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Who's going broke? Comparing growth in Public Healthcare Expenditure in ten OECD countries*

CHRISTIAN HAGIST
Freiburg University (Germany)
LAURENCE J. KOTLIKOFF
Boston University

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Abstract

Government healthcare expenditures have been growing much more rapidly than GDP in OECD countries. How much of this growth is due to demographic change versus increases in benefit levels (expenditures per person at a given age)? This paper answers this question for ten OECD countries –Australia, Austria, Canada, Germany, Japan, Norway, Spain, Sweden, the UK, and the U.S. using data from 1970-2002. Growth in benefit levels explains 89 of overall healthcare spending growth in the ten countries over the period, with Norway, Spain, and the U.S. recording the highest annual benefit growth rates. As we show, allowing government healthcare benefit levels to grow at historic rates is fraught with danger given the impending retirement of the baby boom generation.

Key words: Healthcare expenditure growth, long-term fiscal imbalance.

JEL classification: H51, I11.

1. Introduction

As is well known, government healthcare expenditures in developed countries have been growing much more rapidly than have their economies. What is less well known is how much of this expenditure growth is due to demographic change and how much is due to increases in benefit levels, i.e. health expenditures per person at a given age[1]. The distinction

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* Corresponding author: Christian Hagist, Albert-Ludwigs-Universität Freiburg (Freiburg University), D-79085 Freiburg, Germany (Fax +49-761-203-2290, christian.hagist@vwl.uni-freiburg.de). We would like to thank the German Merit Foundation (Deutsche Studienstiftung) and the Hamburger Foundation (Hamburger Stiftung für internationale Forschungs- und Studienvorhaben) for financial support. Furthermore, we gratefully acknowledge helpful comments from Stefan Fetzer, Bettina Hagist and two anonymous referees. All errors remain our own.

is important. Benefit levels are determined by government policy, whereas demographics are largely outside government control. Policymakers who ignore or misjudge the growth in their benefit levels do so at their country's risk. They are left with only a vague understanding of why their health expenditures grew in the past and very little ability to project how they will grow in the future.

This study uses OECD demographic and total health expenditure data in conjunction with country-specific age-health-expenditure profiles to measure growth in real healthcare benefit levels between 1970 and 2002 in ten OECD countries –Australia, Austria, Canada, Germany, Japan, Norway, Spain, Sweden, the UK, and the U.S. Among these nations, Norway, Spain, and the U.S. recorded the highest growth rates in benefit levels. Norway's rate averaged 5.04 percent per year. Spain and the U.S. were close behind with rates of 4.63 percent and 4.61 percent, respectively. Canada and Sweden had the lowest growth rates –2.32 percent and 2.35 percent, respectively.

Benefit growth, even among countries with the lowest benefit growth rates, has played the major role in raising total government healthcare spending in recent decades. Over the 32-year period covered by our data, total healthcare spending grew 2.5 times faster than GDP, on average, across the ten countries[2]. Had there been no benefit growth, healthcare spending would still have grown because of demographics, specifically changes in the age-composition of healthcare beneficiaries and increases in the total number of beneficiaries. But with no growth in real benefit levels, healthcare spending in our ten countries would have grown, on average, only one fifth as fast.

Going forward, growth in real benefit levels will likely continue to play the key role in determining overall increases in healthcare spending. This is not to negate the importance, going forward, of demographics. In 2002 the share of the population 65 and older in our ten countries averaged 14.8 percent. By mid century it will average 25.9 percent –a 75 percent increase! Table 1 shows how the population share of the elderly will change in our ten countries through 2070. Japan, which is currently the oldest of our countries, will retain that ranking, ending up in 2070 with 37.7 percent of its population age 65 or older. The U.S. will also retain its ranking as the youngest of the ten countries. Its 2070 elderly share is projected at 21.6 percent –not much larger than the current elderly share of the Japanese population.

Since healthcare benefit levels are much higher for the elderly than they are for the young, continuing to let benefit levels grow as a country ages will accelerate the increase in healthcare spending. In the U.S., for example, real government healthcare spending increased by a factor of 6.9 between 1970 and 2002. If real benefit levels continue to grow at historic rates, real U.S. healthcare spending will increase by a factor of 7.5 over the next 42 years. Absent growth in real benefit levels, the U.S. *total* real healthcare expenditures growth factor would have been 1.6 between 1970 and 2002. And absent future benefit growth, the factor will be 1.8 over the next 32 years. So demographics matter to overall healthcare spending, but they are swamped in importance by unchecked growth in real benefit levels.

In Japan, maintaining its 1970-2002 annual real benefit growth rate of 3.57 percent for the next 40 years and at the rate of labor productivity thereafter entails present value healthcare expenditures totaling almost 12 percent of the present value of all future GDP. By comparison, Japan's government is now spending only 6.7 percent of the nation's output on healthcare. In the U.S., government healthcare spending now totals about 6.6 percent of GDP. But if Uncle Sam continues to let benefits grow for the next four decades at past rates, it will end up spending almost 18 percent of American's future GDP on healthcare.

