Is the funding of public national health systems sustainable over the long term? Evidence from eight OECD countries

IS THE FUNDING OF SOCIALISED MEDICAL INSURANCE SUSTAINABLE OVER THE LONG TERM? EVIDENCE FROM 8 OECD COUNTRIES

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Abstract

This paper has three aims: first, to examine what impact certain macroeconomic and health-related factors would have on the financial sustainability of health care systems; second, to provide insights as to the additional financial resources that may be needed over the next few years in order for such demand to be met and for health systems not to register a funding gap; and, third, to reflect on the evidence presented on the previous objectives and offer an agenda for reform and action by health care decision makers.

Data from eight OECD countries on macroeconomic (GDP growth, fiscal deficit, overall debt), demographic and health-related indicators and spending was retrieved from publically available data sources (OECD and the IMF) and national statistics in order to ascertain the performance over time of key variables influencing health spending. Using ordinary least squares regression analysis and taking into account historical health spending growth patterns and the increasing demand for health care, the future levels of health spending are calculated (2013-2020) and benchmarked against a baseline scenario of zero growth in real health care spending over the period from 2013-2020.

It is shown that GDP growth is declining over the long term in most countries and that in all eight countries public debt levels have been increasing steadily over the past decades with increasing fiscal deficits and debt levels between 2000 and 2010. The ratio of economically active to retired population is decreasing in all countries, gradually shrinking the revenue base for health and other public spending. Public pension spending has plateaued between 2000 and 2010, with reductions observed in Spain, Germany and Poland partly as a result of reforms undertaken by governments. In contrast, the expenditure on health care is rising monotonously, accelerating in some countries (UK, Spain, Poland and Canada) and decelerating in others (Italy, Germany, Australia, France). Spending on pharmaceuticals is also rising though this growth has slowed in the past decade across all countries. Assuming revenues for health care are fixed at 2012 levels, the funding shortfall in 2017 may range between 12% (optimistic case) and 18% (pessimistic case) of 2012 health expenditure levels. The cumulative 5 year shortfall is likely to range between 39.4% (optimistic) and 61% (pessimistic) of 2012 health expenditure levels.

The combination of current and future austerity measures, a declining economically active population and greater difficulties in financing public deficits with debt may result in a financial squeeze of the health care sector while demand for services and uptake of new technologies and treatments continues to grow. Health care decision makers will – among other things - need to place emphasis on outcomes-based reimbursement, prioritise based on efficiency rules in order to ensure affordability, and implement organizational innovations. Unless these are adhered to, it is likely that exclusions from coverage will be the net result.

Keywords

- Health care reform;
- Financial sustainability;
- Health insurance;
- Macroeconomic performance;
- Financial crisis;
- Global health care;
- Cost containment and efficiency;
- Health economics

1. INTRODUCTION

In recent decades, spending on publicly funded health systems has risen at a higher rate than overall economic growth. From 1970 to the early 1980s, average public spending as a proportion of gross domestic product (GDP) increased by 50% among member states of the Organization for Economic Co-operation and Development (OECD). Even in countries that have been successful at containing health expenditure, such as Sweden, GDP growth was still outpaced by health expenditure growth by a factor of 1.45 between 1970 and 2000, while the same figure for the United States of America (USA) was 2.01.

In the absence of additional policy measures, health spending in OECD countries was projected to increase from an average of 5.7% of GDP in 2005 to 9.6% in 2050. Long term care costs are projected to treble from 1.1% to 3.3% of GDP over the same period (Martins and De la Maisonneuve, 2006). In the wake of one of the most severe financial crises in recent history, where many governments slashed public spending to reduce budget deficits, resources for health and social care were also affected (Stuckler et al., 2010) including countries such as the USA, where health spending drives a significant proportion of public debt (Chernew et al., 2010), but also more generally in European countries facing significant fiscal, external[1] and other macroeconomic imbalances (Sinn, 2012). Together these factors warrant a closer look at the drivers of health care expenditure and the identification of policy levers to mitigate uncontrolled growth in health spending while preserving the core values of national health systems including equity, universal coverage and intergenerational solidarity.

Principles and priorities for health systems have in the vast majority of cases featured effectiveness, cost-effectiveness and necessity, but the issue of financial sustainability has not been addressed (Kenny and Joffres, 2008) until recently, possibly because the combination of an ageing baby-boom generation and continuing innovation in healthcare technology only now poses the unprecedented challenge of having to provide more services for less available resource. It has nevertheless come to the fore in recent years because of the financial crisis (Thomson et al., 2014).

The long-term financial sustainability of national health systems now depends on the ability of decision makers to balance the challenges of what seems to be a very arduous environment: a higher proportion of elderly people relative to those in working age, higher demand for health care from an increasingly well-informed public, more expensive technological innovations, and greater pressure on other social care budgets (e.g. pensions, rising prices, less contributors to pay for everything and severe restrictions on the ability of governments to run up deficits to plug funding gaps).

[1] As they relate to transactions of a country with the rest of the world.

In light of the above, the objective of this paper is threefold: first, to examine what impact certain macroeconomic and health-related factors would have on the financial sustainability of health care systems; second, based on current levels of demand for health care and responding to financial challenges, to provide insights as to the additional financial resources that may be needed over the next few years in order for such demand to be met and for health systems not to register a funding gap; and, third, to reflect on the evidence presented on the previous objectives and offer an agenda for reform and action by health care decision makers.

2. METHOD AND ORGANISATION OF THE PAPER

2.1 DATA SOURCES AND DEFINITIONS

In order to fulfil the paper's objectives we use data from publicly available sources. Such data include macroeconomic indicators (e.g. fiscal deficit, gross/net debt, GDP, public pensions), demographic indicators (e.g. life expectancy, share of people over 65 in the total population), health and pharmaceutical related expenditures and utilization.

Data on fiscal deficit ("General government net lending/borrowing"), and gross/net debt ("General government net/gross debt") were retrieved from the International Monetary Fund (IMF) World Economic Outlook database (IMF, 2014b). Data on GDP, public pensions, life expectancy, elderly population, pharmaceutical expenditure and total health expenditure were retrieved from the Organisation for Economic Co-operation and Development (OECD) Statistics database (OECD, 2014b). Old age support (dependency) ratio data, including projections, were extracted from "Pensions at a Glance 2013"(OECD, 2013). Pharmaceutical expenditure as a percentage of total health expenditure (pharmaceutical and other non-durables, % current expenditure on health) was retrieved from "OECD Health Data 2014" (OECD, 2014a). For comparability, national currency units (NCUs) were converted to euros (€) using average annual exchange rates from the IMF International Financial Statistics database (IMF, 2014a).

Health care expenditure is classified according to the System of Health Accounts (OECD, 2014b; OECD/EUROSTAT/WHO, 2011; OECD, 2015 p. 1). The "Total health expenditure" category includes: financing agents, functions (e.g. curative care, long-term care, preventive care, among others), providers, and financing sources. Gross Domestic Product (GDP, Output Approach) and all expenditure categories when expressed in national currency units (NCUs) were deflated using the World Bank year-on-year GDP deflator using as a base year 1990 (WorldBank, 2014). Old age support ratio (dependency ratio) is defined as the

number of population aged 20-64 years old divided by the number of population 65 or older (OECD, 2014b).

Countries included in the analysis were selected to represent a sample of predominantly tax- (UK, Spain, Poland), social health insurance (France, Germany) and mixed (Australia, Canada, Italy) health care systems (Table 1).

2.2 OBJECTIVES, ASSUMPTIONS AND PROJECTIONS

The first objective of the paper is to examine the extent to which certain exogenous and endogenous factors impact on the financial sustainability of health care systems in the study countries. This was done by examining a number of contributions from the literature. In so doing, section 3 of the paper examines the importance of demographic developments, the need for public pension reform, the impact of ageing, the rising impact of long-term care arrangements, the impact of technological development and the responses by many health care systems in terms of cost containment measures and efforts to improve efficiency in the provision of services.

The second objective of the paper is to provide insights as to the additional financial resources that may be needed over the next few years in order for such demand to be met and for health systems not to register a funding gap. We proceed by identifying key exogenous factors (acting independently of the healthcare system but may still have a major influence on system performance and sustainability, for example key macroeconomic variables) and endogenous factors (those influencing expenditure directly). We subsequently examine current and earlier trends over the 1980 – 2012 period to assess how their performance over time and in light of recent developments is likely to influence the direction of demand for health care and the ability of expenditure to respond to it in the near future. We then undertake projections of health care expenditures in order to determine whether demand for health will outstrip potentially available resources, in which case there would be a funding gap. These future projections were based on linear regression models using ordinary least squares and relying on information and data over the 1990 – 2010 period. For the cases of variables such as male life expectancy at 65 and the proportion of the over-65s in the population, projections were made using annual data and for the 10 most recent years. Future projections on old age dependency ratios and macroeconomic indicators were based on OECD (OECD, 2013) and IMF forecasts (IMF, 2014b). Two different forecast models were produced for the cases of total health expenditure and total pharmaceutical expenditure: according to the 'optimistic' model the future likely increase in health care spending would be moderate and would be contained to the cumulative aggregate average growth rate (CAAGR) of the 2000-2010 period, whereas in the 'pessimistic' model, the increase would be significantly higher and similar to the

CAAGR of the 1990-2010 period. Both models assume that no additional constraints will be put in place over the period from 2013-2020 relative to what the situation was until 2012. The two models were benchmarked against the baseline (control) case of zero annual growth in real health spending. In this case, the key assumption made about governments' reaction to current and future macroeconomic and other constraints was that future budgets for health care were anticipated to remain fixed in real terms; for practical reasons it was assumed that health spending in the study countries plateaued in 2012. Consequently, the difference between the future *demand* for healthcare (i.e. proxied by forecasted total health expenditure) and the future *available* healthcare resources (i.e. based on 2012 total real health expenditure) was used to quantify the possible future gap in available resources. Section 4 presents the discussion and forecasts on the above.

