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Intergenerational Aspects of Health Care

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The physical process of aging means that the use of health services varies significantly by age. This association between age and health care consumption raises a number of issues related to intergenerational equity. In particular, how do society's resources get allocated across age groups, and how will increases in health spending affect this distribution over time? To what degree will the aging of the population increase public sector health care burdens? And, finally, what are the intergenerational implications of public sector health care spending and financing?

I. Health Spending by Age

In all developed countries, health spending systematically increases with age (with the exception of the high level of spending on infants.) Figure 1 plots the age distribution of health spending in the United States in 2004.[1] The data show that health spending increases gradually through middle age, before accelerating sharply at older ages. Much of this sharp acceleration is accounted for by expenditures on home health and nursing home care, which are very highly concentrated on those 85 years and older. However, even without these long-term care expenditures, health spending increases markedly with age.

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[1] The graph uses the data on health spending by age (CMS, 2004) reported at the bottom of figure 1. The x values are simply the middle age in the age range of each group, with 90 chosen as the plotting point for the 85+ age group.

I. a. Cross-Country Comparisons of the Age Distribution of Health Spending

While this general relationship is a characteristic of health spending in most countries, the exact relationship between age and health spending varies considerably (Sheiner 2004; OECD 2006; EC 2006). This cross-country variation is likely the product of both differences in the age profile of health needs (i.e., differences in the relative health of the population by age) as well as institutional factors that affect prices seen by the consumer or access to technology.

It is useful to examine both total health spending and spending excluding long-term care.[2] Countries differ substantially on whether long-term care is provided formally or informally (EC 2006), and there may be differences in the extent to which formal long-term care services are deemed health expenditures versus other non-health social services. Furthermore, long-term care services are, in many ways, different from other forms of health care. In particular, spending on long-term care is less likely to be affected by technological change than other forms of health care, and thus is less relevant in thinking about how future technological advances might affect the age distribution of health spending.[3] (Cutler and Sheiner 2001)

[2] The OECD (OECD 2006) and the EC (EC 2006) long-term projections analyze long-term care spending separately from other types of health care spending.
[3] Of course, to the extent that advances in technology prolong life in such a way as to increase the demand for long-term care, technological advances will indirectly affect such spending.

Table 2 reports various measures of health spending gradients across countries from Sheiner (2004)[4]. According to her data, the ratio of total health spending of the elderly relative to the nonelderly ranges from 3.9 in the UK and the US to 5.2 in Canada; that is, health spending per elderly person is about 4 times as large as health spending per nonelderly person in the UK, and about 5 times larger in Canada[5]. With the exception of the Netherlands, the pattern across countries is similar for spending excluding long-term care, with Canada and New Zealand allocating relatively large shares of spending to the elderly and the UK and Australia allocating relatively small shares.

Perhaps a more interesting comparison is the relationship between health spending and age *within* the elderly population. The elderly have different sources of health insurance coverage than the nonelderly in a number of countries, and may also have different access to certain types of services. In the US, for example, the elderly are covered by Medicare, whereas the nonelderly are covered by a mixture of private and public insurance. Because Medicare sets the prices it pays to providers, differences in spending between the elderly and the nonelderly may reflect differences in prices, rather than differences in actual health services. Furthermore, if the differential use of high-technology accounts for the variation in the distribution of spending across countries, such differences are likely to be more apparent in comparisons of the relatively young old and the oldest old. Increases in life expectancy make these differences particularly

[4] Cross-country comparisons of the age distribution of health spending are difficult because each country gathers data and estimates age distributions in different ways. Recently, the OECD and the EC have undertaken efforts to compile such data on a more standardized basis, but nevertheless, countries still differ on the accuracy and comprehensiveness of their data. See OECD (2006) and EC (2005).

[55] The 1999 data for the US have been updated to reflect newer estimates of the age distribution of health spending from the national health accounts (CMS 2004).

germane to forecasts of future health expenditures, as the oldest old will comprise an increasing share of the elderly.

The bottom two rows of the table report results from Sheiner (2004) on the age distribution of acute health spending within the elderly population. Relative to 65-74 year olds, average spending on 75-84 year olds varies from a low of 1.2 times as much in the US to a high of 1.7 times as much in the UK. Relative spending on the oldest old shows similar variation: in the US and in the Netherlands, spending on those 85 and over is about the same as on those 75-84, whereas in Canada and the UK, spending on those 85 and over is about 60 percent higher than on those 75 to 84.

There are several possible explanations for these differences. Sheiner points out that the countries with the highest ratios of spending of the oldest old relative to the younger old are those countries that use new technologies less intensively. She hypothesizes that, because new technologies tend to be used on the younger old before they diffuse to the older old, a faster rate of technology adoption could account for the differences in the relative spending by age.

However, these differences could be the result of a host of other factors as well, including differential access to health services, arising out of differences in the ratio of coinsurance to income, as well as differences in the pricing and composition of services used by the oldest old relative to the younger old. A deeper understanding of the source of these

differences across countries would be helpful in projecting future age/health profiles and also in analyzing the potential effects of different health reforms.

I. b. Changes in the Age Profiles of Health Spending over Time

An important question in forecasting future health care costs for the elderly is whether the distribution of health spending by age will change over time. Analysts have identified a number of reasons why the relationship between health spending and age might not be stable.

Effects of Technological Growth

Technological advances in the treatment of illness might affect the distribution of health spending by age. For example, it is clear that advances in the treatment of premature babies have led to a significant concentration in spending on the youngest young. Similarly, technological advances that allow for better treatments for the very ill might lead to an increased concentration of spending on the elderly, and technological advances that are focused on prevention or treatment of chronic conditions-- might lead to a less concentrated spending distribution.