The difference between the Japanese 12 percent and U.S. 18 percent figures is remarkable given that Japan is already much older than the U.S. and will age much more rapidly in the coming decades. The difference accentuates the obvious –disproportionate growth in benefit levels can be much more important than aging in determining long-term healthcare costs. Moreover, the fact that the present value of projected U.S. healthcare expenditures is so high –indeed, the highest of any of our 10 countries when measured relative to GDP– suggests that the U.S. may be in the worst overall fiscal shape of any of the OECD countries even though its demographics are among the most favorable. The paper proceeds by describing our methodology, presenting our data, discussing our findings, examining their long-term fiscal implications, and reiterating the importance of controlling growth in benefit levels.

2. Methodology

Let E_t stand for the value of real healthcare expenditures in a country in year *t* and write

$$E_t = \sum \varepsilon_{i,t} P_{i,t} \qquad (1)$$

where $\varepsilon_{i,t}$ indicates healthcare expenditures per head of age group *i* at time *t* and $P_{i,t}$ represents the population age *i* at time *t*. OECD (2004a) provides past population counts for the age groups *0-14*, *15-19*, *20-49*, *50-64*, *65-69*, *70-74*, *75-79*, and *80* plus. The subscript *i* references these age groups.

We assume the profile of age-specific health spending is constant through time and normalize the age-profile of average expenditures by dividing by average expenditures of age group *50-64* in year *t*. This defines:

$$\begin{aligned} &\frac{\varepsilon_{0-14,t}}{\varepsilon_{50-64,t}} = \alpha_{0-14}; \frac{\varepsilon_{15-19,t}}{\varepsilon_{50-64,t}} = \alpha_{15-19}; \frac{\varepsilon_{20-49,t}}{\varepsilon_{50-64,t}} = \alpha_{20-49}; \frac{\varepsilon_{50-64,t}}{\varepsilon_{50-64,t}} = \alpha_{50-64} = 1; \\ &\frac{\varepsilon_{65-69,t}}{\varepsilon_{50-64,t}} = \alpha_{65-69}; \frac{\varepsilon_{70-74,t}}{\varepsilon_{50-64,t}} = \alpha_{70-74}; \frac{\varepsilon_{75-79,t}}{\varepsilon_{50-64,t}} = \alpha_{75-79}; \frac{\varepsilon_{80plus,t}}{\varepsilon_{50-64,t}} = \alpha_{80plus} \end{aligned} \qquad (2)$$

In what follows, we treat absolute average real expenditures of age group *50-64* as the country's benefit level. Letting *b* stand for the base year, 1970, and assuming benefit levels grow at a constant annual rate, we have

$$\varepsilon_{50\text{-}64,t} = \varepsilon_{50\text{-}64,b}\,(1+\lambda)^{t-b} \tag{3}$$

Use (2) and (3) to rewrite (1) as

$$E_t = \varepsilon_{50-64,b}(1+\lambda)^{t-b}\sum_i \alpha_i P_{it} \tag{4}$$

Note that in the base year, *t=b*, so given the value of base-year aggregate healthcare spending (E_b), knowledge of the age-health expenditure profile (the $\alpha_i s$), and the base-year, age-specific population counts (the P_{it}s), we can use (4) to determine $\overline{\varepsilon}_{50\text{-}64,b}$. Setting *t=2002* in (4), we can determine the value for λ. Given a value of λ for each country we can accomplish our paper's first two goals, namely comparing benefit growth rates across countries and decomposing total healthcare expenditure growth into the part due to benefit growth and the part due to demographics.

The recovered values of λ are also used to meet our third objective –projecting future aggregate government healthcare spending in the ten countries. In forming these projections we use Bonin (2001)'s demographic program, which projects population by single age[3], and equation (4) to determine future values of E_t. In using (4), we a) take the base year *b* to be 2002, b) treat age group *i* as representing a single age of life, rather than as an age range and c) determine the value for $\varepsilon_{50\text{-}64,2002}$ by setting *t=b=2002*. Where sex- as well as age-specific relative healthcare expenditure profiles are available we also distinguish the age groups by sex. This is the case for Australia, Austria, Canada, Germany, Norway and the U.S. We summarize the size of each country's projected future aggregate healthcare expenditures by comparing its present value with the country's present value of GDP, with both present values measured over the infinite horizon. In projecting GDP we assume that real per capita GDP grows in the future at the average rate observed in each country over our sample period– 1970 through 2002[4]. In forming present values of both future healthcare spending and future GDP, we consider real discount rates of 3, 5, and 7 percent. Unfortunately, we have only limited and recent data on healthcare expenditures by age for the ten countries. Hence, we are not in a position to investigate fully the extent to which age-healthcare-expenditure profiles have changed through time and are likely to change in the future. If improvements in medical treatments and outcomes make the age-healthcare expenditure profile steepen over time, the overall benefit growth rate we calculate will overstate benefit growth at younger ages and understate it at older ages. If improvements in medical treatments and outcomes make the age-healthcare-expenditure profile flatter over time, the opposite will be true[5]. In either case, it's not clear whether and how our calculated overall benefit growth rate will be biased relative to the average using complete data.