Finally, in addressing the third objective of the paper and in light of the evidence presented in sections 3 and 4, section 5 discusses whether health care systems are financially sustainable over the longer term and what options are available in order to improve their financial sustainability.

3. FACTORS INFLUENCING THE DIRECTION OF HEALTH EXPENDITURE

3.1 DEMOGRAPHIC CHANGES

In the 50 years from 1950 to the turn of the millennium, the world population aged at a relatively benign rate with the proportion aged 60 and above rising from 8% to 10%. In the 50 years from 2000 to 2050, this proportion is projected to rise to 22%. By 2030, half the population of Western Europe is expected to be aged 50 years or older and have a life expectancy of around 90 years; the rising life expectancy also means the proportion of very old citizens, aged 80 and above, is the fastest growing group in the world, with an anticipated growth rate of more than 3% per year until at least 2020 (Harper, 2010). At the same time, younger generations are unable to replenish the economically active population at the same rate as older generations retire, leading to a significant decrease in the ratio of working- to non-working age population (old-age support ratio) (Harper, 2010, DG-ECFIN and AWG, 2009).

3.2 THE NEED FOR PUBLIC PENSION REFORM

With a rapidly ageing population and longer life expectancies on the horizon, there has been considerable interest in the reform of public expenditure on older people, such as pensions and health care. In the absence of attenuating policies in the European Union (EU), age-related spending – particularly pensions, health, and long-term care - on average is projected to account for an additional 27.85%

of GDP by 2060 (from 23.1% in 2007), with about half on pensions and half on health and long-term care (LTC) (DG-ECFIN and AWG, 2009). Factoring in current developments in pension reforms, however, the budgetary impact of ageing is reduced considerably in most countries. Based on age structure alone, German pensions would rise from 10.3% of GDP (2000) to 26.2% of GDP by 2050 in the absence of reforms, whereas the figure drops to 13.1% of GDP by 2050 when reforms are factored in, with a similar trend over a sample of 18 other OECD countries (Meier and Werding, 2010).

Pension spending relies mainly on the population structure and the level of benefit per capita; as a result, policy instruments to control spending are largely focused on the latter, including linking benefits to lifelong contributions (actuarial fairness) and introducing "notional defined contribution" schemes. The key issue in most OECD countries is the declining old age support ratio, meaning less potential transfers between the economically active and inactive population. As the major asset in pay-as-you-go schemes is the human (working) capital, a decline in this source of funds means either a decline in benefits per capita or a shift to funded pensions, i.e. based on real, accumulated capital (Meier and Werding, 2010).

3.3 AGE RELATED HEALTH

The complexity of healthcare poses a challenge in identifying the main cost drivers, which are broadly thought to relate to population ageing and technological developments, but there is diverging evidence on the role of ageing in particular. Life years gained through increased life expectancy can be spent in good or bad health depending on the relative improvements in morbidity and mortality: if mortality improves faster than morbidity there is an "expansion of morbidity" due to gains in life spent in ill health (Olshansky et al., 1991), whereas the opposite scenario gives a "compression of morbidity" (Fries, 1980), or the two may balance each other out and postpone morbidity to the end of life.

In a review of 12 OECD countries, old-age disability was found to be reduced in only 5, increased in 3, unchanged in 2 and inconclusive in two countries (Lafortune and Balestat, 2007) showing mixed support for the hypotheses of expanded/compressed morbidity. However, others have found that most measures of morbidity have declined in recent years despite higher incidence of chronic diseases, and with morbidity declining faster than mortality this supports the compression hypothesis (reviewed in Payne et al., 2007) and suggests more moderate future LTC cost.

Two lines of thought have emerged in quantifying the impact of ageing on healthcare expenditure, with some arguing that age itself is a major cost driver (Longman, 1987), and others that associations between ageing and spending are

explained by omitted variables such as per capita income (eg. Getzen, 1992). More recent analyses suggest age impacts spending differently in different countries (O'Connell, 1996, Cottarelli, 2010a). Recent studies addressing the issue of ageing and cost at patient level have found a stronger correlation between spending and proximity to death than age in general (eg. Dixon et al., 2004), but even in countries were the compression of morbidity theory seems to hold, health expenditures have not been seen to decline. Rather, the cost of end-of-life treatment has stagnated while the costs further from death seem to have increased (Payne et al., 2007).

3.4 SHIFT TO LONG-TERM CARE AND OTHER PRIORITIES

In absolute terms, future demand for healthcare is expected to rise on account of the increasing proportion of elderly population, due to the concentration of health care expenditure in the later years of life (DG-ECFIN and AWG, 2009, Harper, 2010). Moreover, preventable deaths caused by infectious diseases and other treatable conditions are declining in most industrialised countries (Nolte and McKee, 2008) and chronic conditions are on the rise (Stuckler, 2008). Though preventable deaths are declining, a significant proportion of mortality (on average 24% of deaths under the age of 75 across 16 high-income countries) is still caused by conditions that are treatable (Nolte and McKee, 2011). As health systems improve, more survivors may also exert upward cost pressure, in particular in the presence of disabilities resulting from illness.

If the “expansion of morbidity” hypothesis is borne out in reality, which may be the case for at least some chronic diseases including dementia and cancer (DG-ECFIN and AWG, 2009), expenditure on LTC can be expected to rise significantly (Fernandez and Forder, 2010). The market for private LTC insurance is limited due to difficulties in predicting LTC costs and, by extension, premium setting, as well as a number of market failures including information asymmetry and adverse selection (Sloan and Norton, 1997, Brown and Finkelstein, 2007), and as such the LTC burden is likely to fall on governments and SHI funds. In anticipation of this several countries in the OECD area (Japan, Germany and Austria, among others) have taken steps to reform their SHI schemes to include LTC, while other countries (e.g. France and Spain) have implemented tax-based measures (Fernandez and Forder, 2010).

Although some uncertainty surrounds the impact of ageing and technology on health spending, there is less controversy over the impact of diminishing productive populations. The proportion of retired (age 65+) to working population (age 15-64) is set to rise above 70% in Italy, Spain and Japan by 2050 (Harper, 2010), and on average in the EU to double from 25.4% in 2008 to 53.5% in 2060 (DG-ECFIN and AWG, 2009). This has considerable consequences for revenue generation based on economic activity, such as payroll taxes, but also a

more subtle effect in reducing the potential work force for informal LTC, which is estimated to exceed by several times the value of services provided by formal care (Wanless, 2006, Andersson et al., 2003), a situation which is exacerbated by increasing female participation in the workforce, increased divorce rates and reduced cohabitation across generations (Fernandez and Forder, 2010). As the proportion of elderly relying on cheaper informal care is estimated at 80-90%, and those relying on institutional care at only 1-12%, a decrease in the availability of informal care could have consequences for future LTC costs (Saltman et al., 2006).

3.5 PROFESSIONAL INCOME LEVELS, EFFICIENCY, PRICES AND TECHNOLOGICAL ADVANCES

In contrast to other goods and services, the level of healthcare provided and consumed is not necessarily driven in its entirety by population demand, i.e. health status. Since this question was first addressed in the context of national health systems, income level has surfaced as a recurring theme, with higher income countries generally spending more on health than lower income (Abel-Smith, 1967, Gerdtham et al., 1992). Because individual health spending at the same time is considered to be relatively inelastic (Manning et al., 1987), this has led to the classification by some of health care as an "individual necessity and national luxury" and, perhaps detrimentally, to the perception that national income matters more than systems of service delivery (Newhouse, 1977). This view is countered more recently by work suggesting that GDP measured in currency fails to take into account the element of purchasing power, and when regressions are based on purchasing power parities (PPP) rather than currency, the elasticity of income becomes less than unity, in line with health care as a necessity good (Parkin et al., 1987). Consequentially, income as an explanatory factor for healthcare expenditure growth should be interpreted with some caution.

A significant body of evidence from high income countries suggests developments in medical technology, increases in unit prices of care relative to other goods and services, increases in demand for and utilisation of care, provider efficiency and a range of other factors are considerably more important determinants of health care expenditure than age per se (reviewed in Cremer et al., 2007).

One such factor is physician and other health professionals' income. Because health care is labour intensive, wages of physicians and other health staff have the potential to impact expenditure. Comparing Canada and the USA, it was found that per capita expenditure on physicians was 72% higher while utilisation was actually 28% lower in the USA. Apart from wage differentials, significant transaction costs in billing multiple insurers, insuring against

malpractice suits and other reasons are suggested for higher costs in the USA (Fuchs and Hahn, 1990).

The role of technology in health care expenditure growth has attracted significant attention over the years. Early work using regression modelling showed growth between 1947-1967 was mainly attributable to rising prices (3.7%), growing income per capita (2.3%) and population growth (1.6%). However, 0.6% of growth remained unaccounted for, and was argued to be caused by the use of the most advanced technologies available for treating patients; this was the so-called "residual approach" (Fuchs, 1972). With a negative residual, it was subsequently argued that technological developments could also be responsible for decreasing costs by introducing technologies that are more efficient (Mushkin and Landefeld, 1979). In a related approach, the so-called "excess inflation", the effects of inflation in the wider economy and above-average inflation of healthcare staff in particular are accounted for, and any residual expenditure growth is deemed to be growth in quality and quantity of services, much of which is assumed to be technological development (Altman and Wallack, 1977).

