population, non-demographic drivers also have an impact on LTC expenditure growth. The projections account for three of them: changes in the relative price of LTC, income effects and changes in the demand for public-financed LTC, which in turn depend on the availability of informal care.

One of the main non-demographic drivers of public LTC expenditure is the relative share of informal and formal care.[7,8] Most informal care is provided by family and friends (Colombo *et al.,* 2011). Even using a narrow definition of the family care "workforce", its size is at least twice that of the formal care workforce (*e.g.*, in Denmark), and in some cases it is estimated to be more than ten times the size of the formal-care workforce (*e.g.*, Canada, New Zealand, the United States, the Netherlands). On average, around 70% to 90% of those who provide care are family carers (Fujisawa and Colombo, 2009). Changing societal models – such as declining family size, changes in residential patterns of people with disabilities and rising female participation in the formal labour market – are likely to contribute to a decline in the availability of informal care-givers, leading to an increase in the need for

7. Formal care is provided by care assistants who are paid for providing care under some form of employment contract. It includes both care provided in institutions and care provided at home. To be considered informal, the provision of care cannot be paid for as if purchasing a service. However, an informal care-giver may still receive social transfers conditional on his/her provision of informal care and possibly, in practice, some informal payment from the person receiving care.

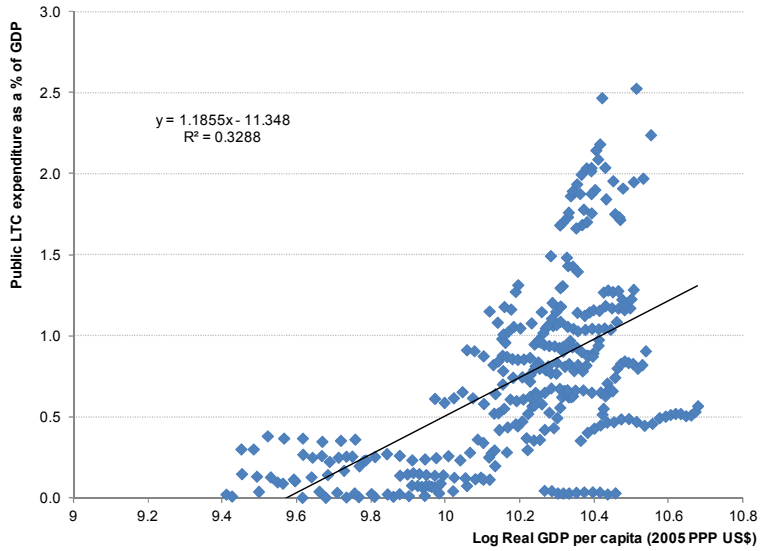
8. The projections do not distinguish between formal care delivered within institutions and that delivered to the patient's home. There are fundamental differences between countries in the way they organise their formal LTC. Institutional LTC is particularly widespread in the Nordic countries (OECD, 2005). Whether this form of organisation is adopted by other countries or a (cheaper) ambulatory help-at-home strategy is pursued could have important consequences for public expenditures.

paid care (Colombo *et al.,* 2011). Since there is evidence that informal elderly care is associated with lower female labour force participation (Viitanen, 2005), informal carers have been proxied by the labour force participation of women aged 50-64 to project the future evolution of LTC spending (a sensitivity check has also been carried out using their exit rate from the labour force). As participation rates by age and gender are not readily available for non-OECD countries, informal carers have been proxied by the overall participation rates in these countries.

Another important non-demographic driver of public LTC expenditure is a "cost disease" or Baumol effect (Baumol, 1967; 1993). The LTC sector is highly labour-intensive and the room for productivity gains is often seen as more limited than elsewhere in the economy. With equalisation of wages across sectors, this implies that the relative price of LTC *vis-à-vis* other goods and services in the economy, tends to rise as aggregate productivity and GDP per capita increase. With a price-inelastic demand, the share of LTC expenditure in GDP would, therefore, tend to increase over time. A possible way to capture this effect is to assume that unit costs rise in line with average earnings of care staff or a measure of wage inflation in the economy (Comas-Herrera *et al.,* 2003). In this paper, productivity growth in the total economy has been used as a proxy for the Baumol effect on public LTC expenditures.[9]

Finally, income is also likely to play a role in LTC expenditure. Indeed, as real incomes rise, demand may be directed at higher quality services (Colombo *et al.*, 2011), thereby increasing expenditures. Figure 10 shows a positive relationship between income and public LTC expenditure with an elasticity above one. It is difficult however to distinguish the income from the cost-disease effect, proxied by aggregate productivity, since they are too highly correlated. Given the multicollinearity between productivity and income, the two effects were estimated separately. The estimated influence of each of the non-demographic drivers of LTC expenditures has been used to parameterise the projection equation in Box 3.