3. Data

OECD (2004a) reports aggregate annual real public healthcare expenditures, valued at 1995 prices, for the years 1970 to 2002. As mentioned, the OECD also provides population counts for the eight age groups. We were able to obtain age-healthcare expenditure profiles for each country for either 2000 or 2001 from different academic and governmental sources. Data for Australia, Canada, Germany, the UK, and the U.S. come from the following respective government agencies: the Australian Institute of Health and Welfare (2004), the Minister of Public Works and Government Services Canada (2001), the German Federal Insurance Authority (2003), the United Kingdom Department of Health (2002), and the Centers for Medicaid and Medicare Services (2003). Austria's profile comes from Hofmarcher and Riedel (2002). Japan's profile comes from Fukawa and Izumida (2004). These authors also generated profiles for earlier years and conclude that the age-specific distribution of Japanese public health expenditure did not change significantly over the past decade. Norway's profile comes from Fetzer, Grasdal, and Raffelhüschen (2005) who analyze the Norwegian health sector within a Generational Accounting framework. Profiles for Spain and Sweden are based on the work of Catalán *et. al.* (2005) and Ekman (2002), respectively.

3.1. Age-relative expenditure profiles

Table 2 present our age-relative expenditure profiles. The profiles decline with age at young ages. This reflects the costs of birth, vaccinations, infant care, and other treatments for young children. From age group 15-19 on, all profiles rise[6]. At older ages the slope of the profiles varies significantly across countries. In Austria, Germany, Spain, and Sweden, expenditures per head on those 75-79 and 80 plus are only twice the level of expenditures per head of the reference age group (50 to 64 years). At the other extreme, we have the U.S., where the oldest old receive benefits that average 8 to 12 times those received by members of the reference group. In between these two extremes we have Japan, Norway, the UK, Canada, and Australia, where the relative spending factors for the old range from 4 to 8.

Unlike the other countries, the U.S. government does not provide healthcare to the entire population[7]. Instead, it covers the lion's share of the healthcare costs of the very poor and of those over 65. It does this through its Medicaid and Medicare programs[8]. Medicare participants are primarily 65 and older, while Medicaid participants are primarily younger than 65. Hence, the shape of the age-government healthcare expenditure profile for the U.S. reflects, to a large extent, the fact that Medicaid covers a relatively small fraction of the population at any age, and certainly under 65, whereas Medicare covers everyone 65 and over. Stated differently, for age groups under 65, the average values of government health expenditures used to form the U.S. profile are averages over the entire population at a particular age, including those not eligible for Medicaid and, therefore, receiving no benefits.

If we consider the age-health expenditure profile simply of those over 65, we find the U.S. still spending a relatively large amount on the very old, but not dramatically more than several other countries. For example, the ratio of age 75-79 to age 65-69 average healthcare expenditure is 1.7 in the U.S. and 1.8 in the UK. That said, the fact that the U.S. profile is so steeply inclined, after age 65, compared to other county profiles and that so many people will be moving into the older age groups augers for very rapid overall healthcare expenditure growth in the U.S.

3.2. Population projections

Our population projections incorporate age-specific mortality rates, age-specific fertility rates, net immigrations rates, initial age distributions of the population, age-specific net immigration rates, and assumptions concerning the future development of these variables. These country-specific data come from the website of the national statistic office or census bureau of the country in question as well as from the websites of Eurostat and of the Population Division of the UN. Our projections differ only slightly from the medium variant projections of the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005).

4. Findings

Table 3 compares real levels and real growth rates of per capita government healthcare expenditures, benefits, and per capita GDP over our sample period. A quick glance at columns 3, 6, and 9 in table 3 shows two things. First, growth in per capita healthcare expenditures significantly outpaced growth in per capita GDP in all ten of our OECD countries. Second, the growth rate of benefit levels is very close to the growth rate of per capita expenditures in each country, indicating that growth in benefit levels (benefits at a given age), rather than changes in the age composition of the population or the fraction of the population eligible for benefits is primarily responsible for overall growth in expenditures per capita. Table 3 also indicates that public healthcare expenditures now represent from 5.45 percent to 8.56 percent of GDP in the ten countries.