Attempts to quantify the contribution of technology more directly have employed a "cost of treatment" approach, showing that earlier expenditure growth was driven by intensified use of relatively low-cost technology such as X-rays and laboratory tests (Scitovsky and McCall, 1975), while more recent growth was better explained by introduction of new and expensive "big-ticket" technologies (Scitovsky, 1985). A related concept is that of "service intensity", a line of thought suggesting that expenditure growth may also be caused by a higher volume of services provided to each patient on admission (Newhouse, 1993).

Returning to the macro perspective, a cross-section study of 19 OECD countries found that apart from income growth, several institutional and structural factors affected healthcare expenditure: urbanisation, proportion of public financing, proportion of inpatient expenditure and fee-for-service remuneration in the outpatient sector. Hospital care and fee-for-service payments increase costs, while perhaps surprisingly public financing predicts lower expenditure (Gerdtham et al., 1992). Broadly consistent results have been reported, with hospital care associated with higher expenditure, and a primary care gatekeeping system consistently associated with lower costs probably due to lower in-patient expenditure. This study also found a larger stock of physicians to be associated with lower expenditure (except when the reimbursement system was based on fee-for-service) and a cost-decreasing effect of capitation or wages in physician reimbursement. As a proxy for technological spending, the rate of renal dialysis was associated with significantly higher inpatient costs, while no significant effects were seen from age structure, female labour force participation or unemployment (Oxley and MacFarlan, 1994, annex).

Technological advances have extended the range of conditions that can be treated, either by curing the disease or extending life and relieving symptoms, while the scope of diagnostics has been increased considerably by e.g. imaging technologies (Oxley and MacFarlan, 1994). Some newer treatments such as organ transplants or kidney dialysis bear extremely high price tags and the dissemination of such technologies together with universal coverage means the expected health care cost per individual trends upwards (Weisbrod, 1991). However, as noted above, the magnitude of the effect of technology on total expenditure alongside other supply- and demand side factors remains a question of significant debate.

As a result of the continuous growth in healthcare expenditure, most OECD governments have introduced cost containment measures; these have included, among others, wage and price controls, resulting in relative stability of expenditures until the 1990s (Docteur and Oxley, 2003), but also and more extensively, budget setting and budget-shifting practices (Stabile et al., 2013). For example, reforms to ensure sustainability in social health insurance (SHI) systems have included linking the growth in overall SHI revenues to the rate of increase in salaries (Germany), enacting additional out-of-pocket payments (Netherlands), removing expensive, non-essential drugs from the publicly reimbursed package (France) and introducing an index to limit expenditure growth (Belgium) (Saltman, 2004), however such reforms may compromise access, equity or other core values, and are generally aimed at achieving short term cost control.

An analysis of OECD public health expenditure from 1981 to 2002 revealed an average growth of 3.6% per year, of which only 0.3% was accounted for by demographic effects. The majority (2.3%) was due to income (assuming unity income elasticity of health care), while a residual of 1% was argued to be largely due to technological advances. By 2050, demographics have been projected to increase average OECD health spending by only 0.6% of GDP (5.7% to 6.3%), while a "business as usual" scenario where spending grows at historic rates would almost double expenditure to 9.6%. Reducing the 1% residual by e.g. controlling uptake of new technologies predicted a lower expenditure growth to 7.7% of GDP by 2050 (Martins and De la Maisonneuve, 2006). Similarly, an analysis of 1970-2002 per capita healthcare expenditures in OECD suggested 89% of growth was due to increased benefit levels, including the uptake of new treatments, while the remaining 11% would be attributed to demographic factors (Hagist and Kotlikoff, 2005).

4. CURRENT TRENDS AND FUTURE PROJECTIONS IN KEY VARIABLES INFLUENCING HEALTH CARE EXPENDITURE

It has already become clear that numerous factors influence health spending or individual elements of health spending (e.g. in-patient care, pharmaceutical care, long-term care). Such factors may not be related – strictly speaking – to the health care system and, as a result, are exogenous to it, whereas others may stem from it and, consequently, as endogenous. More specifically, exogenous factors act independently of the healthcare system but may still have a major influence on system performance and sustainability, and include overall macroeconomic performance and investment in broader social policy such as public pensions. Endogenous factors are inherent in healthcare systems where they directly influence expenditure; these include the impact of technological and demographic developments.

4.1 TRENDS AND PROJECTIONS IN EXOGENOUS FACTORS POTENTIALLY INFLUENCING HEALTH EXPENDITURE

Macroeconomic Performance

Using real GDP growth as a metric**,** it can be seen that the long-term performance of the eight study countries has declined over the past 30 years. Although real annual GDP growth since 1970 has had several peaks and troughs, in the long run there is a clear downward trend for all countries except Poland. In 1972-1973 most countries reached the peak of their GDP growth rates of around 7-8% (Australia outperformed with 11% and Germany underperformed with 5%), whereas by 2008-2009 most countries reached their lowest point of around -2% to -5% (with the exception of Poland, which maintained positive growth).

Real average GDP growth rates are declining over time. Looking at 20 year average annual growth rates for each country, values for 1971-1990 ranged from 2.2% (UK) to 3.2% (Canada) with the average of 7 countries being equal to 2.8% (Poland not included due to missing data); values for 1991-2010 range from 0.8% (Italy) to 3.3% (Australia), with the average of the 7 countries equal to 1.95% (Poland has the highest average of 3.8% and is excluded for comparability). Between the 7 countries, only Australia has a higher average annual growth rate in the latter period, rising from 2.58% to 3.29% (+0.7%). All other countries experience a decline ranging from -2.17 (IT) to -0.18 (UK) %.

General government debt has been rising at an almost constant rate. An examination of 10-year intervals since 1990 suggests that gross debt as % of GDP has risen for all countries, on average from 49.3% in 1990, to 58.1% in 2000, then to 72.8% in 2010 and, most recently, rising to 82.9% in 2014 (Figure 1). In 2014, Italy had the highest debt figure among the 8 study countries (134.5% of GDP), while Australia had the lowest at 30.8%, followed by Poland at 49.5% (Table 2). The overall trend for net debt (gross debt of the general government minus its financial assets in the form of debt instruments) over the period is also

increasing, on average from 38.0% in 1990, to 41.2% in 2000, to 49.2% in 2010 to 60.3% in 2014 (Figure 1). Australia, Canada and Poland are notable exceptions to this trend, despite an upturn in 2014, total net debt remains below the 8-country average at 16.1%, 39.5% and 21.8% in 2014 respectively; whereas Italy again had the highest debt at 112.4% followed by France at 89.5% (Table 2).

Fiscal deficits have also been increasing, especially during the last decade, where the 8 country average deficit as % of GDP has risen from 0.4% in 2000 to 6.6% in 2010 and fallen slightly to 3.4% in 2014 (Figure 1); with fiscal deficits reflecting the increase in average gross debt and net debt over the same period (Table 2).

These developments have a number of consequences for future levels of health spending. First, declining GDP growth in isolation reflects a slowing of economic activity and consequently lower growth in public revenues from personal income and corporate taxes to support rising demand on health and, ultimately, health spending. Second, increases in overall government debt levels lead to higher levels of debt repayment in the future as a percent of GDP. Third, excessive fiscal deficits as a percent of GDP require tighter fiscal policies in order for these to be reduced and for the budget to be balanced. In the opposite case, excessive borrowing is only going to lead to a deteriorating debt position; this is neither politically acceptable nor financially sustainable. In combination with increasing public debt over the past decades, and the current focus on reduction of fiscal deficits to improve this situation, this is likely to result in lower public expenditure on aggregate, including in the health sector.

In sum, higher re-payments due to higher debt levels imply fewer resources available for health; some countries are protecting or ringfencing the level of public spend devoted to health, but this is at best taking place at nominal, rather than real, level and does not take into account the year-on-year increase in the demand for health care due to ageing and related factors. The need for tight fiscal policies over the longer term implies that governments will very reluctantly agree to real increases in public (and health) spending. This trend will intensify in a situation where GDP growth remains low.

Public spending by sector and the impact of pension financing

The single largest category of public expenditure across all countries is social protection, accounting for approximately 32-54% of total public spending (Figure 2). It includes public pensions and other cash- and kind benefits such as housing, child and disability benefits. In general, public pensions constitute a significant cost pressure for public finances and spending as a proportion of GDP has been increasing since 1980 (Figure 3); the exceptions in our study countries are Canada, Australia and the UK, where, except for basic or state pensions, much of the burden has been shifted from the public sector to individual households, with the latter making their own arrangements through private pension

providers. Expenditure on public pensions as a percent of GDP ranged from 2.8% (Canada) to 9.7% (Germany) in 1980, while in 2011 the range was 4% (Canada) to 13.5% (Italy). Italy and France experienced the highest burdens of 13.5% and 12.5% respectively, whereas Germany was the only country with a decrease in public spending over time (-11.3%) (Figure 3).

A more detailed view of social protection trends suggests that in most countries (except Poland and the UK) social protection spending has remained relatively stable or increased slightly in the past decade (Figure 4).

4.2 TRENDS AND PROJECTIONS IN ENDOGENOUS FACTORS INFLUENCING HEALTH EXPENDITURE

Demographic structure and the dependency ratio

Developments in demographics are likely to increase the demand for health care in a variety of ways as discussed earlier. A trend of increasing life expectancy at 65 years is seen in all countries since 1970 (except for Poland in 1970-1990). Figure 5 shows the increase in male life expectancy between 1960 and its projected value in 2020. The 8-country average has shifted from 12.4 years in 1970 to 17.5 years in 2009, an increase of 5 years (40.6%). Based on linear regression, projections for 2020 indicate a male life expectancy at 65 of 19.9 years, an increase of 2.5 years or 13.9% higher than in 2009.

