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Demographic Change, Welfare, and Intergenerational Transfers: A Global Overview

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Redistribution of resources across age has always been centrally important throughout human history, but the circumstances have changed in fundamental ways. First, the shape of the economic life cycle has changed, altering the dependent life stages. Second, the institutional context of transfers to fund these stages of dependency has changed. And third, the shape of the population age distribution has changed which alters the relative weightings of dependency and surplus production. Change in all three dimensions continues, and will doubtless continue throughout this century. I will take a broad historical perspective on these changes, and discuss their interaction.

The Changing Shape of the Economic Life Cycle

Hunter-Gatherers

Human evolution took the distinctive path of prolonged and heavy investment in children during a period of dependency which apparently lasted for about 20 years, according to studies of contemporary hunter-gatherer groups (Kaplan, 1994; Kaplan and Robson, 2002). To raise a child to this age, including wastage of resources through premature death, took food calories equivalent to about three years of adult consumption, in addition to the time spent carrying, guarding and instructing the young. At the other end of the age scale, people continued to produce resources in excess of their consumption into old age, transferring the surplus to their children and grandchildren. The elderly might experience a short period of dependency before dying, with death sometimes coming at the hands of younger members of their group (Kaplan, 1994; Hill and Hurtado, 1996). However, there was no stage of the life cycle corresponding to retirement as it occurs in some agricultural populations and in modern industrial populations. Figure 1 shows the pattern of net production and consumption over the life cycle for sexes combined in pooled data for three groups of hunter-gatherers/horticulturalists (Kaplan, 1994; Lee, 2000). The direction of transfers of food was strongly downward, from older to younger people. Calculation reveals that the average population-weighted age at which a food calorie was produced in these groups was 34 years, and the average age at which a calorie was consumed was 23, so that the downward direction of the flow was very pronounced (for a discussion of the interpretation and significance of such average ages, see Willis, 1984, and Lee, 1994 and 2000).

Agriculture

As settled agriculture replaced hunter-gathering, property rights were established and ownership of land, dwellings, livestock and other goods became widespread. Much property was owned by the elderly, providing an enduring source of power and control. Perhaps because of this, many contemporary intensive agriculturalists do have a life cycle stage of retirement (Mueller, 1976; Stecklov, 199*). The elders might contribute childcare, managerial skills, specialized knowledge and various home production tasks, and it is therefore difficult to assess their economic contribution. However, taking estimates of labor and time use at face value, it appears that resources are transferred from adult children to their elderly parents, often facilitated by co-residence. In surveys administered to Third World agricultural populations around the world, people often list support in old age as a leading reason for having children. At the same time, children in settled agricultural become net producers at a younger age than in hunter-gatherer groups, and appear to be far less costly to raise. Nonetheless, empirical analysis shows that the net direction of transfers in agricultural societies is also strongly downwards, from older to younger, in every society so far examined (Lee, 2000; Stecklov, 199*; Lee and Kramer, 2001). This downward flow results not only from the shape of the economic life cycle, but also from the young age distribution of the population. Although this result appears to contradict Caldwell's earlier views about wealth flows, the contradiction may be more apparent than real, since a broader view of children's contributions might change the picture.

Industrialized Societies

Studies of labor force participation rates in the 19th century for a number of the currently industrialized countries show that men continued to work to quite old ages (Costa, 1999*). It appears, therefore, that full retirement was not a major factor in either the agricultural or the industrial sectors of these countries before the late 19th century. For 1900, the age at retirement in the US has been estimated at 70 years (Burtless and **, 2001). During the 20th century, and most notably in its second half, this situation changed rapidly; throughout the industrial world retirement ages were falling (Gruber and Wise, 1999), often by five years or more since the 1960s, and more than this since 1900.

At the younger ages of the life cycle, children were sometimes drawn into early and heavy labor in manufacturing. However, in the longer run education grew in importance and crowded out child labor. Children returned to a longer and more thorough-going stage of dependency while society invested in their human capital.