Figure 10. Long-term care expenditure and GDP per capita



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Source: OECD Health database.

9 The relative price effect may be limited by a growing share of immigrants among LTC workers. According to Colombo *et al.,* (2011), foreign-born workers play a significant and growing role in LTC in some countries. The average wage of the immigrant work force is lower than that of native workers and their bargaining power is weaker. The process of equalising the wages of foreign-born and native work forces will take time, but will certainly materialise over the long-run.

Box 3. Estimations to calibrate the LTC framework

In order to estimate the LTC spending elasticities to productivity (Baumol effect) and to the participation rate, which are used to parameterise the projections model, the following equation was estimated over the period 1990-2009.

$$\log\left(\frac{LTC}{P_Y \cdot Y}\right) = \alpha + \beta * \log(OAdep) + \gamma * \log(Prod) + \delta * \log(PR) + u$$

Where the share of long-term care expenditure in GDP (LTC/(P_y*Y)) is explained by *Prod*, the total economy productivity capturing the Baumol effect (or alternatively the income per capita variable to estimate the income elasticity) and *PR*, the female labour force participation rate used as a proxy for the provision of informal care (or alternatively their exit rate from employment was also used). In this equation *OAdep*, the ratio of people aged 80 and above to total population, is a control variable that plays no role in the projections, as a demographic effect already covers the effects of ageing.

As expected, the old age dependency ratio (people above 80) is a significant determinant of LTC expenditure (see de la Maisonneuve and Oliveira Martins, 2013). The relative price effect (proxied by total economy productivity) emerges with an elasticity of around two. Alternatively, when the income variable is introduced, its elasticity amounts to around 2.7. While regression estimates point to Baumol or Income elasticities higher than unity, a conservative choice has been made of a unitary elasticity for both the relative price and the income variable. Sensitivity analysis has been carried out to test for the impact of these assumptions with the income elasticity alternatively fixed at two (see below). Finally all the proxies for informal care (female participation or exit rate from the labour force) also turned out to be significant.

Projection results: long-term care, 2010-2060

As for health care, a cost-pressure scenario and a cost-containment scenario were computed. Both scenarios are based on a unitary income elasticity assumption and the "healthy ageing" hypothesis. However, in the cost-pressure scenario, for OECD countries, a full Baumol effect is assumed, meaning that LTC unit labour costs increase fully in line with aggregate labour productivity; for non-OECD countries, excess labour supply especially in the non-tradeable sector suggests weaker wage pressures than in the OECD countries, and therefore the cost-pressure scenario only incorporates half of the Baumol effect. In the cost-containment scenario, the elasticity of LTC spending to productivity increases is set at half the value of the cost-pressure scenario (0.5 for OECD countries and 0.25 for non-OECD countries), possibly reflecting policy action aimed at mitigating relative wage increases of LTC providers. For example, action to curb expenditure could be aimed at facilitating access to LTC provision by low-skilled migrants or at providing incentives to balance institutional and home-based LTC.

Sensitivity analysis has been carried out in the context of the cost-containment scenario, with respect to the Baumol effect, the income elasticity and the implications of healthy ageing for the number of dependants. As for health care, the starting year of the projections is an average over the period 2006-2010 so as to smooth out the impact of the recent crisis. The main assumptions underlying each projection scenario are listed in Table 5.