Cutler and Meara (1998) used a series of national medical expenditure surveys to document the distribution of health spending in the United States by age over time. Their analysis showed an increasing concentration of spending on the elderly between 1963 and 1987, which was accompanied by an increase in the intensity of service use by the sickest

elderly patients. Their results suggested that increased use of high-technology in medicine could lead to a more highly concentrated distribution of spending.

However, as noted above, differences in the health spending of the elderly and the nonelderly in the US are difficult to interpret because of the different sources of insurance coverage. In particular, the rate of growth of Medicare reimbursements has differed from the growth rate of private sector reimbursements, and so the changes in nominal spending might not reflect differences in real health expenditures. It would not be reasonable to attribute the changes in the age/health profiles to technology if changes in nominal spending reflect differences in prices of services rather than differences in quantity of services.

To address the problem with the US data, Sheiner examined the trends in the distribution of health spending in Canada and Japan over the 1980s and 1990s (Figures 2 and 3; reproduced from Sheiner (2004)). She finds no evidence of an increasing concentration of spending on the elderly in Canada between 1980 and 2000—either for total health spending or spending excluding long-term care, suggesting that technological innovation has not had a disproportionate effect on the spending of the elderly. Similarly, the distribution of spending between the elderly and nonelderly in Japan was relatively stable.

Sheiner (2004) also examines the distribution of health spending for the elderly of different ages in the US during the 1990s. This comparison is not subject to the same

problems as the comparison of the elderly and nonelderly because Medicare is the primary insurance coverage for virtually all persons 65 or older in the United States. Her results show no evidence of an increase in concentration of health spending on the oldest old. (Figure 4).

This finding was reinforced by the results of Meara, White, and Cutler (2004), who found that the earlier trend toward increasingly concentrated spending on the elderly had reversed itself. They attributed the reversal to reforms to Medicare's physician, hospital, and home health payment systems and to the differential coverage of prescription drugs between Medicare and the private sector

Effects of improving health

While average health spending increases with age, age is not a good predictor of health spending at the individual level. Health spending is far better explained by measures of health status (OECD 2006). A key question in assessing how age profiles are likely to shift over time is how the health of the population will evolve.

The most easily measured indicator of health improvements is the ongoing increase in life expectancy. Over the past 25 years, life expectancy has increased by an average of almost 1 percent per year in the US, and projections of future populations assume that life

expectancy will continue to increase over time.[6] Predictions for other developed countries are for similar increases.[7]

The impact of increasing life expectancy on health expenditures depends on whether the additional years of life are spent in poor health or in good health. In the past, most projections of health expenditures assumed that the age distribution of health expenditures would remain constant. The 85-year olds of tomorrow, for example, were assumed to have the same health status as the 85-year olds of today. Under this assumption, increases in life expectancy raise total health spending because they increase the number of old people and because the increase is concentrated in the oldest old -- those with the highest health expenditures.

The assumption of constant age distribution of health spending has been criticized as overly pessimistic. It is well documented that, across many countries, health expenditures climb sharply as a person approaches death and that time until death is a better predictor of health spending than is age (Gray 2005; OECD 2006; EC 2005; Sabelhaus, Simpson, and Topoleski 2004). The relationship between spending and proximity to death means that increases in longevity, which lower proximity to death at any given age, are likely to reduce health spending at any given age, and that the ageing of the population need not imply large increases in health spending (Zweifel 1999) .

[6] Social Security Administration, Office of the Actuary, *The 2008 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*,'
[7] OECD (2006).

In addition to the ongoing increases in life expectancy, researchers have documented an ongoing reduction in disability in a number of countries (Jacobzone, Cambois, and Robine 2000/2001)). As noted by Cutler and Sheiner (2001), even when proximity to death is accounted for, measures of disability are good predictors of health spending. They estimated that including both proximity to death and projected declines in disability could lower projected medical expenditures by about 15 percent by 2050. However, the recent steep rise in rates of obesity threatens to reverse the trend of declining disability (Sturm, Ringel, and Andreyeva 2004).

The relationship between disability and longevity and health expenditures may be more complicated than has often been acknowledged by this strand of the literature. To the extent that increases in longevity and reductions in disability arise from factors unrelated to contemporaneous health spending—for example, reductions in smoking, improvements in diet, less physically taxing jobs, or better preventive care when young—then age-specific health spending for the elderly should decline over time. However, if the reductions in disability and increase in longevity are attributable to improved and more costly medical care, then the relationship between improved health and the age-distribution of health spending is more ambiguous, as the increased spending that produces these health benefits might outweigh the reductions in spending associated with improved health. Indeed, several studies find that increased use of technology increases life expectancy and lowers disability, but also increases health spending. (Goldman, et. al. 2005; Chernew et al 2005; Lubitz 2005; Jacobzone 2003; Holly 2005)

Nonetheless, in recent years, many official projections of future health spending have incorporated some effects of likely improvements in health over time. For example, the Congressional Budget Office now incorporates 'death costs' in their long-term Medicare projections.[8] Using their methodology, including the effects of time-to-death has a relatively small effect on projected Medicare expenditures, reducing them by about 5 percent by 2080. The European Commission projections include death costs as well as other improvements in health in their long-range projections. (EC 2006) On average, their preferred scenario assumes that improvements in health lower health spending by about 25% by 2050.[9]

II. Implications of Demographic Change for Aggregate Health Spending

The age composition of the population in most developed nations will undergo dramatic changes in the next few decades. In the US, for example, the population over age 65 is projected to rise from 12 percent today to 20 percent by 2035.[10] In Japan and many European countries, the elderly share of the population is already significantly higher than in the US and it is projected to continue rising. For example, in Germany, the elderly share of the population is already 20 percent and it is projected to rise to 30 percent by 2035.[11]

[8] See Sabelhaus, Simpson, and Topoleski (2004) for a description of CBO's methodology.
[9] Author's calculation. Under the assumption that all increases in life expectancy are spent in good years, the projections of health spending are halved by 2050. In their preferred scenario, health improves by half this much—i.e., 25 percent
[10] Intermediate Scenario, Social Security Trustees Report (2007).
[11] Eurostat Population projections, 2008.