What was the net effect of strengthened child dependency together with longer and more complete withdrawal from the labor force by the elderly? A calculation of the average ages of production and consumption for individuals in the US around 1990 shows that now, the net direction of flows has shifted from down to up. These average ages reflect both the underlying age profiles and the population age distribution. Similar calculations done at the household level also show upward flows in England and Japan, as well as in the US (Ermisch, 1989**). This is a sea-change, and it is likely that the change will be strengthened in coming decades as the populations age further.

Comparisons Across Technological Stages

We can compare the economic life cycle in the contemporary US to the average life cycle for the three hunter-gatherer groups studied by Kaplan (1994). To standardize for the vastly different scale of production, I have divided all age schedules by the average level of consumption for individuals at ages 0 to 49. Figure 1 shows the result, plotting standardized net production against age. We see that the standardized age profiles are very similar for children, and that they continue to be quite similar for adults, up until age 40. After this, net production remains high for the hunter-gatherers, while it drops in the US, becoming increasingly negative after age 60. This divergence of the life cycles at older ages is due in part to the emergence of retirement as a life cycle stage in the US, in part to rising consumption throughout the life cycle in the US, and in part to its lower fertility which means that older adults no longer have children to support and can consume a larger share of their earnings. This life cycle pattern would hold for most or all industrial populations today.

It is also revealing to summarize the direction of resource flows across age in populations at differing technological stages, using an arrow diagram. The tail of the arrow is placed at the average age of producing, and the head at the average age of consuming. These average ages are calculated by weighting the original age schedules by the population age distribution (Willis, 1984; Lee, 1994, 2000), and therefore reflect both the population age distribution and the shapes of the age schedules. Figure 2 plots the arrows for hunter-gatherer groups, agricultural groups, and the industrial states, both on an individual basis, and by age of household head for the industrial states. When the arrow points to the left, down the age scale, that indicates that the net direction of transfers is downwards from old to young, and conversely. The diagram clearly shows the shift from hunter gatherer groups and agriculture to the current industrial situation.

The Changing Institutional Context of Transfers

Hunter-gatherers shared resources within small groups of related families. For example, the hunter-gatherers studied by Kaplan shared food with three or four family households living in clusters. Such sharing evened out random variations in success in foraging for food, and thus accomplished horizontal redistribution and served a kind of insurance function. It also redistributed resources vertically, particularly from adults to children, but also on some occasions to the elderly (Simmons, 1945). In these groups, child rearing is a broadly-shared undertaking, done not only by the parents, but also by older sisters and brothers, aunts, uncles and grandparents, and unrelated members of the group. The average infant in an Efe hunter-gatherer group is cared for by 11 people in addition to its parents (Ivey, 2000). In these circumstances, members of the group had an interest in its demographic composition, and would sometimes act to eliminate elderly who were becoming dependent, or to eliminate children whose father had died (Hill and Hurtado, 1996). The consequences of demographic change were internal to the decision making unit within the group.

Agriculturalists, whose production was less variable (and for whom variations would in any event be quite highly correlated across households due to weather and other general conditions) were less likely to share across households unless elderly family members lived separately (Simmons, 1945). Transfers took place mainly within the family. In this case, too, the consequences of decisions about demographic composition, through fertility and perhaps migration, were internal to the decision-making unit, the household. If the elderly reduced their labor and “retired”, they were sustained by transfers from their adult children, perhaps with help from their grandchildren.

More recently, the public sector in Third World countries has begun to make increasingly extensive transfers, typically downward in direction, for the health and education of children. With the exceptions of Latin American countries and some East Asian countries, public transfers to the elderly are largely limited to civil servants and the military. The first panel of Figure 3 shows the age profiles of taxes paid and benefits received in India in 1981, illustrating this characteristic shape.