Table 5. Assumptions underlying the alternative projection scenarios: public long-term care

Scenarios	Health status	Income effect	Baumol effect	Availability of informal care
Demographic effect	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of life expectancy and health expenditure	n.a	n.a	n.a
Cost-pressure scenario	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of life expectancy and health expenditure (cost-containment scenario)	Income elasticity = 1	OECD countries: Full Baumol effect (elasticity = 1) BRIICS: Half Baumol effect	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates
Cost-containment scenario	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of life expectancy and health expenditure (cost-containment scenario)	Income elasticity = 1	**OECD countries: Half Baumol effect (elasticity = 0.5)** **BRIICS : 1/4 of Baumol effect**	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates
Sensitivity analysis based on the cost-containment scenario				
Income elasticity = 2	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of life expectancy and health expenditure	**Income elasticity = 2**	OECD countries: Half Baumol effect (elasticity = 0.5) BRIICS : 1/4 of Baumol effect	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates
Life expectancy plus 2 standard deviation	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of **life expectancy plus 2 standard deviation** and health expenditure	Income elasticity = 1	OECD countries: Half Baumol effect (elasticity = 0.5) BRIICS : 1/4 of Baumol effect	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates
Life expectancy minus 2 standard deviation	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of **life expectancy minus 2 standard deviation** and health expenditure	Income elasticity = 1	OECD countries: Half Baumol effect (elasticity = 0.5) BRIICS : 1/4 of Baumol effect	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates
Cost-pressure health scenario	Healthy ageing: the prevalence of dependency per age is shifted according to the evolution of life expectancy and health expenditure **cost pressure** scenario	Income elasticity = 1	OECD countries: Half Baumol effect (elasticity = 0.5) BRIICS : 1/4 of Baumol effect	OECD countries: Baseline scenario for participation rates of women aged 50-64 BRIICS: total participation rates

Note: The key assumption changed in each scenario is in bold

As with projections of public health-care spending, non-demographic drivers account for the lion's share of future expenditure increases (Table 6), though with an assumed elasticity of unity, the income effect is not creating additional pressures in terms of expenditure shares to GDP. Demographic changes are projected to exert relatively minor influence on future public LTC expenditures. Indeed, as the LTC cost is independent of age, the pure age effect has only a moderate impact on spending except where ageing is fast enough to increase significantly the share of very-old people in the population (*e.g.* Korea, China, Indonesia). Moreover, this effect is mitigated by the 'healthy ageing' assumption.

Table 6. Projection scenarios for public long-term care expenditure

		Percentage point deviations from starting period in 2030			Percentage point deviations from starting period in 2060		
	Average 2006-2010	Demographic effect	Cost-pressure	Cost-containment	Demographic effect	Cost-pressure	Cost-containment
Australia	0.0	0.1	0.6	0.3	0.3	1.3	0.8
Austria	1.1	0.1	0.5	0.3	0.2	1.0	0.7
Belgium	1.7	0.1	0.5	0.3	0.1	1.2	0.7
Canada	1.2	0.2	0.5	0.3	0.2	1.2	0.7
Chile	0.0	0.2	0.9	0.6	0.6	2.3	1.5
Czech Republic	0.3	0.2	0.7	0.3	0.4	1.6	0.9
Denmark	2.2	0.1	0.4	0.2	0.2	1.0	0.6
Estonia	0.2	0.1	0.7	0.3	0.3	2.0	0.9
Finland	0.8	0.2	0.5	0.3	0.2	1.0	0.5
France	1.1	0.1	0.5	0.2	0.2	1.0	0.6
Germany	0.9	0.2	0.5	0.3	0.3	1.1	0.7
Greece	0.5	0.1	0.6	0.4	0.3	1.4	0.9
Hungary	0.3	0.1	0.6	0.3	0.3	1.8	1.0
Iceland	1.7	0.2	0.3	0.1	0.2	1.0	0.5
Israel	0.5	0.2	0.4	0.3	0.3	0.9	0.6
Ireland	0.4	0.1	0.5	0.4	0.2	1.0	0.7
Italy	0.7	0.1	0.5	0.3	0.2	1.2	0.8
Japan	0.7	0.2	0.5	0.3	0.3	1.4	0.8
Korea	0.3	0.4	0.8	0.5	0.8	2.0	1.3
Luxembourg	0.9	0.1	0.5	0.4	0.3	0.8	0.7
Mexico	0.0	0.2	0.7	0.5	0.6	2.2	1.5
Netherlands	2.3	0.2	0.6	0.4	0.3	1.4	0.8
New Zealand	1.3	0.2	0.5	0.3	0.3	1.4	0.8
Norway	2.1	0.1	0.4	0.2	0.2	1.0	0.5
Poland	0.4	0.2	0.7	0.3	0.5	1.8	1.0
Portugal	0.1	0.1	0.4	0.2	0.3	1.3	0.8
Slovak Republic	0.0	0.2	0.8	0.4	0.6	1.9	1.1
Slovenia	0.7	0.2	0.6	0.4	0.4	1.5	0.9
Spain	0.5	0.1	0.6	0.5	0.3	1.5	1.0
Sweden	0.7	0.1	0.4	0.1	0.1	0.9	0.5
Switzerland	1.2	0.1	0.5	0.3	0.3	1.3	0.7
Turkey	0.0	0.2	0.7	0.3	0.6	2.3	1.6
United Kingdom	0.9	0.1	0.3	0.2	0.1	0.9	0.5
United States	0.6	0.1	0.4	0.2	0.2	0.8	0.4
OECD average [1]	***0.8***	***0.1***	***0.5***	***0.3***	***0.3***	***1.4***	***0.8***
Brazil	0.0	0.2	0.3	0.3	0.7	1.2	0.9
China	0.1	0.3	0.4	0.3	0.7	2.0	1.1
India	0.1	0.1	0.3	0.2	0.4	1.5	0.8
Indonesia	0.1	0.2	0.3	0.2	0.7	1.6	1.0
Russia	0.2	0.1	0.2	0.1	0.2	0.8	0.4
South Africa	0.2	0.1	0.2	0.2	0.3	0.7	0.5
Non-OECD average [1]	***0.1***	***0.2***	***0.3***	***0.2***	***0.5***	***1.3***	***0.8***
Average [1]	***0.7***	***0.2***	***0.5***	***0.3***	***0.3***	***1.4***	***0.8***