In 1970 Sweden recorded the highest level of per capita government healthcare spending, namely $940 measured in 2002 dollars. Norway's government, in contrast, spent almost one third less per person in that year. But by 2002, Norway's per capita expenditures totaled $3,366, surpassing Sweden's 2002 $2,128 amount by almost three fifths. This change reflects Norway's much higher benefit growth rate. Over the 32 year period, Norway's benefit level grew at an annual real rate of 5.04 percent, whereas Sweden's real benefit level grew at only 2.35 percent per year.

Norway recorded the highest growth in benefit levels over the period followed by Spain with a growth rate of 4.63 percent and the U.S. with a growth rate of 4.61 percent. A second set of countries –Australia, Austria, Germany, Japan, and the UK– registered lower, but still very high, benefit growth rates, ranging from 3.30 percent to 3.72 percent. The remaining two countries –Canada and Sweden – had comparatively modest benefit growth rates, equaling 2.32 percent and 2.35 percent, respectively. The fact that Canada and Sweden appear at the bottom of the benefit growth ranking is not surprising given Canada's and Sweden's use of rationing to limit healthcare spending[9].

What explains the high rates of benefit growth in these countries? The health economics literature connects benefit growth to costly product innovations[10]. A good example here is Spain's acquisition of CT scanners. As reported in OECD (2004a), Spain had only 1.6 CT scanners per one million inhabitants in 1984 compared with 11 per million in the U.S. By 2001 Spain had 12.3 CT scanners per one million inhabitants vs. 12.8 in the U.S.[11]. Japan also expanded its use of medical technology over the 32 year period. Indeed, Japan appears to now have the largest number of CTs of any developed country[12]. Of course, technology doesn't arise spontaneously. It is acquired, and at considerable cost. The willingness of developed economies to pay larger shares of income for advanced medical technology as well as medications suggests that health is a "luxury good", with an income elasticity greater than one[13]. This, indeed, is the case. The income elasticity calculated by taking the ratio of the benefit growth rates in column 6 of table 3 to the per capita GDP growth rates in column 9 range from 1.14 in Canada to 2.29 in the U.S. On average, this elasticity equals 1.73.

Another source, at least for Austria, Spain and the U.S. as reported in OECD (2004a), could be the coverage of public health systems, which grew quite significantly from 1970 on. This could bias our analysis, as the constant age-profile assumption would eventually even more venturous as discussed in section 2. However, as Hagist (2008) has shown, for the U.S. this effect is only little in magnitude. For Austria and Spain we calculate the growth of benefit levels from 1986 to 2002, as since the mid-1980s coverage in both countries is nearly 100 per cent. It turns out that these growth rates are significant lower than the ones reported in table 3 (for Austria, λ is calculated with 1.97 per cent compared to 3.72 per cent, for Spain the difference is only one percentage point). This does not mean coercively that our growth rates estimation are wrong but that we probably overestimate the level of public health expenditure in our projections in the following sections. For the U.S. this is not the case as coverage is still not near 100 per cent of the population so coverage could still be a driver of the growth of public health expenditure.

Table 4 indicates the share of total benefit growth over the 32 year period that's attributable to demographics. The table's first three columns present total healthcare expenditure growth rates, total healthcare expenditure growth rates absent growth in benefit levels, and overall GDP growth rates. The last two columns present ratios of healthcare expenditure growth rates to GDP growth rates with and without benefit growth.

Total real healthcare expenditure growth averaged 4.89 percent per year across the ten countries. Had there been no growth in benefits, this average would have equaled only 1.23 percent. Hence, three quarters of healthcare expenditure growth can be traced to growth in benefit levels. During the same period that healthcare spending was growing at 4.89 percent per year in these ten countries, real GDP was also growing, just not as rapidly. The average annual real GDP growth rate growth averaged 2.87 percent. On average, the rate of healthcare growth exceeded the rate of GDP growth by a factor of 1.70. Absent benefit growth, this factor would have equaled only 0.42. As the first column of Table 4 records, the U.S. clocked the highest annual average real growth rate of aggregate benefits at 6.23 percent per year. This growth rate is 2.01 times the corresponding 3.10 percent GDP growth rate. Had U.S. benefit levels not grown, U.S. government healthcare spending would not have grown twice as fast as the economy, but only half as fast. In addition to the U.S., Norway, Australia, and Spain all recorded growth rates of total real health expenditures in excess of 5 percent per year. Among all ten countries, Sweden had the most success in keeping healthcare spending from growing faster than the economy. But even in Sweden growth in healthcare spending outpaced growth in output by a factor of 1.45.

4.1. Sensitivity analysis

How sensitive are our estimated benefit growth rates to the shapes of the age-benefit profiles? This question is important given that classification of health expenditures by age may differ across countries[14]. One way to examine this issue is to calculate benefit growth rates using an "average" profile. To produce this profile, we estimated a polynomial using relative benefits by age for nine countries. We excluded the U.S. because its public healthcare covers a minority of the population[15].