Industrial nations have moved much farther in this direction, devoting a larger share of GDP to age-targeted transfers. On average, the OECD countries spent 19% of GDP on age targeted transfers in 2000, with some members such as Sweden and Denmark spending nearly 30%, and others such as Poland, Hungary, Austria, and the US spending less than 12% of GDP (Dang et al, 2001:25). Transfers to the elderly dominate. On average, total expenditures on the elderly are roughly twice total expenditures on children in the OECD. In the US, an elderly person receives four times as much as a child through the public sector. The second panel of Figure 3 plots the age schedule of taxes and benefits for the US, which shows a striking contrast to the plot for India.

Once again, average ages in the population provide a convenient summary of the direction of flows. Figure 4 shows the difference between the average age of receiving benefits and the average age of paying taxes for a number of Third World countries and for the US. For every Third World country shown, this difference is negative: the age of receiving benefits is less, implying that tax payers are transferring resources downward to children. For the US, however, the difference is positive, indicating that tax payers on average are transferring resources upwards to the elderly. Other OECD countries with older populations and more generous transfers would provide an even stronger contrast.

Figure 5 again contrasts India and the US, this time using arrow diagrams to show their composition and direction of the three main transfer programs: pensions, health care, and education. This time, the thickness of the arrows indicates the size of the transfer flows relative to GDP. When drawn in this way, the area of the arrows measures the "transfer wealth" generated through each of the transfer systems. We can see several things. First, the size of the public sector transfers relative to GDP is very much less in India than the US. Second, expenditures on education stand out in India as more nearly comparable to those in the US than the other transfer flows. Third, we can see once again that downward public transfers dominate in India and upward transfers dominate in the US.

It is important to note that within families, and within the private sphere, the direction of transfers is still strongly downwards in industrial nations: the elderly, on average, continue to make net private transfers to their children. However, transfers through the public sector overwhelm these downward private transfers, so that the net direction of transfers has become upwards.

A Digression on the Theory of Transfers

At this point, it will be useful to introduce some theory. A natural starting point is Samuelson's (1958) seminal theory of the role of transfers in a simple economy with no durable goods and no life cycle stage of childhood. In Samuelson's world, a life cycle stage of retirement already exists; people take it for granted as a necessity. But how are they going to be able to consume without working? They can't store up surplus output during their working years, since nothing lasts. The only possibility is to make some kind of a deal with others. Old people would like to be able to loan some of their production to others when they are young and strong, and be repaid when they are old and frail. The problem is that every working age people thinks the same way: each would like to be loaning output so that they could be repaid when old, and there is no one who wants to borrow during their working years. Even if the interest rate were zero, so that a borrower has to repay only on a one-for-one basis, no one would want to do it. If the interest rate becomes sufficiently negative, however, it will be possible to induce the youngest people to borrow some money from the older workers. But the resulting life cycle consumption path is highly distorted and would yield low life cycle utility. Much higher life cycle utility can be achieved through a non-market social contract in which the working age generations are obligated to support the elderly generations through transfers which the elderly will never repay. This transfer system, whether familial or public, can deliver a positive rate of return equal to the rate of population growth plus the rate of productivity growth.

This provides a strong justification for upward flowing transfers in a world with no physical capital, like the world of hunter-gatherers. But we have seen that hunter-gatherers do not retire, whereas settled agriculturalists and industrial populations do have capital. With capital, everything changes. Capital typically earns a higher rate of return than the transfer system, so workers can do better by saving and investing in real – hence the appeal of privatization and funded systems. If capital markets become saturated, and rates of return drop below the rate of growth of total output as may happen with population aging in the OECD countries, then further provision for old age can be achieved through the transfer system. Otherwise, it appears that we can do without transfers altogether. So why are they so important in industrial nations today?