1. Unweighted average.

The cost-pressure scenario

In the cost-pressure scenario, starting from 0.8% of GDP on average for OECD countries, the ratio of public LTC expenditure to GDP is projected to increase by 1.4 percentage points to reach 2.1 % of GDP. However, some countries, like Chile, Estonia, Korea, Mexico and Turkey, will experience higher increases (equal to or above 2 percentage points). These countries are starting from a very low level of LTC expenditure and are in the process of catching up to higher levels. Conversely, Israel, Luxembourg, Sweden, the United-Kingdom and the United States are projected to experience only small increases in their LTC expenditure to GDP ratios (less than 1 percentage point). Differences in the initial level of female participation rates as well as policies in place also explain the differences across countries. For non-OECD countries, the increase in LTC spending is projected to be, on average, broadly the same as that experienced by OECD countries but starting from a much lower level (0.1%).

The cost-containment scenario

In the cost-containment scenario, on average for OECD countries, the public LTC expenditure to GDP ratio increases by 0.8 percentage point from 0.8% to 1.6% of GDP. Chile, Korea, Mexico and Turkey experience the most important increases (above 1.3 percentage points), while the increase in Finland, Iceland, Norway, Sweden, the United Kingdom and the United States does not exceed 0.5 percentage points. Non-OECD countries will experience on average the same increase as OECD countries (0.8 percentage points).

Sensitivity analysis

Given the uncertainty about income effects, projections were performed also assuming an income elasticity of two for the cost-containment scenario for OECD countries. For non-OECD countries, the sensitivity analysis assumed an income elasticity of 1.5. On average, for OECD countries LTC expenditure would reach in this case 2.5% of GDP in 2060. In this scenario, Chile, Estonia, Mexico and Turkey would experience a deviation from base case of around 1.7 percentage points of GDP. Again, the assumptions underlying the GDP projections assume some catch-up for these low income countries, explaining why their LTC expenditure patterns are more affected by the higher income elasticity assumption. For non-OECD countries, the share of LTC in GDP would reach 1.8% of GDP with the higher income elasticity. China, India and Indonesia would experience a deviation from base case of more than 1 percentage point (see Table 7).

A sensitivity analysis has also been carried out for the evolution of the number of dependants. The two drivers of the dependency ratio, life expectancy and health care spending, have been changed separately relative to baseline. Taking life expectancy plus (minus) two standard deviations would induce an average deviation from base case for OECD countries of 0.3 (-0.2) percentage points in the LTC expenditure to GDP ratio, which would then reach, on average, 1.9% (1.4%) of GDP. For each scenario, the expenditure for non-OECD countries will deviate from base case by the same amount as for OECD countries. Due to the very limited impact of health expenditure, alternative assumptions in this area have only a slight impact. Indeed, even under the cost-pressure health care spending scenario, the LTC expenditure to GDP ratio would only deviate from the base case by 0.1 percentage points on average for both OECD and non-OECD countries.