Longer life expectancy is expected to lead to a higher proportion of elderly in the population (Figure 6). The 8-country average proportion of population over 65 has increased from 10.5% in 1970 to 16.5% in 2010, a 54.5% increase. At one end of the spectrum Australia, Canada and Poland represent relatively 'young' populations with their over-65 populations amounting to 13.3%, 13.9%, and 13.5%, respectively in 2010. On the opposite end, Germany and Italy represent the relatively 'old' populations where share of the over-65s has reached 20.5% and 20.2% of the total respectively, in 2010. In France, Spain and the UK the share of the over-65s in the population amounted to 16.7%, 16.7% and 15.8%, respectively in 2010. Projections suggest that the 8 country average share of over-65s in the total population could grow from 16.5% in 2010 to 18.1% in 2020, assuming fertility rates and other factors influencing demographics remain unaffected.

The combined increase in life expectancy and the share of the over-65s in the population has a direct effect on the old age dependency ratio, defined as the number of people at working age to the number of people over 65. Since 1960, the 8 country average ratio has dropped from 6.3 working persons per non-working person to 3.8 in 2010, almost a 40% decline (Figure 7). In 2010, Germany and Italy had an old age dependency ratio of 2.9 and 3.0, respectively, whereas in Australia, Canada, and Poland this ranged between 4.4 and 4.8.

Projections for 2020 show the 8 country average ratio decreasing to 3.0, with Germany's and Italy's declining to 2.6.

Pharmaceutical Spending

To illustrate the impact of technological developments on health spending, pharmaceutical expenditure was used as a proxy. Total pharmaceutical spending increased significantly in real terms between 1990 and 2010 (Figure 8). Specifically, the cumulative 20 year increase ranged from 24% in Italy (from €11.6bn to €14.4bn) to 303% in Australia (AU$3.0bn to AU$12.0bn or €1.6bn to €8.4bn), with a 7 country average (Poland excluded due to missing data) of 130%. In real absolute terms, Canada had the highest increase in real pharmaceutical expenditure, whereas Italy had the lowest.

In terms of likely future trends, the projected total real expenditure for 2020 as a percentage change of 2012 under the two scenarios we have used to calculate projections is shown in Figure 9. The average change for all 8 countries ranged from 13.0% according to our optimistic scenario of moderate cost increase to 26.2% according to our pessimistic scenario of significant cost increase. The baseline (median) value stood at 19.6%.

4.3 HEALTH EXPENDITURE TRENDS AND PROJECTIONS

Having examined endogenous cost drivers (demographics, medical technology) and exogenous financial pressures (macroeconomics, public pensions) on health systems, it has been shown that health expenditure growth has outpaced GDP growth over the course of the past 20 years. Figure 10 summarises the growth rates in the study countries and shows that the 10-year increase between 1990 and 2000 in national currency ranged from 20.3% in Italy (€54bn to €65bn) to 149.1% in Poland (ZL3.0bn to ZL7.4bn or from €0.7bn to €1.9bn); the average increase across the 8 study countries was 53.3%. Between 2000 and 2010, the change in the rate of expenditure growth ranged from -6.8% in Germany (from €180.5bn to €168.2bn) to 87.1% in Poland (ZL7.4bn to ZL13.8bn or from €1.9bn to €3.4bn), with the average increase being 45.1%. For the entire 1990-2010 period the 20-year cumulative increase in real health spending ranged from 49% in Italy (from €54bn to €80.6bn) to 366% in Poland (ZL3.0bn to ZL13.8bn or from €0.7bn to €3.4bn), the average for all 8 countries being 139%. In real absolute monetary terms, France has had the highest rise in expenditure, an increase of €5.6bn, whereas Poland has the lowest, an increase of ZL10.8 billion (€2.6bn) (Figure 10).

The projected total real health expenditure for 2020 as a percentage change of 2012 values under the two scenarios ('optimistic' and 'pessimistic') is shown in

Figure 11. The average change for all 8 countries ranges from 20.8% (optimistic) to 28% (pessimistic) with a median value of 24.4%.

Based on the assumption that countries are going to resist real increases in health spending in the future because of adverse fiscal and other macroeconomic conditions, we are able to calculate the extent of future funding gaps. This is done by using the projected total real health expenditure values, which act as a proxy for health care demand, and subtracting from these the real health spending values assuming zero health spending growth for the next 8 years (2012 – 2020). The funding gaps, therefore, illustrate the difference between the projected future levels of demand for health (trend of total health spending) and a hypothetical zero growth in health care budgets in real terms at 2012 levels. Based on this, Figure 12, shows the funding gap for the 2012-2020 period for the case of Canada; the gap (vertical line) is quantified as the difference between the 2012 real total health expenditure (horizontal dashed line) and the forecasted demand for healthcare under two scenarios. The potential gap in 2017 is shown to range from CN$ 17.3bn (€ 11.4bn), based on the optimistic scenario to CN$ 21.9bn (€ 14.5bn) based on the pessimistic scenario. These values correspond to 13.7% and 17.4% of 2012 Canadian total health expenditure respectively, with a baseline (median) a gap of CN$ 19.6 billion (€ 15.7bn) or a 15.6% increase based on 2012 value.

The minimum and maximum ranges of funding gaps, reflecting the optimistic and pessimistic scenarios respectively, have been calculated for the remainder of the study countries for 2017 relative to 2012. These are as follows: Australia AU$12.0bn or € 8.0bn (15.6% of real total health spending in 2012), France €19.0bn (11.4%), Germany -€3.1bn (-1.9%), Italy €11.5bn (15.0%), Poland €3.5bn (24.2%), Spain €10.0bn (19.5%), and United Kingdom £11.3bn or € 15.3bn (15.0%). The mean magnitude of the funding gap for 2017 across the 8 countries for each scenario is 12.3% (optimistic scenario), and 17.7% (pessimistic scenario) of 2012 total real health expenditure, respectively.

With respect to the baseline, the cumulative funding gaps in 2017 and their respective percentage changes based on 2012 real health expenditure are as follows: Australia AU$ 36.0bn or € 24.1bn (46.8%), Canada CN$ 60.3bn or € 39.9bn (47.9%), France € 62.8bn (37.8%), Germany -€5.8bn (-3.6%), Italy €45bn (58.3%), Poland €11.1bn (76.8%), Spain €32.9bn (64.2%), and United Kingdom £62.9bn or € 85.4bn (73.3%), as illustrated in Figure 13. The mean magnitude of the cumulative funding gap across the 8 countries for each scenario is 39.4% (optimistic scenario), and 61.0% (pessimistic scenario) of 2012 total real health expenditure.

5. IS HEALTH CARE FUNDING SUSTAINABLE OVER THE LONG-TERM?

The data presented in the previous section show a declining overall GDP growth across the past three to four decades in 7 of the 8 countries studied (Poland being the exception), and a constantly increasing (although at a declining rate) level of healthcare expenditure. As discussed above, real total health spending for all countries has been rising at high rates. Between 1990 and 2010, the average increase in total real health expenditure in the 8 countries was 139%, ranging from 49% in Italy to 366% in Poland. In contrast, spending on pensions has stabilized and in some cases declined in the 2000s despite a monotonously increasing life expectancy and proportion of elderly population, due to various policy initiatives implemented to control growth (Meier and Werding, 2010), partly shifting the burden to households.

Total health expenditure growth has slowed down over the past few years across all study countries. Reforms to stabilise the rate of growth of health expenditures have seen a mix of supply and demand side measures to promote cost containment and macroeconomic efficiency. In this context, measures have included cutting minor benefits, increasing user charges, encouraging GP gatekeeping, introducing prospective hospital reimbursement through DRG implementation, pharmaceutical price controls, broader use of health technology assessment (HTA), budget caps on hospitals and GP practices, restrictions on GP pay rises and pharmaceutical benefits, and embarking on decentralization (Cottarelli, 2010a, Cottarelli, 2010b).

While estimates of the impact of ageing on health expenditure differ, some upward pressure is inevitable. It has been estimated that in some countries (including Italy and Germany), ageing is the only cost driver for the next two decades and will result in an increase of less than 1% of GDP, whereas in others, ageing only constitutes around 30-50% of a projected increase of 1-2% of GDP (including Australia, Canada, France and Spain). In extreme cases, including the UK and the US, the non-age related cost growth alone could reach 3% of GDP in the next 20 years due to rising incomes, technological advances, the Baumol effect (increase in wages without associated increase in productivity) and health policies/institutions.

Pharmaceutical spending, which is used as a proxy for the impact of medical technology, is shown to be increasing moderately or significantly. Overall, over the 1990-2010 period all countries experienced a major growth in real pharmaceutical spending ranging from 23.9% in Italy, to 303.1% in Australia, with the 8-country average being 130.4%. The slowing of pharmaceutical expenditure growth since 2000 coincides with the establishment of national authorities to review clinical and cost-effectiveness of new pharmaceutical interventions before admission into national reimbursement lists, including the

UK National Institute for Health and Care Excellence (NICE) in 1999 and the Institute for Quality and Efficiency in Health Care (IQWiG) in Germany in 2004, and also with the expiry of patents on certain blockbuster drugs and increased use of generics (Aitken et al., 2009). Health Technology Assessment (HTA) agencies such as NICE and IQWiG determine which *new* technologies constitute value for money, but the question of which *existing* technologies are ineffective or even unsafe is not yet part of the agenda (Elshaug et al., 2009, Kanavos et al., 2009) e.g. due to resource limitations and lack of a clear methodology for disinvestment. Disinvestment in particular can be difficult to implement without considerable stakeholder resistance (Elshaug et al., 2009, Elshaug et al., 2008). While policies to curb pharmaceutical expenditure are implemented across the study countries and more widely within the entire OECD area, these are unlikely to have much long term impact given the proportion of pharmaceuticals to total health spending is approximately 15% in most OECD countries (Cottarelli, 2010a).