But Samuelson's world doesn't only lack capital, it also lacks children. Workers can save for their retirement, but they also must provide food and shelter for their children. In the later nineteenth and twentieth centuries, as developing economies began to need and reward an educated workforce, children began to need costly education. Becker and Murphy (1988) have developed an interesting theory linking parental transfer decisions to the development of the welfare state. Ideally, parents would invest in the education of their children up to the point where the rate of return to an additional year of education would equal the rate of return on an additional unit of capital. This is the socially optimal amount of investment in children. If parents want to do still more for their children beyond this point, they can bequeath them physical capital earning the market rate of return, higher than additional education would earn. The difficulty is that most parents have competing goals: they want to make their children happy and prosperous, but they also want to provide for their own old age. Balancing off these conflicting goals, they provide less than the optimal amount of education for their children in order to save enough for their own retirement.[1]

Children would like to be able to borrow the money needed to complete their education to the optimal level, but no one will loan it to them. Their parents would be happy to loan it, but typically there is no way to enforce the repayment of such a loan, except perhaps in Singapore. Society and individuals are stuck at a sub-optimal level of well-being, because education is too low. This sets the stage for the start of public education. The state taxes the worker-parents to raise the revenues to provide the optimal amount of education for the children. This may be good for the children, but it is bad for the parents. Had they wanted to pay to educate their children optimally, they could have done so to begin with.

So to compensate the parents, the state taxes the children, once they are grown into workers, to pay their now elderly parents a public pension. The new transfers from parents to children, through the state, for public education are balanced by new transfers from adult children to their parents for retirement. If the timing of the introduction of these programs is just right, then all generations will be better off than before. It is true that annual public transfers to the elderly are much larger than to children, but they come about 60 years later in the life cycle, on average (age 70 for the elderly versus age 10 for children), and consequently should earn a rate of return compounded over many years, and at a real discount rate of 3% they approximately balance in the US.[2]

Whether for this reason or some other, all industrial nations have followed this route, introducing public education, public pensions, and public health care – which is also a net transfer to the elderly. Third World countries are at various stages of introducing these programs, with all governments providing some degree of public education, most providing health care, and some providing pensions.

Public pensions raise some new issues, since they may affect parental decisions about both saving and childbearing. It is common sense that public pensions will reduce the need for wealth in old age, and therefore lead to lower savings (Feldstein, 1974). It is also common sense that if parents once had children in part for security in old age, public pensions would weaken that motivation. Public transfers inevitably change incentives for private behavior and inevitably create a gap between private and social costs and benefits, a gap I will discuss later.

Changing Population Age Distribution

So far, I have talked mostly about the individual economic life cycle, and the emergence of a stage of consumption in excess of production. But sheer demographic change also plays an important role here. The later stages of the demographic transition involve profound population aging, and the industrial world is still early in this process, with major population aging yet to come.

The trends in aging are well known. In what follows, I will draw extensively on a set of fiscal projections by the EU and OECD (Dang et al, 2001). Their demographic component is based on Eurostat and national projections. These imply that the average national old age dependency ratio (65+/20-64) will double by 2050. Since much has been written about these trends in population aging and about fertility trends in the industrial world, I will not discuss either of these further. However, it may be useful to discuss mortality.

According to Dang et al (2001) the average increase in life expectancy projected for 21 OECD countries, and used in the fiscal projections reported below, is 4.5 years. Official government agencies have a history of underpredicting mortality gains at older ages, and consequently underpredicting the number of elderly (Keilman, 199*; National Research Clouncil, 2000; Lee and Miller, 2001). Projection of mortality for the G7 countries, based on extrapolation of continuing exponential decline at the historical rate for each age, leads to average life expectancy gains by 2050 of 7.1 years, twice as great as the average gains in the official projections (Tuljapurkar et al, 2000). If these projections based on historical trends are correct, then population aging will be greater than the official projections once again.

However, there is some reason to think that life expectancy gains may be even greater than these. Two recent articles have found rapid linear increases in life expectancy in the past at a rate of 2.3 years per decade (Oeppen and Vaupel, 2002, average of sexes for record life expectancy, 1840-2000) or 2.1 years per decade (White, 2002, average of sexes, for 21 industrial nations, 1955-1995). At these rates, life expectancy would rise by 10.5 years to 2050 under the White result, and by 11.5 years under the Oeppen-Vaupel result. We can take an 11 year increase as representative of this approach, which is 2.4 times as great as the OECD projected increase. Longer run projections would lead to even greater differentials, because most official forecasts assume gains slow or cease after 2050. Later, I will discuss the fiscal implications of more rapid mortality decline.