Table 7. Sensitivity analysis on public long-term care projections

(Performed on the cost-containment scenario)

	Income elasticity=2[1]	Life expectancy plus 2 standard deviation	Life expectancy minus 2 standard deviation	Cost-pressure health-care expenditure
	Percentage point deviations from cost-containment scenario in 2060			
Australia	1.0	0.2	-0.2	0.1
Austria	0.6	0.2	-0.2	0.1
Belgium	0.8	0.2	-0.2	0.1
Canada	0.8	0.2	-0.2	0.1
Chile	1.7	0.3	-0.2	0.1
Czech Republic	1.3	0.3	-0.2	0.1
Denmark	0.8	0.2	-0.2	0.1
Estonia	1.8	0.3	-0.2	0.1
Finland	0.8	0.2	-0.2	0.1
France	0.6	0.2	-0.2	0.1
Germany	0.8	0.3	-0.2	0.1
Greece	0.6	0.3	-0.2	0.1
Hungary	1.4	0.3	-0.2	0.1
Iceland	0.8	0.2	-0.2	0.1
Israel	0.7	0.2	-0.2	0.1
Ireland	0.5	0.2	-0.2	0.1
Italy	0.6	0.2	-0.2	0.1
Japan	0.9	0.3	-0.2	0.1
Korea	1.0	0.4	-0.3	0.2
Luxembourg	0.1	0.3	-0.2	0.1
Mexico	1.7	0.3	-0.3	0.1
Netherlands	0.8	0.3	-0.2	0.1
New Zealand	1.2	0.2	-0.2	0.1
Norway	0.8	0.2	-0.2	0.1
Poland	1.1	0.3	-0.2	0.1
Portugal	0.7	0.3	-0.2	0.1
Slovak Republic	1.3	0.3	-0.3	0.1
Slovenia	0.9	0.3	-0.2	0.1
Spain	0.7	0.3	-0.2	0.1
Sweden	0.9	0.2	-0.2	0.1
Switzerland	0.9	0.3	-0.2	0.1
Turkey	1.7	0.3	-0.2	0.1
United Kingdom	0.8	0.2	-0.2	0.1
United States	0.7	0.2	-0.2	0.1
OECD average [2]	***0.9***	***0.3***	***-0.2***	***0.1***
Brazil	0.6	0.4	-0.3	0.1
China	1.2	0.4	-0.3	0.1
India	1.3	0.2	-0.2	0.1
Indonesia	1.0	0.3	-0.3	0.1
Russia	0.5	0.2	-0.2	0.1
South Africa	0.7	0.2	-0.1	0.1
Non-OECD average [2]	***0.9***	***0.3***	***-0.2***	***0.1***
Average [2]	***0.9***	***0.3***	***-0.2***	***0.1***

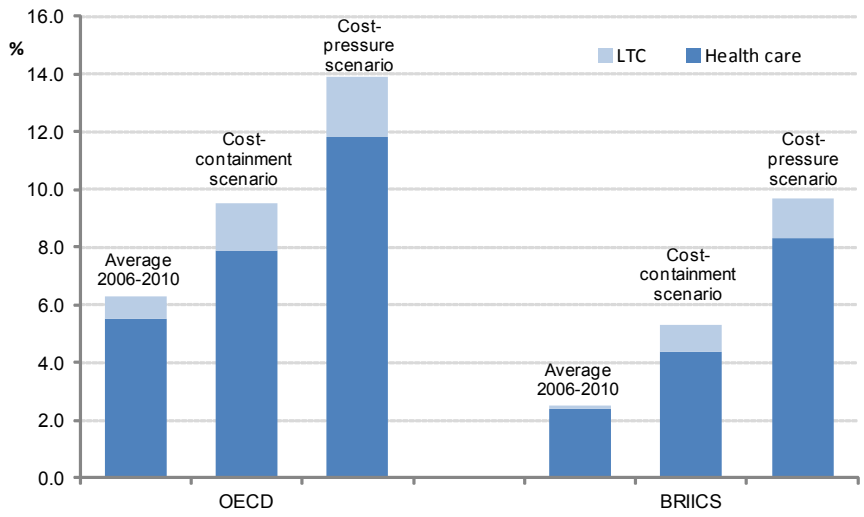
1. Income elasticity = 1.5 for the BRIICS.
2. Unweighted average.