Sustainability of health system financing is not an entirely new area of concern and enquiry, but an issue that has been raised across several decades. For example, in the early 1980s, there was concern over the rising costs of Medicare in the USA caused by an ageing population which, in turn, would mean less productive population and higher utilisation of health services (Fuchs, 1984). Recent evidence from a cross-section of Australian physicians and health service consumers (general population) suggests the issue of sustainability is familiar to the majority of the population, with elderly respondents more likely to be very concerned about cost of care. Doctors seem to be more concerned with the cost of technological innovations than patients, and a large majority (82.9%) of consumers vs approximately one third of doctors feel treatments should be offered no matter how small the chance of benefit and how high the cost (Robertson et al., 2011), highlighting the inherent difficulty in rationing medical treatments. Today the concern has been generalised across many –if not most- OECD countries and materialised into a *bona fide* sustainability threat. As a result, policy-makers are faced with the need for significant short- and long-term savings.

However, long-term savings are unlikely to materialise from indirect and direct price cuts and controls alone, but, rather more likely from increasing the efficiency and modernising the delivery of health care services. Indeed, a number of sources of inefficiency have been identified in areas such as pharmaceutical utilisation, health care goods and services, labour inputs to the health care system, and health care interventions that, if addressed, could provide both savings and efficiency gains for the future (Chisholm and Evans, 2010). More specifically, these include, among others, the underuse of generic pharmaceuticals in many settings and the higher than necessary prices for medicines; the inappropriate (overuse, underuse, misuse) and ineffective use of

prescription pharmaceuticals; the overuse or over-supply of equipment, investigations and procedures; the inappropriate or costly staff mix and associated incentive structures leading to potentially unmotivated health workforce; and potentially inappropriate hospital admissions and length of stay (Chisholm and Evans, 2010). The above should also be supplemented by factors such as medical errors, the provision of low quality of care, but also wasteful use of resources, corruption and fraud, which remain hidden agenda items in most health care systems.

Since most countries face escalating fiscal pressures, we assume there will be a turning point on the growth of their health care budgets. By taking 2010 as the year of this turning point, we assume that healthcare spending in real terms will remain constant during the following years. In using as a proxy for demand for healthcare the temporal trend of (observed and projected) health expenditure, we observe a gap between future demand and supply. The average forecasted funding gap for 2017 across the 8 countries has a baseline value of 15.0%, ranging from the 'optimistic' value of 12.3% to the 'pessimistic' value of 17.8% of 2012 total health spending.

Options to address the problem of the escalating expenditure for health care and the resulting funding gap(s) can be divided into three main categories. The first category relates to increasing the level of resources available for health care; this could be achieved in a number of ways, for example by increasing taxes and/or social insurance contributions, or reallocating budgets from other areas of government spending into health care. The public acceptability of different tax increases may vary according to setting; typically, "sin" taxes e.g. on tobacco, alcohol or other unhealthy consumption goods, such as the tax on saturated fat recently introduced in Denmark (Folketinget, 2011), carry a greater degree of acceptability than do increases in income tax or taxes on general consumption. However, the fiscal benefit of those taxes that are considered to be 'acceptable' from a societal perspective is likely to be limited. An additional downside is that some of these taxes may be regressive and may not necessarily tackle the reason why some consumers are more likely to engage in risky or unhealthy behavior. The reallocation of funds from other areas of public spending, such as social protection, education or defense, may be politically sensitive, particularly with regards to shifting funds from the education budget. Nevertheless, data from recent years suggest that social protection spending as a proportion of total spending fluctuates from year to year and could be amenable to modest or moderate shifts to the health sector.

The second category is associated with policies to decrease the health system's obligations and its associated costs. This could be achieved through rationing non-clinical quality coverage such as waiting times, enabling population/service exclusions from coverage, expanding cost-sharing, and enabling a variety of supplementary health insurance options. Rationing is likely to be feasible in less

essential services, such as dentistry, physiotherapy or optical services, and a well-functioning private insurance market would be able to offer such coverage on a voluntary basis. A number of countries have already opted for this and reduced the level of coverage to their citizens significantly in dental or optical care, unless where it is absolutely essential and medically necessary. Excluding population groups from some coverage on a means-tested basis is possible and already implemented in some instances, e.g. free prescriptions for children, disabled and other vulnerable groups in the UK NHS. As cost-sharing has been shown to have some negative effect on health service utilization (Manning et al., 1987), such measures must be implemented with care, but are likely to be feasible for less essential services.

The final category of measures relate to improving the efficiency of the health care system and would include reforming service delivery by introducing Health Technology Assessment (HTA), prescribing guidelines, changing provider payment methods and refining the incentive structure for health professionals, and, even, privatising parts of the health care system, increasing competition on the delivery of health care or enabling a variety of complementary private insurance options. An efficient pharmaceutical policy, which includes generic substitution and price controls for originator drugs, may help to control spending in this category, as may the use of HTA to limit uptake of technologies with limited benefit. Disinvestment in existing procedures and technologies that are not cost-effective may become an area of increased focus in the near future. The introduction of market mechanisms to increase provider competition and efficiency is argued by some to result in savings, though the overall picture on this is unclear.

Overall, in order for health care systems to remain financially sustainable over the long-term and for publicly funded health care systems to retain their public nature, a number of incisive reforms need to be implemented; first, there needs to be intensified focus on an outcomes-based reimbursement system by refining the incentive structure for health care professionals and providers; second, there is significant need to apply HTA rules to ensure value for money not only based on available clinical trial evidence (efficacy) but also in daily clinical practice (effectiveness and indeed relative effectiveness); third, it is imperative to further negotiate reimbursement rates to ensure technologies, procedures and health interventions are not only cost-effective, but also affordable; fourth, it may be necessary to adjust the models of payment for services to the benefit they deliver to patients or society; for example, tiered payments could be offered for interventions that are administered at a discrete point in time – and would therefore require a significant amount of investment upfront - but deliver benefit over a patient's lifetime; fifth, it is important to simplify and rationalise processes to facilitate organisational innovation, support care integration and coordination as well as streamline administration in order to improve health

care delivery; sixth, it is increasingly important to ensure that health professional mix is constantly refined to reflect need and severity; greater use of nurses, nurse prescribers and practitioners as well as pharmacists would enable (senior) clinicians allocate their time more efficiently to more demanding cases; seventh, it is critical to develop – if not already available - national health information technology frameworks characterised by an overarching data interface, which would link insurers with all providers, avoid duplication in service provision and improve efficiency in service delivery; eighth, health systems need to ensure they make clinical data on interventions, outcomes and costs available to researchers in order to monitor performance and evaluate the outcome of specific policy interventions; and, finally, it remains essential to constantly identify revenue sources to provide comprehensive health insurance coverage for everyone, where this is needed.

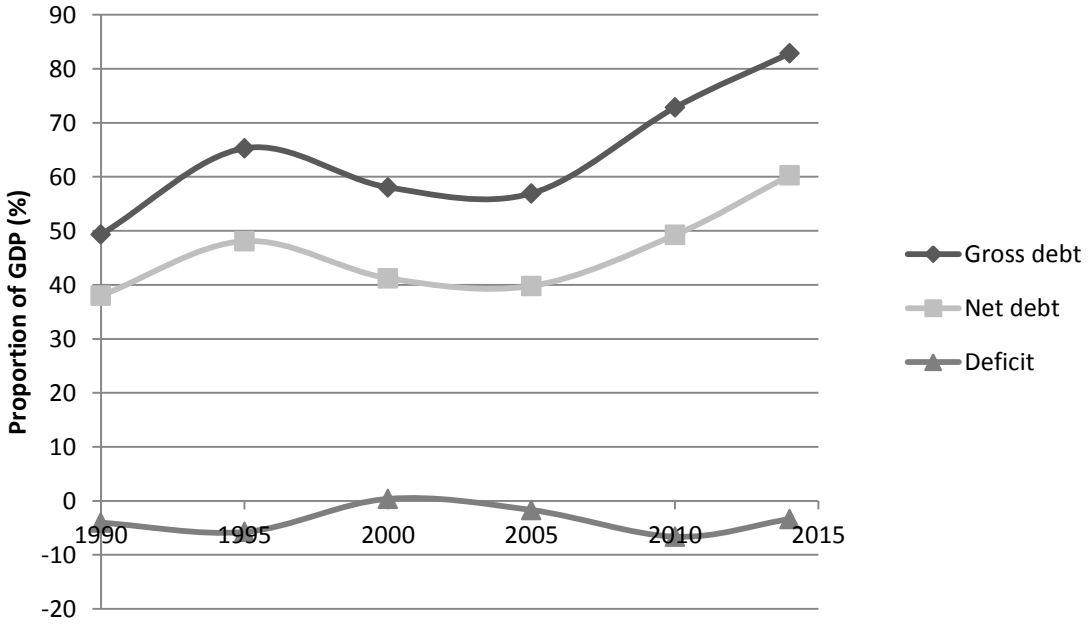
Table 1
Overview of health system financing mechanisms in 8 OECD countries

Country	Health system financing (payer)	Health service provision	Private Health Insurance
Australia	Public (General taxation + health tax)	Public and private	Voluntary
Canada	Public (general taxation)	Public and private	Voluntary
France	Social Health Insurance (statutory) and public (general + health tax)	Public and private	Voluntary
Germany	Social Health Insurance (statutory) and public (general taxation)	Public and private	Voluntary (some substitutive)
Italy	Hybrid of Social Health Insurance and Public	Public and private	Voluntary (some substitutive)
Poland	Public (Health tax + general taxation)	Public and private	Voluntary (limited scope)
Spain	Public (General taxation + National Insurance)	Predominantly public	Voluntary
United Kingdom	Public (General taxation)	Public and private	Voluntary

Sources: Australia (HiT, 2006); Canada (HiT, 2013); France (HiT, 2015); Germany (HiT, 2014a); Italy (HiT, 2014b); Poland (HiT, 2011a); Spain (HiT, 2010); UK (HiT, 2011b).