Population aging stems from two sources: increases in life expectancy and reductions in fertility. The previous section addressed how increases in life expectancy and other improvements in health might affect per capita health spending of the elderly. A more important source of aging has to do not with increases in life expectancy, but with past reductions in fertility. The dramatic decline in fertility following the post-war baby boom (in the US, from a peak of 3.7 in 1957 to roughly 1.7 by 1977) means that the ratio of elderly to nonelderly in the population will increase substantially over the next 20 years or so. As noted by Cutler, Poterba, Sheiner, and Summers (1990) most of the increase in the elderly share of the population between now and 2030 stems from past reductions in fertility, rather than gains in life expectancy.[12]

The reduction in fertility has two effects on health spending as a share of GDP—one direct and one indirect. The direct effect stems from the fact that the elderly spend substantially more on health care than the nonelderly. Thus, an increase in the share of elderly in the population raises average health spending per capita.

The indirect effect stems from the relationship between fertility and per capita GDP. Given its capital stock, a nation's output is determined by the size of its labor force and the productivity of its workers. A reduction in fertility eventually translates into a decline in the working age population and, barring major changes in labor force participation or

[12] Most projections assume that fertility rates stabilize but that life expectancy continues to increase over time. Thus, over the long run, life expectancy increases are the primary cause of population aging.

immigration, in a lower ratio of workers to population, thus lowering GDP per capita even as GDP per worker is unaffected.[13]

A simple overlapping generations model demonstrates these effects.

- There are two generations, young and old.
- There are N_y young and N_o old.
- The elderly share of the population is α.
- The average health spending of the old, HC_o, is β times the average health spending of the young, HC_y, with $\beta > 1$.
- The labor force participation of the young and the old are L_y and L_o, respectively.
- GDP is equal to output per worker, P, times the number of workers, $L_yN_y + L_oN_o$.

Then, aggregate health spending can be written as:

$$HC_T = N_y HC_y + N_o HC_o = HC_y(N_y + \beta N_o)$$

Per capita health care is

$$PCH = \frac{HC_T}{N_y + N_o} = \frac{HC_y(N_y + \beta N_o)}{N_y + N_o} = HC_y((1-\alpha) + \alpha\beta) = HC_y(1 + \alpha(\beta - 1))$$

[13] See Elmendorf and Sheiner (2000) for an overview of the macroeconomic effects of aging on GDP and living standards.

Given that $\beta > 1$, per capita health care spending increases with α, the elderly share of the population. Per capita health spending also increases with β, the ratio of elderly to nonelderly health spending.

The effect of aging and improving health on β is ambiguous. Holding constant relative health needs by age, aging leads to an increase in β as the share of the very old increases.[14] However, an improvement in the health of the elderly lowers β. Depending on how much improvements in health lower age-specific health spending, β may increase or decrease over time.

To calculate health care spending as a share of GDP, we write GDP per capita as:

$$P\frac{Workers}{Population} = P\frac{L_y N_y + L_o N_o}{N_y + N_o} = P((1-\alpha)L_y + \alpha L_o) = P(L_y - \alpha(L_y - L_o))$$

As long as the labor force participation of the young, L_y, exceeds that of the old, L_o, then an increase in the elderly share of the population, α, lowers per capita GDP. Just as the improving health of the elderly can lower the relative health spending on the elderly, β, it is also plausible that the improving health of the elderly might increase the labor force

[14] As the baby boomers enter retirement, the share of the oldest old in the elderly population declines a bit. However, as the baby boomers age, the share of the oldest old climbs significantly (Jacobzone, Cambois, Chaplain, and Robine 2000/1)

participation of the elderly, thereby offsetting some of the effects of aging on per capita GDP. [15]

Putting these two pieces together, we can write health spending as a share of GDP as the ratio of per capita health care spending to per capita GDP:

$$\frac{HC_T}{GDP} = \frac{HC_y}{P} \frac{(1+\alpha(\beta-1))}{(L_y - \alpha(L_y - L_o))}$$

This equation includes all the important factors underlying the relationship between aging and health care spending as a share of GDP – the elderly share of the population, the relative health of the elderly, and the relative labor force participation of the elderly.[16] As can be seen, population aging increases health spending as a share of GDP because (1) the elderly spend relatively more on health care and (2) they are less likely to participate in the labor force.

In addition, the first term, $\frac{HC_y}{P}$, which is the ratio of per capita spending on the young relative to output per worker, measures the relative cost of health spending.[17] If per capita health spending rises with productivity, then this term is a constant. If per capita

[15] See Sheiner, Sichel, and Slifman (2007) for a discussion of the magnitude of the increase in labor force participation necessary to offset the macroeconomic effects of aging.
[16] These are the factors considered in the OECD 'Projecting OECD Health and Long-Term Care Expenditures, What are the Main Drivers?', OECD 2006.
[17] The health care of the young in this model can be thought of as the age and sex adjusted health spending that is typically used in exercises measuring the relative cost of health spending.

health spending rises faster than productivity, then this ratio increases over time, boosting the health care spending share of GDP.