4. Prospects for total public spending on health

Both health and LTC expenditures are projected to put sizeable pressure on public finance over the next 50 years. Overall, on average across OECD countries, the total health and LTC expenditure to GDP ratio is projected to more than double in the cost-pressure scenario, increasing from 6.2% in the starting period to 13.9% of GDP in 2060. In the cost-containment scenario the ratio would still increase by more than half, to reach 9.5% (Figure 11). For the BRIICS, starting from a much lower level, public health and LTC expenditure will increase from 2.5% in the starting period to about 10% and above 5% in 2060 in the cost-pressure and the cost-containment scenario respectively.

Figure 11. Projected public health and long-term care expenditure

(As a % of GDP, in 2060)



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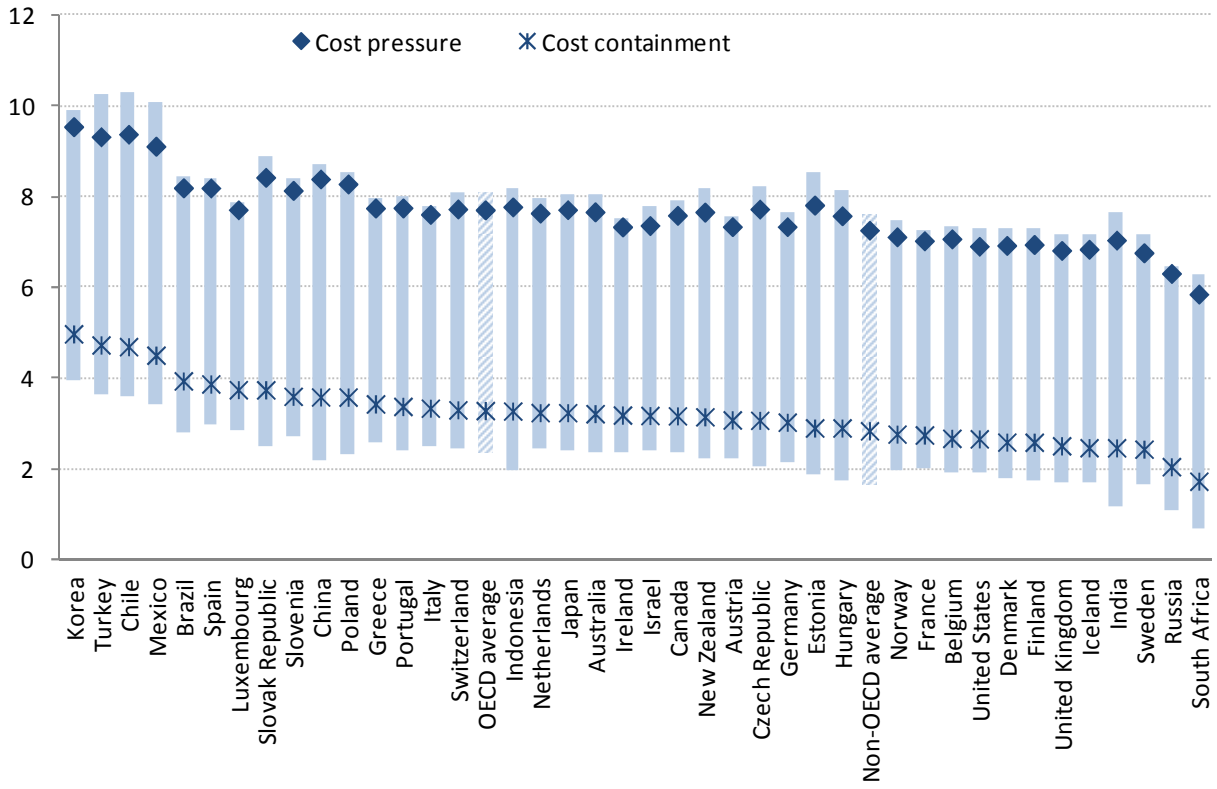
There are, however, striking differences across countries (Figure 12). In the cost-containment scenario, one group of countries experiences a 4 to 5 percentage point increase in total spending to GDP ratios over the period 2010-2060. It includes countries that are ageing very rapidly (Korea and Chile), as well as those with currently low labour force participation especially of women, which may face a substantial increase in the demand for *formal* long-term care (Spain and Mexico) as labour force participation increases and care is no longer provided by family. By contrast, in the United States, the United Kingdom and the Nordic countries the projected increase is below 3 percentage points of GDP. In these countries demographic trends will be more stable and the share of formal long-term care is already relatively high. On average, spending ratios in the BRIICS will remain lower than in OECD countries. However, they will rise significantly under both scenarios. For instance, even in the cost-containment scenario, ratios will more than double by 2060 – close to levels currently observed in OECD countries (Table 8).