Table 5 compares the benefit growth rates implied by this polynomial age-benefit profile. As is clear from column 3, the use of this alternative profile does not materially alter calculated benefit growth rates. Indeed, the difference in computed growth rates differs at most by 0.3 percentage points. Take Australia, for example. Its value of λ is 3.66 percent using its own profile and 3.60 percent using the "average" profile. Spain has the largest difference. Its calculated growth rate falls from 4.63 percent to 4.32 percent. Remarkably, even the U.S. calculated benefit growth estimator remains largely unchanged in using what for the U.S. is clearly the wrong profile.

4.2. Changes over time in age-benefit profiles

In the case of Canada, we have a 21-year (1980-2000) times series of age-benefit level profiles. Figure 1 shows how these profiles have changed over time. They change, but not much and with no clear trend. In 1980, the public health care costs per head for an over 85-year-old Canadian was 14.4 times larger than that for a representative 50-64-year-old person. This value peaks in 1988 at 16.0; in 2000, it equals 14.3. Using the actual 1980-2000 profiles shown in Figure 1 we estimate a 1.4 percent growth rate in real benefit levels in Canada over the 21-year period. Assuming a constant profile for this time period produces a 1.8 per cent real benefit growth rate. So our bias due to the assumption of constant profiles equals, in the case of Canada, 28 per cent.

5. Who’s going broke?

Table 6 examines the present value budgetary implications of permitting benefit levels to continue to grow at historic rates. For reference, the second column presents 2002 healthcare spending as a share of 2002 GDP. The remaining columns show, for different discount rates, the present values of projected future healthcare spending relative to the present value of GDP. The four sets of columns assume that benefit levels grow at historic rates (see column 7 of table 3) for the number of years indicated at the top of the columns and then grow at the same rate as per capita GDP (see the last column of table 3). We consider real discount rates of 3, 5, and 7 percent. A 3 percent discount rate may be most appropriate given the low prevailing rates of long-term inflation indexed bonds in the U.S. and abroad. On the other hand, the spending streams being discounted are uncertain, which suggests using a higher discount rate to adjust for risk. These projections should not be taken as “real” projections but more as a simulation baseline.

Consider first columns 3-5 –the case that benefit growth is immediately stabilized. Under this assumption Canada and Germany have the largest present value costs when scaled by the present value of GDP. The reasons are three. First, both countries have relatively high current benefits, which they provide to their entire populations. Second, both countries are slated to age very significantly. And third, and most important, both countries have very steep age-benefit profile.

Next consider the size of scaled healthcare costs if benefit levels continue to grow at historic rates for 40 years. In this case, the U.S. has the highest scaled costs for discount rates of 3 and 5 percent. At a 7 percent discount rate, Norway takes first place. Interestingly, Austria turns out to be the low scaled present value cost country at each discount rate. At a 3 percent discount rate, Austria’s cost is 9.48 percent of future GDP. This is much lower than, for example, Germany’s 14.99 percent cost figure. Since Austria and Germany have very similar demographics, historic benefit growth rates, and age-benefit profiles, what explains the difference? The answer is that Austria has a significantly higher historic growth rate of per capita GDP. Hence, the denominator in Austria’s cost rate –the present value of future GDP– is relatively high compared to that of Germany. At a 3 percent discount rate, the U.S. is projected to spend 18.85 cents of every present dollar the country produces on its two healthcare programs –Medicare and Medicaid. At a 7 percent discount rate, the figure is 14.98 cents on the present value dollar. Given that the U.S. government is now spending 6.57 percent of GDP, this projection implies a huge additional fiscal burden on the American public. Norway is in similar shape in terms of its healthcare costs, but Norway does not have to bear the burden of paying for a large military. In addition, it has significant oil wealth to help cover its costs.

The comparison between Japan and the U.S. is quite interesting. At a 3 percent discount rate Japan’s costs are 12.95 percent of future GDP compared with 18.85 percent. At a 7 percent discount rate the respective figures are 10.17 percent and 12.51 percent. How can the U.S. have so much higher present value costs when Japan is already so old and will end up much older than the U.S. will end up? The answer is that Japan has a lower benefit growth rate, a higher per capita GDP growth rate, and a much flatter age-benefit profile. Turn next to the 20-year benefit growth figures. In the case of the U.S., for example, letting benefit grow at historic rates for just 20 years leads to a 13.24 percent cost at a 3 percent discount rate. This figure is quite high on its own and also quite high relative to the 18.85 percent cost that arises with 40 years of benefit growth. The message then is that letting benefits grow at historic rates even on a relatively short-term basis is extremely expensive. It locks in high benefit levels for years and generations to come. Finally, consider the 60 benefit growth scenario. In this case, at a 3 percent discount rate, the U.S. ends up spending 26.42 cents of every present dollar the economy generates on its government healthcare programs. Not far behind are Norway, which spends 22.99 cents, Germany, which spends 17.44 cents, and Australia, which spends 17.15 cents. The lowest costs, again, are those of Austria, which spends 11.05 cents.