The growth rate of $\frac{HC_y}{P}$ is generally referred to as 'excess cost growth' and assumptions about how this term will evolve over time are key to long-term projections of health spending.[18] In most countries, the relative cost of health care has been growing significantly faster than productivity. As noted in OECD (2006), age-adjusted per capita health spending in OECD countries grew, on average, 1 percentage point faster than per capita GDP between 1981 and 2002, and 1½ percentage points faster than GDP between 1970 and 2002, with the slowdown in health spending growth during the latter period reflecting cost cutting measures taken by OECD countries. In the US, per capita health spending increased at a rate of about 2 percentage points faster than per capita GDP between 1970 and 2005 (CBO 2007).[19] However, analysts have found that roughly ½ of this increase is attributable to changes in administrative costs, the structure of insurance, and relative prices, and demographics, with the remaining roughly 1¼ percentage point increase attributable to "excess cost growth." (Newhouse 1992; Cutler 1995; Smith, Heffler, and Freeland 2000; Follette and Sheiner 2008)

[18] Excess cost growth is typically defined as the excess of health spending per capita over GDP per capita, instead of GDP per worker (implicitly, this definition implies that the income elasticity of spending is one, so that any growth in the ratio of spending to income is "excess" of what can be explained.) In steady state, the ratio of workers to population is constant, and there is no difference between the two concepts. During the demographic transition, however, the ratio of workers is declining and thus per capita income is increasing more slowly than productivity. The EC report (2006) discusses which of these measures of cost growth is more reasonable as a baseline—if health care demand grows with income, than the income concept is appropriate. However, to the extent that health care is a labor-intensive industry, increases in productivity can increase the relative cost of health care.

[19] Analysts have attempted to explain the excess growth of health care spending by such measures as demographic composition, administrative costs, increased insurance, and nonunitary income elasticities. (Generally, the results of such analysis suggest that on the order of one-half of the excess cost growth is explainable by these factors, with the remainder a residual typically assumed to be the result of technological advances. (Newhouse 1992; Cutler 1995; Smith, Heffler, and Freeland 2000; Follette and Sheiner 2008).

There is a great deal of uncertainty surrounding the likely path of future health care spending. On the one hand, health spending has continued to grow faster than GDP for decades; on the other hand, health spending growth must slow to the rate of GDP growth eventually or else it would eventually comprise 100 percent of GDP growth. Most long-term projections assume that health spending growth will slow gradually to the rate of per capita GDP growth, although the pace of that slowdown differs significantly between projections.[20]

III. Implications of Demographic Change for Government Budgets

Much of health care spending is publicly financed. The average public share of health spending is about 75 percent in the OECD countries, ranging from a high of 90 percent (Luxembourg) to a low of about 45 percent (the United States and Greece.) (OECD 2007) This substantial government involvement in health care financing means that macroeconomic challenges are also budgetary challenges.

Incorporating government financing into our simple model is easy.

Let S_y be the share of the young's health spending that is government financed and

Let $S_y + \lambda$ be the share of the old's health spending that is government financed.

[20] For example, the Medicare Trustees (2007) assume that per capita health spending grows 1 percentage point faster than per capita GDP on average over the next 75 years, with faster growth in the near term and slower growth further out. The OECD (2006) presents two scenarios – one where per capita health spending continues to grow at a rate 1 percentage point faster than per capita GDP, and another where cost controls gradually bring the growth of health spending in line with GDP growth.

Then, public spending on health care is equal to

$$S_y HC_y N_y + (S_y + \lambda) HC_y ß N_o$$

Per capita public health spending on health care is:

$$S_y HC_y (1+\alpha(ß-1)) + \lambda\alpha ß HC_y$$

and

public health spending as a share of GDP is

$$\frac{HC_y}{P} \frac{S_y(1 + \alpha(ß-1)) + \lambda\alpha ß}{(L_y - \alpha (L_y - L_o))}$$

III.a. Government Financing by Age

If the government financed an equal share of the per capita spending of the young and the old, then $\lambda = 0$, and government health spending as a share of GDP would be a constant fraction of total health spending as a share of GDP. But if the government finances more of the health care of the elderly than of the nonelderly, then $\lambda > 0$, and aging has an additional impact on government health spending over and above its impact on national health spending – as the share of the elderly increases, the share of health spending financed by the government also increases.

This is clearly the case in the US, where all the elderly are covered by Medicare, but only some of the nonelderly receive publicly-financed care through Medicaid or other low-income programs. In 2004, for example, 67 percent of the health spending of the elderly was publicly financed, compared with 33 percent of the health spending of the nonelderly. Because Medicare is financed by the federal government whereas Medicaid is jointly financed with the states, the federal government's health spending is even more skewed toward the elderly than total government spending. In 2004, the federal government financed roughly 60 percent of the health spending of the elderly but only 20 percent of the health spending of the nonelderly.[21] The increased public financing of health spending arising from the increased elderly population share accounts for most of the increase in projected federal health spending over the next 30 years (CBO 2008).