Figure 1

Eight country average General Government Gross debt, Net debt and Deficit as % of GDP, 1990-2014



Note: Includes the following countries: UK, Germany, France, Italy, Spain, Australia, Canada, Poland.

Source: IMF, World Economic Outlook Database, April 2014.

Table 2

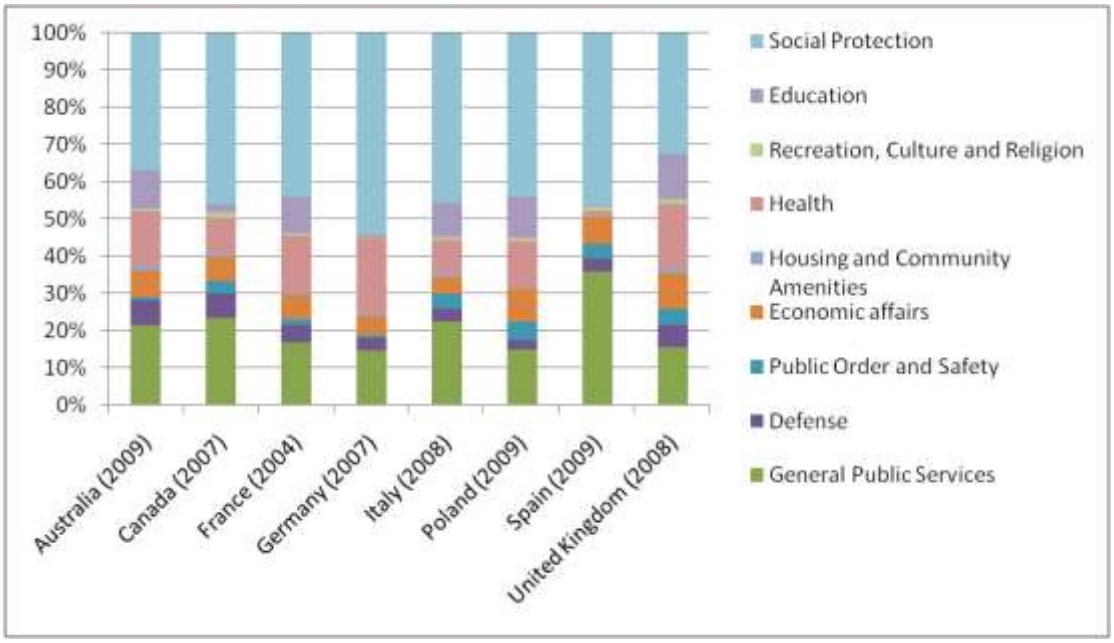
General Government Gross debt, Net debt and Deficit as % of GDP, 1990 - 2014

	Gross debt (% of GDP)				Net debt (% of GDP)				Deficit (% of GDP)			
	1990	**2000**	**2010**	**2014**	**1990**	**2000**	**2010**	**2014**	**1990**	**2000**	**2010**	**2014**
Australia	16.4	19.5	20.5	30.8	9.6	7.1	3.9	16.1	0.29	1.74	-5.08	-3.36
Canada	75.2	82.1	83.1	87.4	43.7	46.2	29.7	39.5	-5.65	2.94	-4.93	-2.50
France	35.2	57.4	82.4	95.8	25.4	51.4	76.1	89.5	-2.48	-1.52	-7.09	-3.68
Germany	n/a	60.2	82.5	74.6	n/a	40.6	58.2	52.9	n/a	1.14	-4.15	0.02
Italy	94.3	108.6	119.3	134.5	89.2	93.2	100.0	112.4	-11.40	-0.91	-4.38	-2.69
Poland	n/a	36.8	54.8	49.5	n/a	6.9	20.5	21.8	n/a	-3.03	-7.86	-3.54
Spain	42.5	59.4	61.7	98.8	30.3	50.4	33.2	65.7	-3.52	-0.95	-9.61	-5.89
UK	32.4	40.5	78.5	91.5	29.9	33.9	72.2	84.4	-1.54	3.55	-9.97	-5.28
Average	49.3	58.1	72.8	82.9	38.0	41.2	49.2	60.3	-4.05	0.37	-6.63	-3.37

Source: IMF, World Economic Outlook Database.

Figure 2

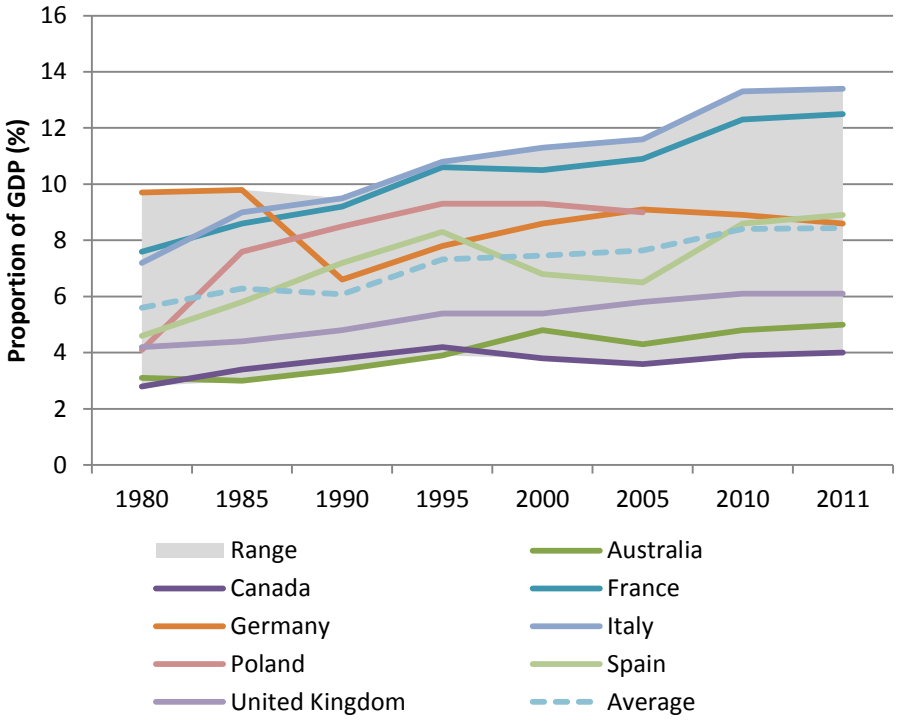
Public spending by sector and type of activity



Source: OECD Statistics Database, 2014.

Figure 3

Public Pensions as % of GDP 1980-2011

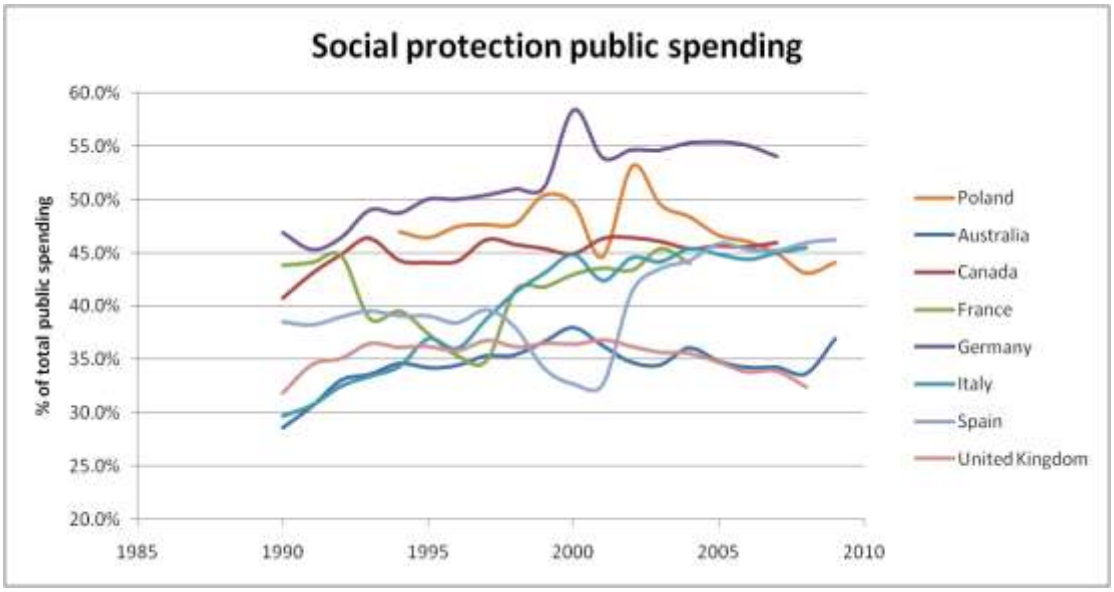


Note: Includes the following countries: UK, Germany, France, Italy, Spain, Australia, Canada, Poland.