Interaction of Population Aging with Static Intergenerational Transfers

As the population grows older, the costliness of our current package of public sector transfers will grow relative to our incomes. Figure 6 shows this by plotting a projection of the fiscal support ratio for the US over the 21st century. It is based entirely on the current structure of benefits, including current costs per enrollee of health care, although these are expected to rise substantially. The projected population is weighted by the current age distribution of net tax payments in the numerator, and by the current age distribution of costly benefits, in the denominator. We can see that it will decline markedly over this century as the population ages, and that a declining share of children will not do much to offset this decline.

How Population Aging Interacts with Funded and Unfunded Systems: Capital or Implicit Debt

When retirement exists as a life cycle stage, the elderly require a claim on some portion of current production in order to consume. Such claims may be based on the prior accumulation of ownership of physical assets (homes, stock market equities) in a funded retirement system, or under life cycle saving. In a funded system of this sort, population aging leads to more capital per person, and higher labor productivity. Even though aggregate saving rates may decline as the population ages, the population and labor force will grow more slowly, so permitting capital per worker to increase. In our simulations (Lee, Mason and Miller, 2000) for Taiwan and for the US, we find that population aging induces a strong increase in the capital labor ratio, by 70% or so, under the life cycle saving hypothesis.

The claims of the elderly may also be based on expectations of transfers from an unfunded old age support system, such as familial support or an unfunded public pension program. The net obligations of such a system at any instant are its implicit debt, equal to the difference between expected future contributions by the existing participants and their expected future benefits. The implicit debt in a system may be enormous. For example, Lee, Mason and Miller calculate that in 2000, the implicit debt in Taiwan's family support system equals 2.5 times GDP. For the US, they calculate that the implicit debt of the public pension system is 1.7 times GDP. Similar levels of implicit debt have been estimated for a number of Latin American pension systems (Bravo and Uthoff, 2000). For transfer systems, population aging is a pure cost, increasing the tax burden on the existing population, and increasing the implicit debt per capita and relative to GDP.

For one reason or another, the industrial nations established unfunded pension systems, and the existence of these systems is now a given. One might wish that the systems had been started on a funded basis, but theory tells us that there would be no Pareto improvement in switching to a funded system today by repaying the implicit debt and saving for future retirement.

But that diagnosis is not entirely correct for the situation now faced by the industrial nations. With population aging, implicit debt per capita will greatly increase, nearly doubling in the US over this century, for example, and similarly for Taiwan. In a sense, we must create new old age support systems to support the increasing numbers and proportions of elderly. If we chose, we could maintain the existing implicit debt but develop a funded system to deal with the greater support burden that is projected. In practice, this is what would be accomplished by a decision to partially fund our current unfunded public pension systems. In this way we would avoid the questionable project of paying off our existing implicit debt, while capturing the capital building advantages of a funded system for the population aging to come. Furthermore, such an approach may find some justification in the Becker-Murphy theory. Unfunded pension systems can be viewed as a counter-balance to public investments in children, up to a point. With lower fertility as in the OECD today, and with longer life, this rationale for providing old age support through transfers rather than through saving in advance, has run its course.

Projections of Population Aging, Public Pensions and Other Benefits

As we have already seen, population aging raises the implicit debt in unfunded pension systems, and increases the cost in terms of after tax income of providing a standard set of life cycle benefits. These consequences of population aging are unavoidable features of unfunded public transfer systems. A third consequence is that if taxes and benefits are not suitably adjusted, rising expenditures due to population aging will put long-term finances deeply in the red. This is not intrinsic to unfunded systems. A system can carry a heavy load of implicit debt, but still be long run financial balance. Unfortunately, that is not the case for the OECD countries.