While other countries do not have such a stark distinction between spending for the nonelderly and the elderly, the public share of health spending tends to be higher for the elderly than the nonelderly (Columbo and Tapay 2004). In Canada, for example, the average public share of health spending in 2001 was 65 percent for the nonelderly but 79 percent for the elderly. Some of this difference is attributable to programmatic differences—the Canadian government provides the elderly larger subsidies for prescription drugs and dental visits than the nonelderly, and some is due to differences in the composition of spending. In particular, spending on prescription drugs and non-physician professionals is mostly privately financed. These two categories of spending represent a smaller share of the total health spending of the elderly than the nonelderly,

[21] All of these calculations are based on CMS (2004).

thus raising the publicly-financed share of the health spending for the elderly relative to the nonelderly.[22]

III.b Endogenous Changes in Public Financing

As noted above, recent long-term projections of health spending have attempted to adjust for the improving health of the elderly, likely changes in labor force participation, and rates of growth of health spending.

However, one factor that is typically treated as a constant is the share of health spending that is government financed. As already discussed, to the extent that the government finances a larger share of the health spending of the elderly, this will understate the government's likely future burden and budgetary effects.

In addition, if per capita health spending continues to increase more rapidly than per capita GDP, there may be another reason to anticipate changes in the public financing of health benefits. As health spending increases as a share of income, the costs of private insurance and out-of-pocket payments can become prohibitive, particularly for those with low income and relatively large health expenditures. This increased private burden of health spending may prompt changes in government policy.

Follette and Sheiner (2005) studied the evolution of public financing of health expenditures in the United States. They found that the share of health spending in the

[22] Author's calculations from data in Statistics Canada (2001).

United States that is publicly financed has been increasing over time, particularly for those with low income. Because of this increased public role, health spending as a share of income has increased much more slowly for the low income groups than has overall health spending as a share of GDP. For example, if the public share of health care had remained at the level it was in 1970, by 2008, the elderly in the lowest income quintile would have been spending 38 percent of their income on private insurance premiums and out of pocket payments; instead, Follette and Sheiner estimate that the share in 2008 will be just 25 percent.[23] Looking forward, they note that, under the assumption of 1 percentage point excess cost growth, without changes in the share of health spending that is publicly financed, health spending for the lowest quintile of elderly would reach about 30 percent of income by 2030 and 40 percent of income by 2050. Under the assumption of 2 percentage point excess cost growth, these shares would be 40 percent and 60 percent, respectively. To the extent that the government continues to expand low-income subsidies so as to prevent such increases in private health spending and the consequent family budget pressures, current projections of government health spending likely understate the demands on public budgets.

It is very difficult to find data on private health spending by age and income in other countries. However, given that, in most countries, a significant share of health spending is private and the fact that the health spending of the elderly is so much higher than that of the nonelderly, the private health expenses of the elderly most likely exceed those of

[23] The income share of health spending for the lowest-income quintile elderly climbed to almost 39 percent by 2004, as prescription drugs (which were not covered by Medicare at the time) consumed a larger share of health spending. Subsequently, Medicare was expanded to provide subsidized prescription drug coverage, with the largest subsidies for those with low income. Follette and Sheiner (2007) point to this expansion of public funding as an example of the public reaction function.

the nonelderly. In this case, if per capita health spending continues to increase faster than income, then, as in the US, private health spending will likely become unacceptably burdensome for the low-income elderly, and there will be demand for increased public subsidies. Thus, projections that assume that the public share of health spending is constant will likely understate the budgetary challenges faced by governments with developed health systems.

IV. Intergenerational Transfers in Public Health Spending

Health spending has two attributes that raise the question of intergenerational transfers.[24] First, health care spending varies by age. Second, health care is heavily subsidized by government. If health care, paid either directly out-of-pocket or through insurance, were privately purchased, then there would be little scope for intergenerational transfers--people would simply choose what to spend their money on, and it would not matter whether it was health care or something else.[25] People would either consume less when young in order to finance health care when older, or they would spend more on health

[24] It is important to distinguish between the question of fairness and the calculations of intergenerational transfers. The existence of the transfers reflects, at least in part, the societal viewpoint that unequal access to appropriate health care is in itself unfair, and, thus the existence of intergenerational transfers does not necessarily imply that the health system is inequitable. Van Doorslaer and Ourti (2009) and Olsen (2009) discuss the various approaches to defining and measuring intergenerational equity in health care.

[25] Government can induce intergenerational transfers through regulation. For example, insurance market regulations that require community rating can lead to implicit subsidies for those with higher expected health spending. In addition, there is the possibility that, even with private health insurance, there is some intergenerational redistribution. Sheiner (1999) explores whether employer-provided insurance implicitly subsidizes older workers. If the wage offset for the value of employer-provided insurance doesn't vary by age, then younger workers would be subsidizing the insurance premiums of older workers. However, she finds evidence that wages do vary based on the expected value of health expenditures, and thus, there is no intergenerational redistribution. The possibility that retiree health benefits are financed by current workers also seems plausible, but it has not been examined empirically.

care and less on other goods when they were older.[26] However, the fact that health care spending is government subsidized raises the question of whether certain cohorts receive government subsidies at the expense of others.

This question has been heavily analyzed for public pensions, particularly the social security system in the United States. Most public pensions are largely pay-as-you-go; that is, current benefits are financed by taxes on current workers. This system has well known characteristics. In particular, the system depends on the ratio of workers to beneficiaries—as this ratio falls, benefits need to be cut or taxes increased. In order to assess intergenerational fairness, analysts examine rates of return on pension contributions (generally payroll taxes) and the net present values different cohorts receive from the system over their lifetimes.[27] Early cohorts—those who received benefits without paying much in taxes—tend to have the highest rates of return, while rates decline for older cohorts. In steady state, the rate of return in any pay-as-you-go system must equal the growth of aggregate income.[28]

[26] As discussed in Elmendorf and Sheiner (2000), whether health care is substitutable for other forms of contemporaneous consumption or whether it should be treated separately affects the way health spending affects saving. Martins, de la Maisonneuve and Bjornerud (2006) suggest that private health care spending should be viewed as substitutable for other consumption, whereas public health care spending needs to be treated differently.