Source: OECD Statistics Database, 2014.

Figure 4

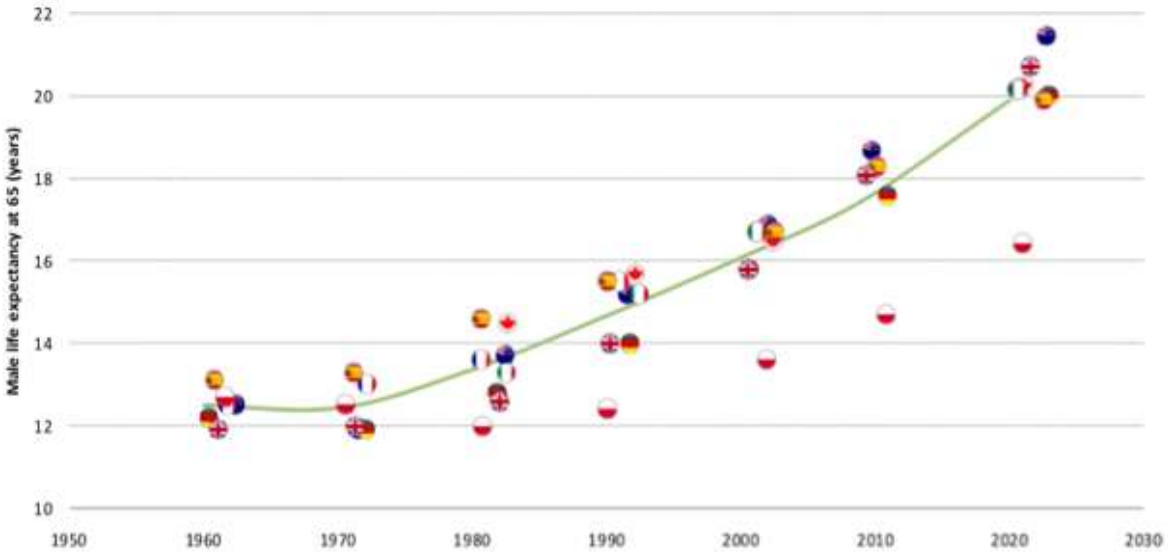
Social protection as proportion of total public spending over time



Source: OECD Statistics Database, 2014.

Figure 5

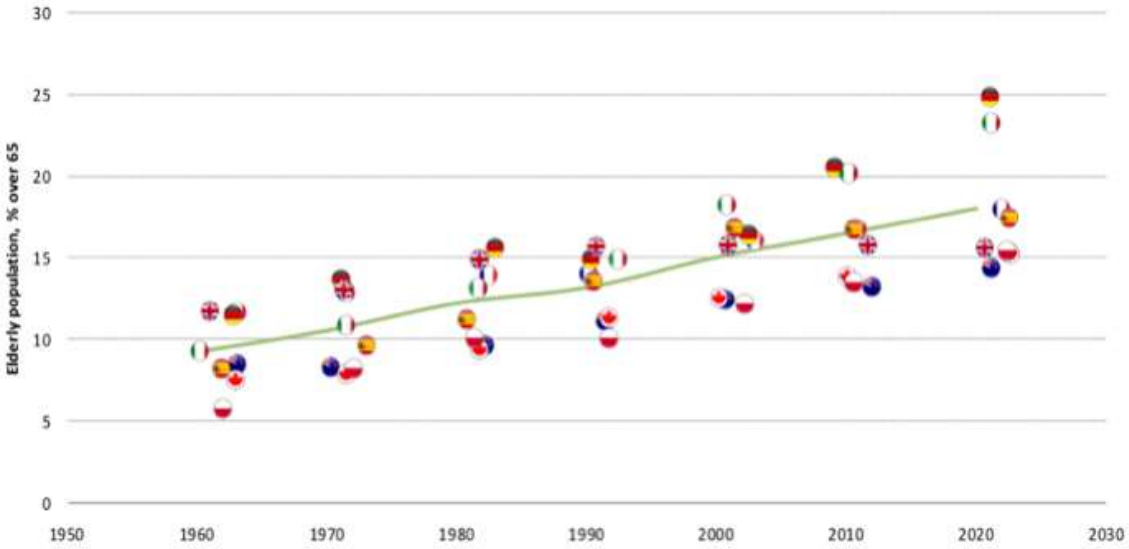
Male life expectancy at 65 years, 1960-2020



Note: [1]2020 figures are based on OECD projections.
Source: OECD Statistics Database, 2014.

Figure 6

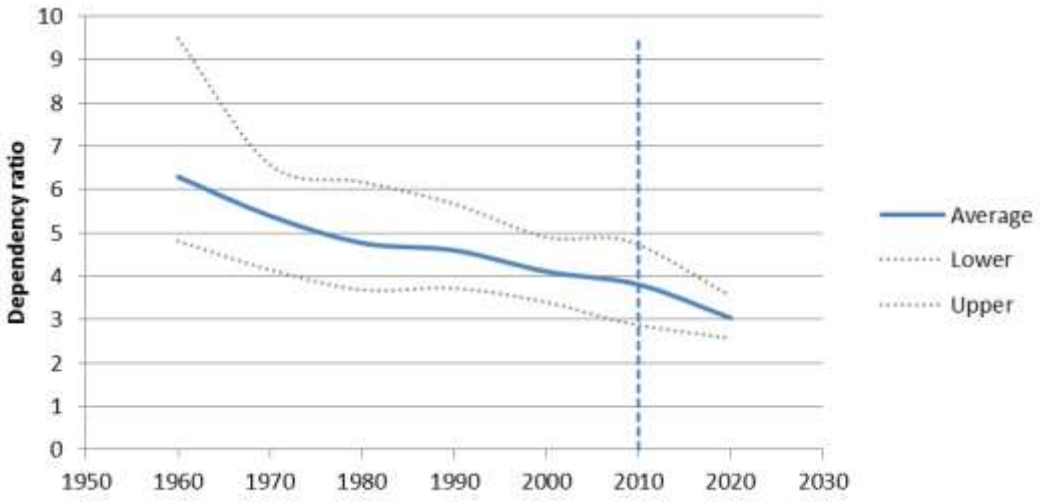
Elderly population over 65, 1960-2020



Note: [1]2020 figures are based on OECD projections.
Source: OECD Statistics Database, 2014.

Figure 7

Eight OECD country average, lower limit and upper limit on old age dependency ratio 1960 – 2020[1]

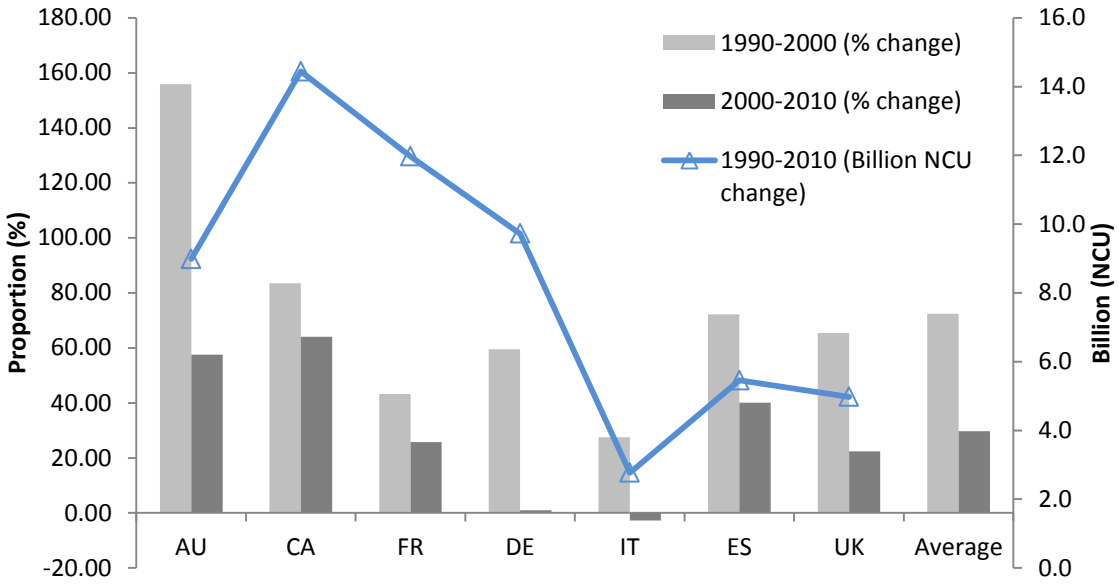


Note: [1]2020 figures are based on OECD projections. Upper boundary reflects the values from Poland and the lower boundary reflects the values from Italy.

Source: OECD, Pensions at a Glance 2013.

Figure 8

Total Real Pharmaceutical Expenditure Growth: % change 1990-2000, % change 2000-2010, and 1990-2010 change in national currency units (NCU), billion



Source: The authors based on OECD and World Bank data.