6. Conclusion

Growth since 1970 in aggregate healthcare spending by our ten OECD governments reflects first and foremost growth in benefit levels (healthcare spending at any given age). Indeed, three quarters of overall healthcare expenditure growth and virtually all of growth in healthcare expenditure per capita reflect growth in benefit levels. Although OECD countries are projected to age dramatically, growth in benefit levels, if it continues apace, will remain the major determinant of overall healthcare spending growth. The very rapid growth in benefit levels documented here is clearly unsustainable. No country can spend an ever rising share of its output on healthcare. Benefit growth must eventually fall in line with growth in per capita income. The real question is not if, but when, healthcare benefit growth will slow down.

Raising benefit levels is one thing. Cutting them is another. If OECD governments spend the next three decades expanding benefit levels at their historic rates, the fiscal repercussions will be enormous. The fiscal fallout is likely to be particularly severe for the United States. Like Norway and Spain, its benefit growth has been extremely high. But unlike Norway, Spain, and other OECD countries, the U.S. appears to lack both the institutional mechanism and political will to control its healthcare spending. America's elderly are politically very well organized, and each cohort of retirees has, since the 1950s, used its political power to extract ever greater transfers from contemporaneous workers[16]. The recently legislated Medicare drug benefit is a case in point. Although the present value costs of this transfer payment is roughly $10 trillion, not a penny of these costs is slated to be paid for by the current elderly.

There is, of course, a limit to how much a government can extract from the young to accommodate the old. When that limit is reached, governments go broke. Of the ten countries considered here, the U.S. appears the most likely to hit this limit.

Notas

1. Breyer and Ulrich (2000) and Seshamani and Gray (2003) examine growth of health expenditures in Germany, Japan, and the UK.

2. This 1.8 factor is obtained by averaging the ten country-specific ratios of A to B, where A is the 1970-2002 growth rate of real healthcare expenditures and B is the 1970-2002 growth rate of real GDP.

3. Bonin (2001)'s projection program is based on the component method proposed by Leslie (1945). The standard procedure has been extended to distinguish between genders and to incorporate immigration.

4. This may overstate somewhat likely future growth in per capita output given the aging of the work force [see Benz and Fetzer (2004)]. If so, we will understate future healthcare expenditures as a share of future GDP.

5. There is a growing literature on how medical advancements will affect healthcare spending at different ages and for different cohorts. See, for example, Buchner and Wasem (2004) or Breyer and Felder (2004), Zweifel, Felder and Meiers (1999), Zweifel, Felder and Werblow (2004), Stearns and Norton (2004), and Miller (2001).

6. In some of our profiles in table 2 this is not the case. This is due to the structure of the reported data in some countries which is stated not per cohort but also per age group, sometimes very large ones (0 to 19 years). In such cases, the profile is flat for the first two age groups.

7. Strictly speaking, Germany has no universal health insurance scheme. However, all but 10 percent of the population are insured by statute. Of those not statutorily insured, the largest group consists of civil servants whose "private" insurance plan is financed in large part by the government.

8. For a detailed description of the U.S. public health insurance scheme see Iglehart (1999a, 1999b, 1999c).

9. In the case of Canada Walker and Wilson (2001) show that waiting times for certain treatments in Canada increased over time and Naylor (1992) speaks of implicit rationing through waiting lists. For the Swedish situation see for example Svenska Kommunförbundet (2004). However, as one of our referees pointed out, in the Swedish case this could also be due to a trend to convergence as Sweden had the highest health care spending per capita in the beginning of the 1980s.

10. See Newhouse (1992) and Zweifel (2003).

11. The number for this year is not reported for Australia. The most recent Australian number in OECD (2004a) is 20.8 CT scanners per one million inhabitants in 1995. This comparatively high number is probably due to Australia's special geographic situation.

12. See also Reinhardt, Hussey and Anderson (2002) for this point.

13. For a discussion and an overview about several studies concerning income elasticities of healthcare expenditures, see Roberts (1999).

14. See Reinhardt, Hussey and Anderson (2002).

15. The curve is estimated as 0.28 + 0.05**agegroup***agegroup* while *agegroup* is measured discretionary (1 to 8). This leads to the following α*'s*: $\alpha_{0\text{-}14}$=0.33; $\alpha_{15\text{-}19}$=0.48; $\alpha_{20\text{-}49}$=0.73; $\alpha_{50\text{-}64}$=1.08; $\alpha_{65\text{-}69}$=1.53; $\alpha_{70\text{-}74}$=2.08; $\alpha_{75\text{-}79}$=2.73 and α_{80+}=3.48. We then normalize these α*'s* to the reference age group and derive a benefit growth rate reported in table 5.

16. Mulligan and Sala-i-Martin (2003) show very nicely how public spending among age groups in the U.S. has developed since the 1950's .