[27] As noted by Steuerle and Bakija (1994) in reference to social security, calculations of rates of returns and net present values can yield different conclusions about the distribution of benefits by income. For example, the rates of return on social security contributions for lower-income workers might be higher than for high-income workers, but because the contributions of high-income workers are larger, they might receive a larger dollar value of subsidy when calculate in net present value terms. This is not likely to be an issue with Medicare, however, as the benefits received do not vary as much by income.

[28] The steady state rate of return from a pay-as-you-go system is equal to the rate of growth of the economy's wage bill, or $(1+n)(1+g)$, where n and g are defined as above. This rate of growth is believed to be less than the interest rate, r, so that payroll contributions earn less than they would if they were invested. The loss from the system experienced by later cohorts is the product of their contributions and the difference between r and $(1+n)(1+g)$. The larger are the benefits paid to earlier cohorts, the larger are the payroll contributions and the larger the net present value loss for later cohorts.

The public provision of health care has the same basic intergenerational structure as public pensions—the taxes on workers exceed their current benefits, while the dollar value of benefits to the elderly exceeds their taxes. However, because much of government health insurance is financed through general revenues rather than payroll taxes, the link between taxes paid and benefits received is less clear cut than for public pensions. In addition, public pensions provide cash whereas public health programs provide health insurance, which can be hard to value, particularly at the individual level Nonetheless, the dollar flows between generations provide a reasonable measure of the intergenerational impacts of publicly-provided health insurance.

IV.a Measures of Intergenerational Transfers

The parallel between public health care and public pensions is clearer in the United States than in other countries: The United States provides public health insurance to its elderly through Medicare, and part of Medicare spending is financed explicitly through payroll taxes. But, even in countries with universal health systems, the health systems typically involve significant intergenerational transfers. As noted by Corak, Lietz, and Sutherland (2005), taxes paid in Europe are heavily weighted toward the working-age population, while benefits are weighted toward the elderly. Thus, the health system can be viewed as having the same structure as the pension system, with the working age population paying "net taxes" equal to taxes paid less health benefits

received, and the elderly receiving "net benefits" equal to health benefits received less taxes paid.

Cutler and Sheiner (2000) analyzed the rates of returns received by different cohorts from the Medicare program.[29] Their results, reproduced in Table 3 and Figure 5, illustrate the patterns of redistribution (but not the magnitude) implicit in the health systems of most developed countries. The first line Table 3, labeled baseline, presents the internal rates of return realized by different cohorts under the assumption that per capita health growth slows to the rate of per capita GDP growth over 25 years.[30] As expected, the early cohorts experienced very high rates of return from the Medicare program. For example, the rate of return on the taxes paid by the cohort born in 1910—whose members turned 65 in 1975, just a few years after Medicare's inception—was about 28 percent. Subsequent generations receive lower returns, but, because of the rapid growth of health costs, the rates of return are still substantially higher than those received on social security contributions (noted in the bottom line of the table).[31] These relatively high rates of return will be a characteristic of all countries where health spending is increasing faster than income.

[29] Medicare is separated into three parts - Part A, which mostly covers hospital care, Part B, which finances physician expenses, and the new part D, which covers prescription drugs. Part A is funded by payroll taxes, whereas Parts B and D are funded by general revenues. Cutler and Sheiner used the age distribution of income taxes to allocate the burden of the general revenues required to fund Medicare Part B.

[30] This was the Medicare Trustees' basic assumption at the time the research took place.

[31] If per capita health spending is growing at a rate z percentage points faster than per capita GDP, then, under a pure pay-as-you-go system, the rate of return is (1+n)(1+g)(1+z), using the terminology from above. To sustain this rate of return requires tax payments also be increasing at a rate faster than per capita GDP. Eventually, these taxes become too burdensome (in the limit, they comprise all of wages) and then rates of return must fall back to the sustainable level of (1+n)(1+g).

It is important to distinguish between rates of return and net benefits. As health spending increases, the net present value benefit from the system can increase even as the rates of return are decreasing, so long as the rates of return remain above the long-run level. Figure 5 plots the net present value received by different cohorts under the U.S. Medicare program, assuming a 3 percent discount rate. According to this measure, the generation born in 1940 will receive the largest net transfer from the Medicare program.

Of course, under this baseline the Medicare system would be running substantial long-run deficits.[32] As noted above, in steady state, the rate of return on any pay-as-you-go system must equal the growth rate of aggregate income, which the social security actuaries expect to be about 1½ percent per year. The fact that the projected Medicare returns are above that reflects the fact the system is not in long-run actuarial balance. Cutler and Sheiner analyzed two different possibilities for closing the Medicare deficit—raising taxes or cutting benefits. As can be seen from the table and figure, which of these reforms is chosen has important intergenerational consequences. Raising payroll taxes has much greater effects on younger cohorts, whereas cutting benefits also affects older cohorts. [33]

[32] Cutler and Sheiner assume that benefits financed by general revenues are fully paid for each year, but that the payroll taxes used to finance Medicare Part A are constant, as under current law.