Figure 12 Percentage point increase in the total public health and long-term care spending ratio to GDP, 2010-2060

Range of estimates across sensitivity analyses[1]



StatLink http://dx.doi.org/10.1787/888932844315

1. The vertical bars correspond to the range of the alternative scenarios, including sensitivity analysis. Countries are ranked by the increase of expenditures between 2010 and 2060 in the cost-containment scenario.

Table 8. Projection scenarios for public health and long-term care spending

In % of GDP

	Health care			Long-term care			Total		
	Average 2006-2010	2060		Average 2006-2010	2060		Average 2006-2010	2060	
		Cost-pressure	Cost-containment		Cost-pressure	Cost-containment		Cost-pressure	Cost-containment
Australia	5.6	12.0	8.1	0.0	1.4	0.8	5.7	13.3	8.9
Austria	6.6	12.9	9.1	1.1	2.2	1.8	7.8	15.1	10.8
Belgium	5.8	11.6	7.7	1.7	3.0	2.5	7.5	14.6	10.2
Canada	5.8	12.2	8.3	1.2	2.5	1.9	7.1	14.6	10.2
Chile	3.1	10.2	6.3	0.0	2.3	1.5	3.1	12.4	7.8
Czech Republic	5.5	11.6	7.7	0.3	1.9	1.1	5.8	13.5	8.9
Denmark	6.3	12.2	8.3	2.2	3.3	2.8	8.5	15.4	11.1
Estonia	4.3	10.1	6.2	0.2	2.2	1.1	4.5	12.3	7.4
Finland	5.2	11.2	7.3	0.8	1.8	1.3	6.0	13.0	8.6
France	7.4	13.5	9.6	1.1	2.1	1.7	8.5	15.5	11.3
Germany	7.3	13.5	9.6	0.9	2.1	1.6	8.2	15.5	11.2
Greece	5.4	11.8	7.9	0.5	1.9	1.5	5.9	13.7	9.3
Hungary	4.8	10.6	6.7	0.3	2.0	1.2	5.0	12.6	7.9
Iceland	5.8	11.7	7.8	1.7	2.7	2.2	7.6	14.4	10.0
Israel	4.0	10.4	6.6	0.5	1.5	1.2	4.5	11.9	7.7
Ireland	5.5	11.9	8.0	0.4	1.3	1.1	5.9	13.3	9.1
Italy	6.1	12.6	8.7	0.7	1.9	1.5	6.9	14.5	10.2
Japan	6.1	12.5	8.6	0.7	2.0	1.4	6.8	14.5	10.0
Korea	3.3	10.9	7.0	0.3	2.3	1.6	3.6	13.2	8.6
Luxembourg	4.4	11.3	7.4	0.9	1.7	1.7	5.3	13.0	9.1
Mexico	2.5	9.4	5.5	0.0	2.2	1.5	2.5	11.6	7.0
Netherlands	6.4	12.7	8.8	2.3	3.7	3.1	8.7	16.4	12.0
New Zealand	6.4	12.7	8.8	1.3	2.6	2.0	7.7	15.3	10.8
Norway	5.1	11.2	7.3	2.1	3.1	2.7	7.2	14.3	10.0
Poland	4.1	10.5	6.7	0.4	2.2	1.4	4.5	12.7	8.0
Portugal	6.5	13.0	9.1	0.1	1.4	0.9	6.6	14.3	9.9
Slovak Republic	5.4	11.9	8.0	0.0	1.9	1.1	5.4	13.9	9.2
Slovenia	5.2	11.8	7.9	0.7	2.2	1.5	5.8	14.0	9.4
Spain	5.6	12.3	8.5	0.5	2.0	1.6	6.1	14.3	10.0
Sweden	6.6	12.4	8.6	0.7	1.6	1.1	7.2	14.0	9.7
Switzerland	5.7	12.2	8.3	1.2	2.5	1.9	6.9	14.6	10.2
Turkey	3.8	10.9	7.0	0.0	2.3	1.6	3.8	13.2	8.6
United Kingdom	6.5	12.4	8.5	0.9	1.8	1.4	7.4	14.2	9.9
United States	7.1	13.2	9.3	0.6	1.3	1.0	7.6	14.5	10.3
OECD average [1]	***5.5***	***11.8***	***7.9***	***0.8***	***2.1***	***1.6***	***6.2***	***13.9***	***9.5***
Brazil	3.7	10.7	6.8	0.0	1.3	0.9	3.7	11.9	7.7
China	1.9	8.3	4.4	0.1	2.1	1.2	2.0	10.4	5.6
India	1.2	6.7	2.8	0.1	1.6	0.9	1.3	8.3	3.7
Indonesia	1.2	7.3	3.5	0.1	1.7	1.0	1.2	9.0	4.5
Russia	3.1	8.6	4.7	0.2	1.0	0.7	3.4	9.7	5.4
South Africa	3.2	8.4	4.5	0.2	0.9	0.6	3.4	9.2	5.1
Non-OECD average [1]	***2.4***	***8.3***	***4.4***	***0.1***	***1.4***	***0.9***	***2.5***	***9.8***	***5.3***
Total average [1]	***5.0***	***11.3***	***7.4***	***0.7***	***2.0***	***1.5***	***5.7***	***13.3***	***8.9***