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Resumen

En los países de la OCDE el gasto público en sanidad ha crecido mucho más rápido que el PIB. ¿Cuánto de este incremento se debe al cambio demográfico frente a un aumento en el nivel de prestación sanitaria ofrecido (gasto por persona por grupos de edad)?
Este trabajo responde a esta pregunta para diez países de la OCDE –Australia, Austria, Canadá, Alemania, Japón, Noruega, España, Suecia, Reino Unido y Estados Unidos utilizando datos de 1970 hasta 2002. Para todo el grupo de países analizado, el aumento en el nivel de prestación sanitaria explica el 89% del crecimiento del gasto público en sanidad, siendo Noruega, España y Estados Unidos los que registran un mayor incremento anual en el nivel de prestaciones. Demostramos también que permitir el crecimiento sostenido en el nivel de prestaciones sanitarias tiene peligro a largo plazo en países en los que se producirá la jubilación masiva de la llamada generación del baby-boom.

Palabras clave: crecimiento gasto público en sanidad, desequilibrio fiscal a largo plazo.

Clasificación JEL: H51, I11.

APPENDIX

Table A.1
SHARE OF THE ELDERLY POPULATION (65+) IN PER CENT OF TOTAL POPULATION

Country	2002	2030	2050	2070
Australia	12.2	20.4	24.0	25.2
Austria	15.5	24.4	29.1	31.1
Canada	13.0	23.6	26.7	27.1
Germany	17.1	26.3	30.6	31.3
Japan	18.0	29.9	36.8	37.7
Norway	15.1	21.0	23.6	24.5
Spain	16.2	24.2	34.0	30.0
Sweden	17.2	25.5	28.5	29.3
UK	15.9	22.9	26.1	27.3
US	12.4	19.1	21.3	21.6

Source: Own calculations based on United Nations (2005).

Table A.2
AGE-SPECIFIC HEALTH EXPENDITURE PROFILES (IN REFERENCE TO THE 50-64 YEARS OLD)

Country	Age groups							
	0-14	15-19	20-49	50-64	65-69	70-74	75-79	80 +
Australia	0.60	0.57	0.64	1.00	1.81	2.16	3.90	4.23
Austria	0.28	0.28	0.46	1.00	1.42	1.75	1.98	2.17
Canada	0.43	0.61	0.65	1.00	2.45	2.44	4.97	7.54
Germany	0.48	0.43	0.58	1.00	1.52	1.80	2.11	2.48
Japan	0.44	0.22	0.43	1.00	1.70	2.20	2.76	3.53
Norway	0.57	0.34	0.52	1.00	1.70	2.21	2.69	3.41
Spain	0.57	0.39	0.48	1.00	1.46	1.73	1.97	2.11
Sweden	0.43	0.43	0.63	1.00	1.50	1.50	1.96	1.99
UK	1.08	0.65	0.76	1.00	2.07	2.07	3.67	4.65
US	0.88	0.82	0.77	1.00	5.01	5.02	8.52	11.53

Source: See first paragraph of section 3.

Table A.3
COMPARING GROWTH IN PUBLIC HEALTH EXPENDITURE (I)

Country	Public Health Expenditure per capita in 2002 US $			Benefit levels per capita in 2002 US $			GDP per capita in 2002 US $		
	1970	2002	Growth rate p.a.	1970	2002	Growth rate p.a.	1970	2002	Growth rate p.a.
Australia	362	1,323	4.13%	428	1,351	3.66%	11,916	20,813	1.76%
Austria	393	1,375	3.99%	587	1,890	3.72%	11,830	25,570	2.44%
Canada	589	1,552	3.08%	647	1,350	2.32%	12,073	23,072	2.04%
Germany	663	2,066	3.62%	842	2,377	3.30%	14,804	24,143	1.54%
Japan	457	2,082	4.85%	741	2,274	3.57%	14,419	31,194	2.44%
Norway	645	3,366	5.30%	772	3,722	5.04%	16,032	42,032	3.06%
Spain	175	855	5.08%	252	1,074	4.63%	7,477	15,688	2.34%
Sweden	940	2,128	2.59%	1,192	2,511	2.35%	15,833	26,994	1.68%
UK	528	1,694	3.71%	466	1,383	3.46%	13,474	26,298	2.11%
US	481	2,364	5.10%	334	1,415	4.61%	19,076	36,006	2.01%

Source: Own calculations.