[33] As noted, in keeping with the assumption used by the Medicare Trustees at the time, Cutler and Sheiner assumed that per beneficiary Medicare spending would slow to the rate of per capita GDP after 20 years. Since then, the assumptions used by the Trustees have changed significantly. In particular, the Trustees now assume that the growth rate of per capita Medicare spending slows to the growth rate of per capita GDP only very slowly, so that by the end of the 80-year projection period, per capita Medicare spending is still increasing a small bit faster than per capita GDP. In addition, a prescription drug benefit was introduced in 2006; according to the Trustees, the Medicare drug benefit raises Medicare outlays by about 15 percent in 2008 and by about 20 percent by 2030 (CMS Report 2008).

The rates of return from Medicare under these new assumptions have not been analyzed. However, the implications are clear. The combination of the different assumptions about the trajectory of health spending and the enactment of the prescription drug benefit will result in significantly higher rates of return for all cohorts save the ones turning 65 near the end of the projection period—that is for all cohorts

While this analysis is specific to the Medicare system in the U.S., the findings can be generalized to all other countries with rapid health spending growth and financial imbalances. All of these countries will need to eventually close their financing gaps. How they do so can have significant intergenerational consequences.

V. Conclusions

The distribution of health spending by age has important effects on intergenerational transfers, the private burden of health spending, and government budgets. There remains much to be learned about how each of these attributes of the health system will evolve over time. The aging of the population, particularly combined with continued rapid increases in health spending, will bring to the fore difficult issues related to the intergenerational distribution of societal resources. While increased pressures on private budgets will no doubt increase the demand for larger subsidies, increased pressures on government budgets and the tax burden faced by workers will create pressures to limit such subsidies. It is important to have a good understanding of the factors affecting the intergenerational distributions implicit in health systems when addressing these potential intergenerational conflicts.

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born before 2015. Of course, the faster pace of assumed growth would also require a more substantial tax increase or benefit cut to make the system sustainable.

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	Table 1 Age Distribution of Health Spending, United States 2004						
Age Group	0-18	19-44	45-54	55-64	65-74	75-84	85+
Spending	$2,650	$3,370	$5,210	$7,787	$10,778	$16,389	$25,691
Spending omitting LTC	$2,569	$3,240	$4,934	$7,405	$9,684	$13,032	$15,116
LTC	$80	$130	$276	$382	$1,094	$3,357	$10,575

	Table 2 Age Distribution of Health Spending across Countries							
	US (1999)	Canada (1999)	Germany (1998)	Netherlands (2000)	Australia (1998)	New Zealand (1998)	UK (1998)	Belgium (1998)
Ratios of per capita health spending								
1. >65/<65	3.9	5.2		4.9	4.1	4.7	3.9	4.5
2. 75-84/65-74	1.5	1.9		2.2		1.9	2.3	1.7
3. 85+/75-84	1.7	2.2		2.3		2.0	2.0	1.9
4. 75+/65-74	1.8	2.4		3.8	2.0	2.3	2.9	2.1
Ratios of per capita health spending **excluding long-term care**								
1. >65/<65	3.1	4.1	3.1	2.9	3.2	4.2	3.1	3.5
2. 75-84/65-74	1.3	1.6	1.3	1.3		1.3	1.7	1.4
3. 85+/75-84	1.2	1.6	1.1	1.0		1.5	1.6	1.2
4. 75+/65-74	1.3	1.8	1.3	1.3	1.4	1.5	2.0	1.5

Table 3
Internal Rates of Return to Medicare

	Cohort Born In							
	1910	1920	1930	1940	1950	1960	1970	1980
Baseline	27.6%	12.1%	7.0%	4.6%	3.4%	2.8%	2.5%	2.2%
Reforms to close deficit								
Raise payroll tax 2 pct pts	27.6	12.1	7.0	4.5	3.0	2.2	1.6	1.3
Cut benefits 38 percent	27.6	11.6	5.5	3.0	2.1	1.7	1.4	1.3
Social Security Rate of Return	8.4	5.7	4	2.7	2.2	1.8	1.9	1.9

Figure 1
Health Spending by Age Group, US 2004

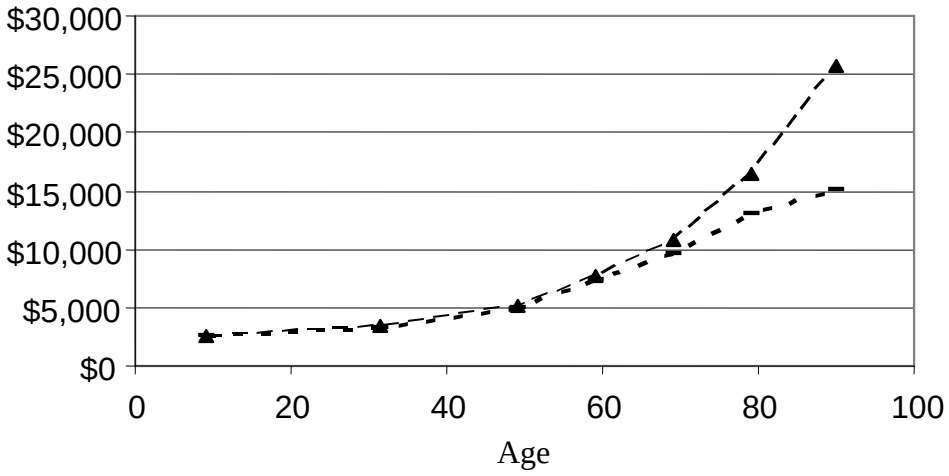

Figure 2
Distribution of Spending by Age in Canada
Ratio of Elderly to Non-Elderly Health Spending