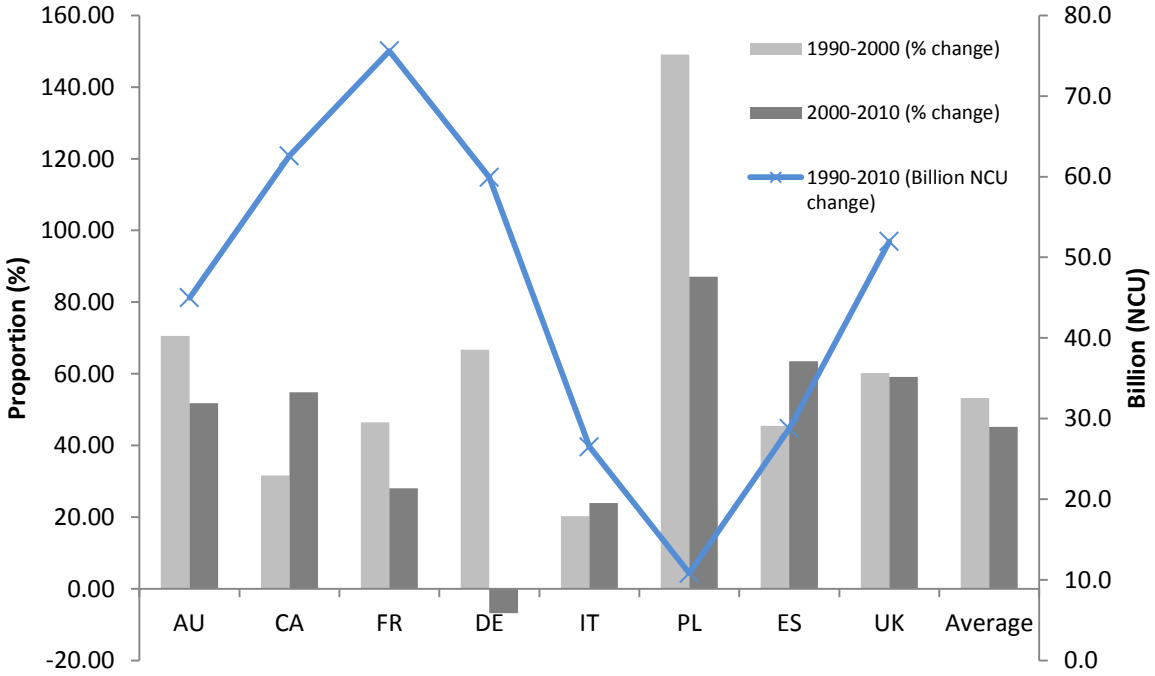
Figure 9

Total Real Pharmaceutical Expenditure Growth Projection: Percent change 2012 - 2020

Source: Authors' projections based on OECD and World Bank data.

Figure 10

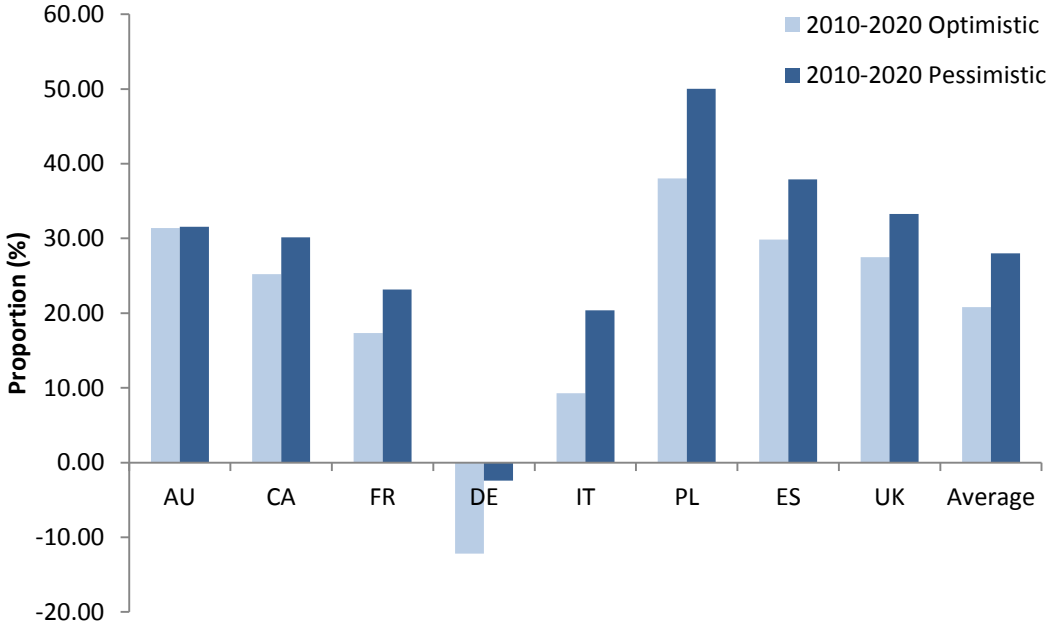
Total Real Healthcare Expenditure Growth: Percent changes between 1990-2000 and 2000-2010, and 1990-2010 change in national currency units (NCU), in billions



Source: The authors based on OECD and World Bank data.

Figure 11

Total Real Health Expenditure Growth Projection: Percent change 2012 - 2020

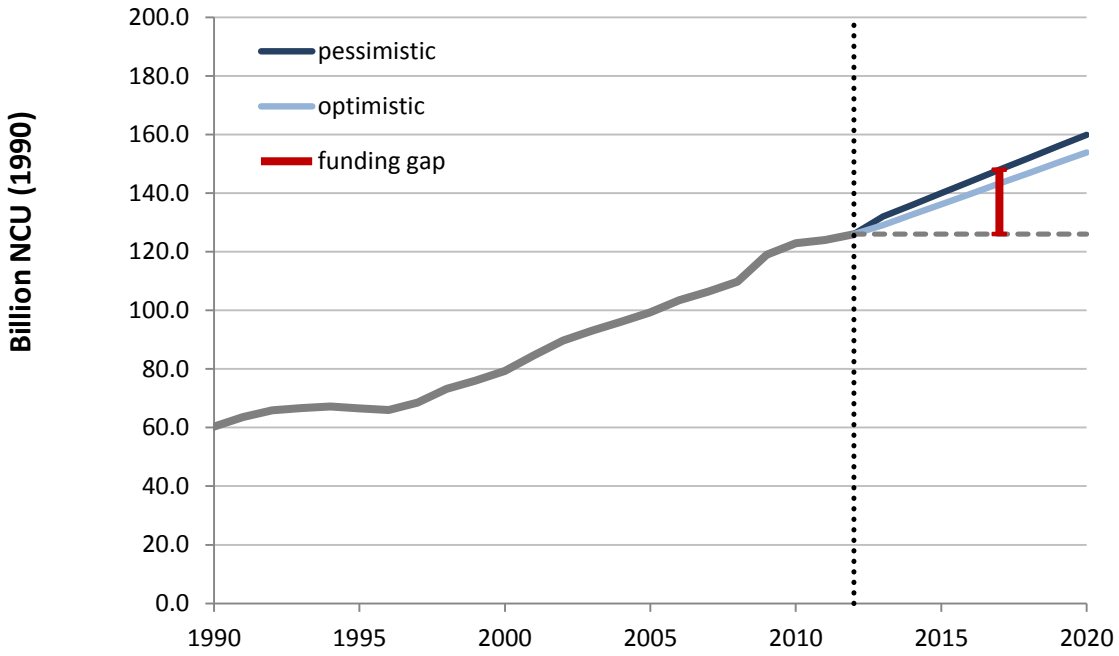


Source: Authors' projections based on OECD and World Bank data.

Figure 12

Canada's total real health expenditure 1990-2012, and evolution of potential funding gap, 2012-2020

(in real national currency units at 1990 prices[1])



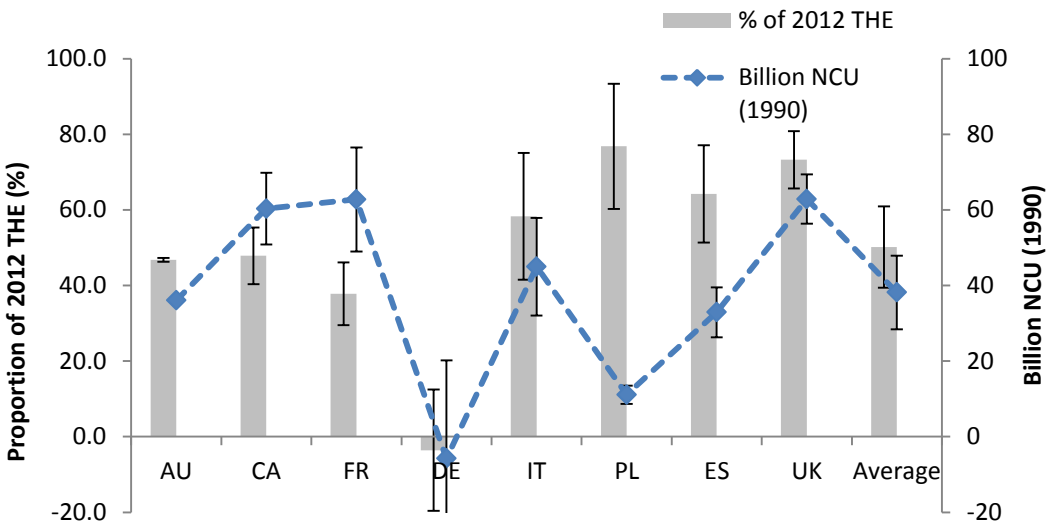
Note: [1] The funding gap is calculated based on the assumption that real health spend will remain fixed beyond 2012, which is the baseline year.

Source: Authors' projections based on OECD and World Bank data.

Figure 13

Cumulative funding gaps across the 8 OECD countries, 2012 - 2017

(ranges shown as error bars)



Source: Authors' projections based on OECD and World Bank data.

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