Table A.4
COMPARING GROWTH IN PUBLIC HEALTH EXPENDITURE (II)

Country	1. Real Healthcare Expenditure growth rate	2. Real Healthcare Expenditure growth rate absent growth in benefit levels	3. Real GDP growth rate	Ratio of column (1) to column (3)	Ratio of column (2) to column (3)
Australia	5.61%	1.96%	3.21%	1.75	0.61
Austria	4.23%	0.51%	2.68%	1.58	0.19
Canada	4.28%	1.96%	3.23%	1.32	0.61
Germany	4.62%	1.32%	2.52%	1.83	0.52
Japan	5.50%	1.94%	3.07%	1.79	0.63
Norway	5.82%	0.78%	3.57%	1.63	0.22
Spain	5.79%	1.16%	3.03%	1.91	0.38
Sweden	2.92%	0.57%	2.01%	1.45	0.28
UK	3.91%	0.45%	2.31%	1.69	0.20
US	6.23%	1.61%	3.10%	2.01	0.52

Source: Own calculations.

Table A.5
COMPARING GROWTH RATES IN REAL BENEFIT LEVELS

Country	Based on country-specific profiles	Based on average profiles	Difference (percentage points)
Australia	3.66%	3.60%	0.06%
Austria	3.72%	3.65%	0.07%
Canada	2.32%	2.46%	–0.14%
Germany	3.30%	3.17%	0.13%
Japan	3.57%	3.83%	–0.26%
Norway	5.04%	4.97%	0.07%
Spain	4.63%	4.32%	0.31%
Sweden	2.35%	2.20%	0.15%
United Kingdom	3.46%	3.35%	0.11%
United States	4.61%	4.71%	–0.10

Source: Own calculations.

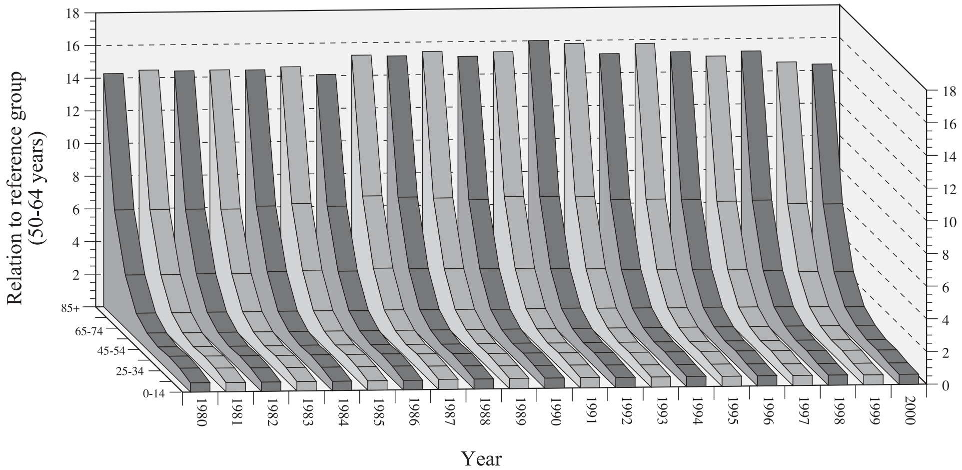

Figure A.1. Development of the Canadian age-specific health expenditure profile

Source: Own calculations based on Minister of Public Works/Government Services Canada (2001).

Table A.6
PROJECTIONS OF PUBLIC HEALTH EXPENDITURE TO GDP RATIOS IN PRESENT VALUE TERMS (IN %)

Discount rate p.a.	2002	Public levels grow at historic rate for 0 years			Benefit levels grow at historic rate for 20 years			Benefit levels grow at historic rate for 40 years			Benefit levels grow at historic rate for 60 years		
		3%	5%	7%	3%	5%	7%	3%	5%	7%	3%	5%	7%
Australia	6.4	8.5	7.8	7.3	10.7	9.6	8.9	13.7	11.6	10.2	17.2	13.4	11.1
Austria	5.4	6.8	6.4	6.1	8.0	7.4	7.0	9.5	8.3	7.6	11.0	9.1	8.0
Canada	6.7	10.9	9.5	8.7	11.3	9.9	9.00	11.7	10.2	9.2	12.2	10.4	9.3
Germany	8.6	10.2	9.7	9.5	12.5	11. 7	11.1	15.0	13.3	12.2	17.4	14.5	12.8
Japan	6.7	9.7	8.9	8.4	11.2	10.1	9.4	13.0	11.2	10.2	14.7	12.1	10.6
Norway	8.0	10.0	9.2	8.8	12.9	11.7	10.9	17.2	14.5	12.8	23.0	17.3	14.2
Spain	5.5	6.7	6.4	6.2	8.9	8.3	7.8	11.9	10.3	9.1	15.6	12.1	10.0
Sweden	7.9	9.0	8. 7	8.5	9.8	9.4	9.1	10.6	9.9	9.4	11.4	10.3	9.6
UK	6.4	8.0	7.5	7.2	9.5	8.7	8.2	11.4	9.9	9.0	13.3	10.9	9.5
US	6.6	9.5	8.4	7.7	13.2	11.4	10.2	18.9	15.0	12.5	26.4	18.8	14.5

Source: Own calculations.