Roseveare et al (1996) calculated the present value over a 75-year horizon of the expected pension revenues minus their expected expenditures on benefits for the OECD countries. Figure 7 plots these net present values as a percent of current GDP, assuming a discount rate of 3% and a productivity growth rate of 1%. The median percentage imbalance is 160, for Austria and Australia. Ireland, the UK and the US are in relatively good shape at around 50% imbalance, while New Zealand and Denmark are in bad shape with imbalances about seven times as great, near 350% of GDP. These are very large discrepancies, reflecting very large imbalances in long term finances, imbalances that must be addressed in one way or another.

The second set of OECD projections (Dang et al, 2001), issued five years later, projects changes in public pension spending as a share of GDP over the next fifty years, along with similar changes in the costs of other transfer programs. The pension projections take into account "reforms legislated but not yet implemented". Figure 8 gives an idea of the effects of implementing these reforms. It plots the increased pension spending as a percent of GDP in 2050 along with the increase that would have been projected based on rising Old Age Dependency Ratios alone. On average, pension spending would rise by 5.2% of GDP under demographic pressures, but the projected total increase is only 3.4%. About one third of the demographic increase is projected to be offset by policy reforms that are already legislated. In the EU states, about half of the demographic driven increase is expected to be offset by reforms.

Figure 9 shows an example of these legislated reforms, projected reductions in the generosity of pension benefits relative to per capita GDP. On average, these countries have legislated a 30% reduction in benefit generosity. There are additional changes in eligibility and employment rates. It remains to be seen whether it will actually be politically possible to implement these changes. Atkinson (2001:235-236) notes: "Failing [a build up in private pension saving], lower incomes and increased poverty among the elderly raise the risk of political pressure for a reversal of these policies…."

Public pensions are only one of the six programs assessed by Dang et al; the others are early retirement programs, health care, long-term care, child and family benefits, and education. These programs account for 19% of GDP on average in 2000, with pensions accounting for 7.4% of that total. The other large programs are health care and education. In total, expenditures on these age-related programs are expected to rise by 7% of GDP over the next 50 years, after taking into account program reforms that have already been legislated as discussed earlier for pensions. Fiscal balance will require that taxes as a share of GDP be raised by the same amount, assuming benefits are not further reduced. Seven percent of GDP is a daunting amount. In the US, political storms are generated by a projected 2% increase in the cost of public pensions. Nonetheless, this 7% figure may understate the actual increases that would be implied by keeping program structures as currently legislated, in part because mortality may fall faster than anticipated, and in part because health care costs may rise much faster than anticipated, as I will discuss next.

How Far and Fast Will Life Expectancy Rise, and What Will It Cost?

The new possibility of linear life expectancy improvement is one we should gladly welcome, provided it comes with similarly improving health at older ages. However, rapid life expectancy gains would add more years of life during the retirement stage that is currently not productive, extending consumption needs. Longer life would certainly increase the adverse fiscal impact of population aging. Using the sensitivity tests provided in Dang et al (2001), we can assess the implications, as shown in Table 1.

Table 1. Fiscal Implications of Official and Alternative Mortality Forecasts

Source of Mort Projection	**e_0 increase to 2050**	**Pension Cost Increase (%GDP)**	**Total Age Targeted Increase (%GDP)**
OECD (official)	4.5 years	3.4%	6.9%
On trend decline in asdr (Tulja et al)	7.5 years	4.4%	8.3%
Linear e0 trend (OV and White)	11.0 years	5.6%	10%

Note: Tuljapurkar et al (2000) forecast e0 gains for the G7 that are 3.6 years above official forecasts to 2050. I have taken 3.0 as the difference for this table, because the average increase in the official projections reported in Dang et al (2001) is about one year greater than those reported in Tuljapurkar et al. The projected increases under different mortality forecasts are calculated using the sensitivity tests for e0 reported in Dang et al (2001:52).