1. Unweighted average.
Source: Authors' calculations.

These new projections broadly deliver the same message as those in Oliveira Martins and de la Maisonneuve (2006); even in the cost-containment scenario public health care and LTC spending will put an important burden on future public finances. The new set of projections suggests a more important increase in health care expenditure, both in the cost-pressure and the cost-containment scenarios while, regarding public LTC funding, the increase in expenditure is lower in the new set of projections than in the previous one. Overall, on average, the current projections suggest only a

slightly lower increase in total health and LTC expenditure confirming the message delivered by the previous set of projections. A comparison between these new projections and the ones from the European Commission, the IMF and the Congressional Budget Office in the United States suggests that the differences arise mainly as a consequence of varying assumptions concerning the future evolution of the main drivers of spending (see de la Maisonneuve and Oliveira Martins, 2013 for details). The EC projected increases in health-care expenditure are the lowest due to the nearly unitary income elasticity associated with the absence of a residual growth. The IMF projections, although difficult to compare as they end in 2050, seem to range between the OECD cost-containment and cost-pressure scenarios. The assumption of low income elasticity is broadly offset by the country specific residual. Nonetheless when the estimated residual is higher than the average like in the United States, the projected increase in health care expenditure is much higher. This high increase is corroborated by the CBO projections.

5. Concluding remarks

Long-term spending projections are inherently uncertain and subject to upside or downside risks. While a more moderate evolution of spending than in these projections cannot be excluded (for instance if cost-saving technologies were to spread out, or if more aggressive cost-containment policies were to be implemented), these are also clear upside risks on spending. For instance, higher health spending could arise due to an extension of the pre-death period of ill health as longevity increases or because of higher than expected costs induced by technical progress. Regarding LTC, higher spending could arise from increased dependency due to obesity trends or dementia. Indeed, according to recent calculations, some 12% of those aged between 80 and 84 years, and almost one in four of those aged over 85 years, suffer from dementia (Alzheimer Europe, 2006). With ageing populations, strong increases in the prevalence of dementia may be expected (see Box 1.1 in Colombo *et al.,* (2011)), though prevention and treatment may also improve in the future.

Even if these upside risks do not materialise, the spending projections point to important policy challenges. These challenges are reinforced by the evidence that macroeconomic cost-containment policies, which had some success in repressing spending trends over the 1980s and 1990s, have their limits. For instance, it is difficult to contain wages and at the same time, attract young and skilled workers into the health-care system. Similarly, controlling prices is not easy when technical progress is permanently creating new products and treatments, while overall constraints on supply result in unpopular waiting lists for these treatments. More generally, it is difficult to determine the appropriate supply of health and LTC services without market signals – but at the same time, health and LTC are areas where market failure is rife.

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