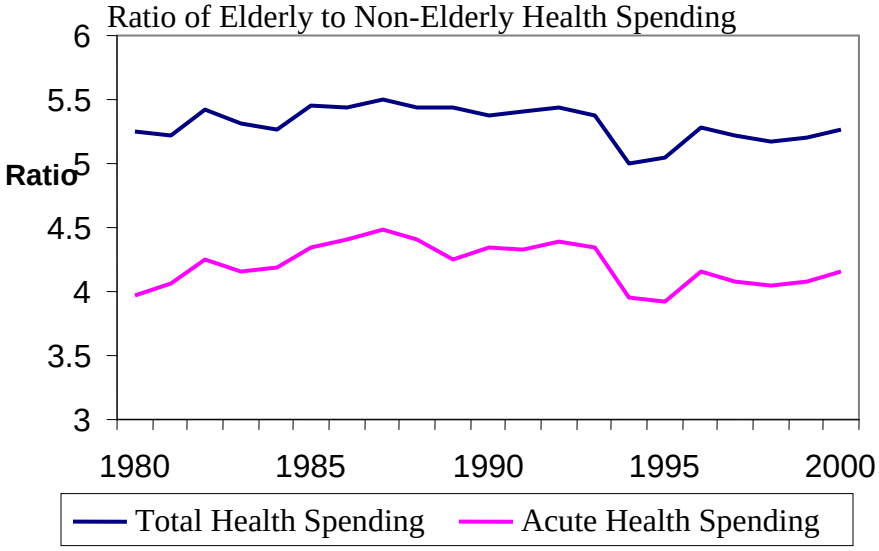

Figure 3
Ratio of Elderly to Non-Elderly Health Spending, Japan

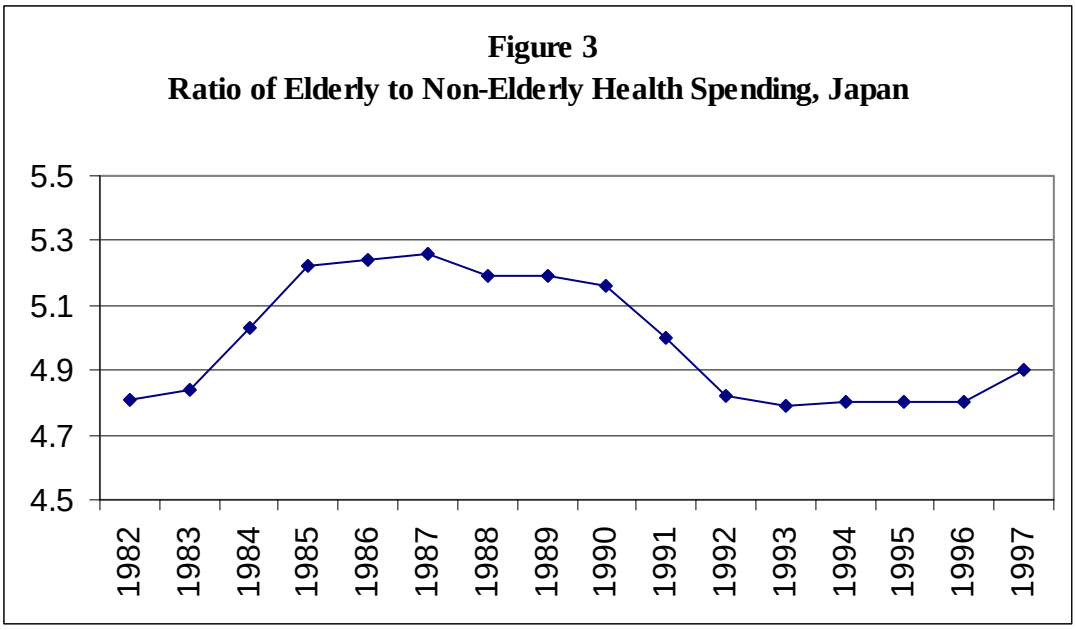

Figure 4
Distribution of US Health Spending by Age Group

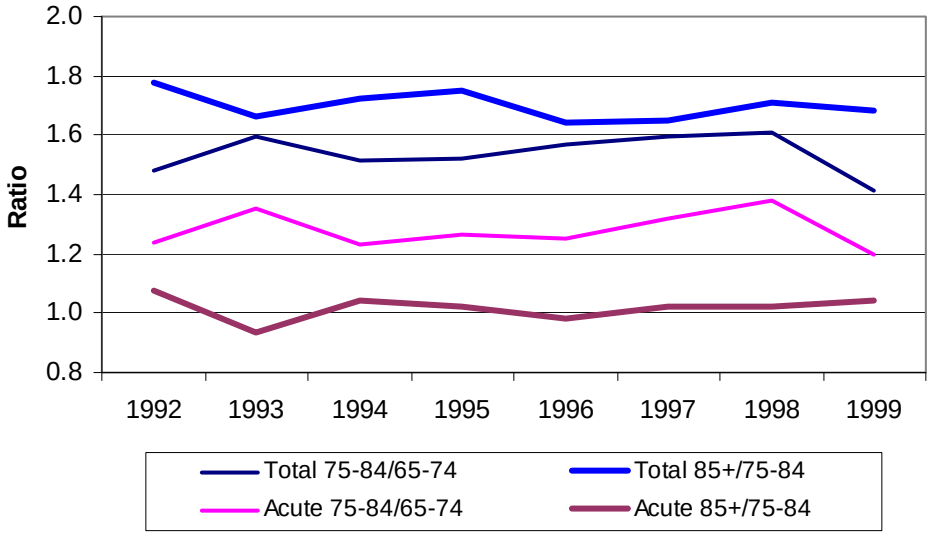

Figure 5
Net Benefits from Medicare, by Cohort