The more rapid decline projected for the G7 by Tuljapurkar would imply that pension costs would be rise by 1% more as a share of GDP, and total costs by 1.4% more. Under the linear life expectancy forecasts, pension costs would rise by 2.2% more as a share of GDP, and total age targeted costs by an additional 3.1%. This would nearly double the projected increase in age-targeted spending. Any projection is speculative and uncertain, but this one requires only the extension of a trend that has already held for 160 years.

Health Care and Long Term Care

Although both Roseveare et al (1996) and Dang et al (2001) project public health care expenditures, the assumptions on which the projections of costs per individual of a given age are based are not clear, and the projected increases appear quite modest. By contrast, for the US both my own projections and official projections indicate massive increases (Lee and Miller, in press). For example, the program for health care for the elderly currently costs 2.2% of GDP, but Lee and Miller forecast that it will be 4.3% by 2030, 5.7% by 2050, and 7.9% by 2075. To 2050, we project it will increase by a factor of 2.6 (=5.7/2.2). These forecasts are based on an analysis of the historical growth of health costs per person in a given health status, and on a forecast of health status that is based on time until death for the older members of the population. For the average OECD country in the Dang et al (2001) forecasts, the increase is only by a factor of 1.55, or by about one third as much (.34 = (1.55-1)/(2.6-1)). Between 1961 and 1999, health costs as a share of GDP for 15 European countries increased by a factor of 2.1, from 3.8% to 8.2%. Over the same period, US health costs increased their share from 5.3% to 13.6%, by a factor of 2.55. Although the share has been higher in the US, the pattern of growth of the share has been quite similar.

Common sense suggests that health care costs per age-adjusted person cannot and will not continue to rise at rates substantially above per capita income growth. But this may be wrong. Research in the US has found that prices for any particular medical treatment have been falling over time, and the reason for the increase in expenditures per person is that new and better technologies are constantly being developed, and these are more costly. It does seem possible that expenditures on health could keep rising if individuals and society decide that higher quality health care is worth it.

If costs in the OECD rose by the same factor as in the US, public expenditures on health in 2050 would reach 13.8% of GDP, a level equal to the current total expenditure on health care in the US, public plus private. We get virtually the same result if we simply assume that per capita public health costs grow 1% per year faster than in the OECD projection, resulting in an increase by a factor of exp(50*.01)=1.65 in 2050, to a level of 13.7% of GDP. The implied increase in health care spending is 5.4% of GDP greater than in the OECD baseline forecast, nearly equal to the entire projected increase in total age targeted spending.

We have already seen that linear increases in life expectancy would cost an additional 3% of GDP. Combined with the costs of more rapidly rising health costs, this could mean that total age-targeted expenditures will rise by an additional 8% of GDP above the baseline forecast, more than doubling the projected increase of 6.9% in the baseline projection (Dang et al, 2002:25). That would bring the OECD average age-targeted spending in 2050 to 34% of GDP. That is, age targeted spending would nearly double relative to GDP.

Will Public Expenditures Actually Increase This Much?

It is important to realize that the projections I just presented will not come to pass. They are contingent on current program structure, and current program structure will surely change. In truth, population aging in the past has played only a small role in the phenomenal increase in public spending on the elderly. Most of the change has been due to increased generosity of benefits and eligibility.

Empirical analysis of the experience of the OECD nations over the past thirty years by Gruber and Wise (2001) finds that as the population aged, only about half the impact was passed on to public expenditures, with the other half absorbed as declining benefits per elderly – not absolute declines, but declines relative to what benefits would have been without population aging. Furthermore, although expenditures on the elderly did rise to cover half of the increase implied by demographic aging, total government expenditures were unaffected, so that public expenditures on other aspects of the budget were reduced (Gruber and Wise, 2001).

This kind of response to population aging should not be surprising. We can think of individuals and society as choosing between a basket of life cycle government benefits corresponding to the current programs, and the goods and services that can be purchased with after tax income. Earlier, we saw that the elderly support ratio based on current programs would decline by a third at the central government level in the US, which tells us that tax rates in the future would have to be 50% higher to pay for that basket of life cycle benefits. We can interpret this as a demographically driven price increase for the basket provided by current programs. Its cost, in terms of reduced after tax income, will rise by 60%. As a result, we would expect individuals and society to substitute away from the basket of benefits and towards after tax income. A lower level of the basket of benefits will be chosen, and the tax rate could either rise or fall. This is consistent with the Gruber and Wise empirical findings.

Social Spill-Over Costs for Fertility and Immigration

Once the resource sharing unit shifts from the family or household to the national transfer system, gaps inevitably are created between the costs and benefits of demographic behavior accruing to the decision maker and to society as a whole. This is certainly true of childbearing, where children impose costs for health care and education on society, but also provide benefits as tax payers who help support the elderly and spread the costs of public goods. Population aging raises these externalities by increasing the need for taxes to help support the elderly. In earlier work, Lee and Miller (1997) evaluated these externalities as shown in Table 2. They calculated that a child born to parents who have a high school education had a net fiscal present value of $171,000 in 1996.

Table 2. Net Present Value of the Fiscal Impact of an Incremental Birth and all Its Descendants, by Education of the Parents and Real Discount Rate

Education of Parent	*Net Present Value in 1000s of 1996$, by Real Discount Rate*				
	2%	3%	4%	6%	8%
<High School	362	92	12	-32	-39
High School	495	171	61	-10	-28
>High School	621	245	106	9	-18

Source: Lee and Miller (1997). Empirical intergenerational educational transition matrices are used to project the probability distribution of eventual educational attainment of the original birth and all subsequent descendants. See Lee and Miller (1997:Appendix 7A for details).

This large positive fiscal externality reflects in large part the fact that the family does not benefit directly from old age support when it has a child, although society does. It is possible, although perhaps not likely, that this externality is partly responsible for the low fertility observed throughout the industrial nations today.

Fiscal externalities also arise in the case of an immigrant, and these have again been evaluated by Lee and Miller (1997), as reported in Table 3. Calculating a weighted average across age of arrival and education, with weights equal to the distribution of immigrants to the US for these characteristics, they found an average fiscal externality of +$80,000. At the state and local level, which funds education, the externality was negative, but at the federal level, which funds old age transfers as well as various public goods, the externality was overwhelmingly positive.

Table 3. Net Present Value of the Fiscal Impact of an Incremental Immigrant and all Descendants, by Education and Age at Arrival in the US

Education of Immig or parent	*Net Present Value in 1000s of 1996$, by Age at Arrival (r=3%)*			
	0	*20*	*40*	*70*
<High School	60	33	−141	−166
High School	92	146	−32	−255
>High School	117	288	132	−149

Source: Lee and Miller (1997). For children, the educational attainment is that of their parents. Empirical intergenerational educational transition matrices are used to project the probability distribution of eventual educational attainment of the original birth and all subsequent descendants. See Lee and Miller (1997:Appendix 7A for details).

Conclusions

First, there is no reason at all we should live today like hunter-gatherers, working until we die. Their behavior provides perspective, but not guidance. There is nothing wrong with society devoting substantial resources to the support of the elderly, provided the choice is made in an informed and undistorted way. Second, there is no reason why society, or individuals within society, should not choose to have a protracted stage of leisure at the end of life, as is now the case in industrial nations, provided again that the decision is made in an informed and undistorted way. Third, even if we decide to reduce public support for retirement at an early age, there will still be very substantial demographic pressures arising from population aging, pressures which will be felt in spending for investment in the health, education, and economic well-being of children. If expenditures on the elderly are viewed by the public as competing for a fixed total of tax dollars as the population ages, that will be very bad news for children as well as for other government activities. Transfers to the elderly are a legitimate and I think desirable activity of the government. However, they should be viewed as falling in a different category than other government programs. In particular, programs for investment in children should be shielded from their growing pressures.

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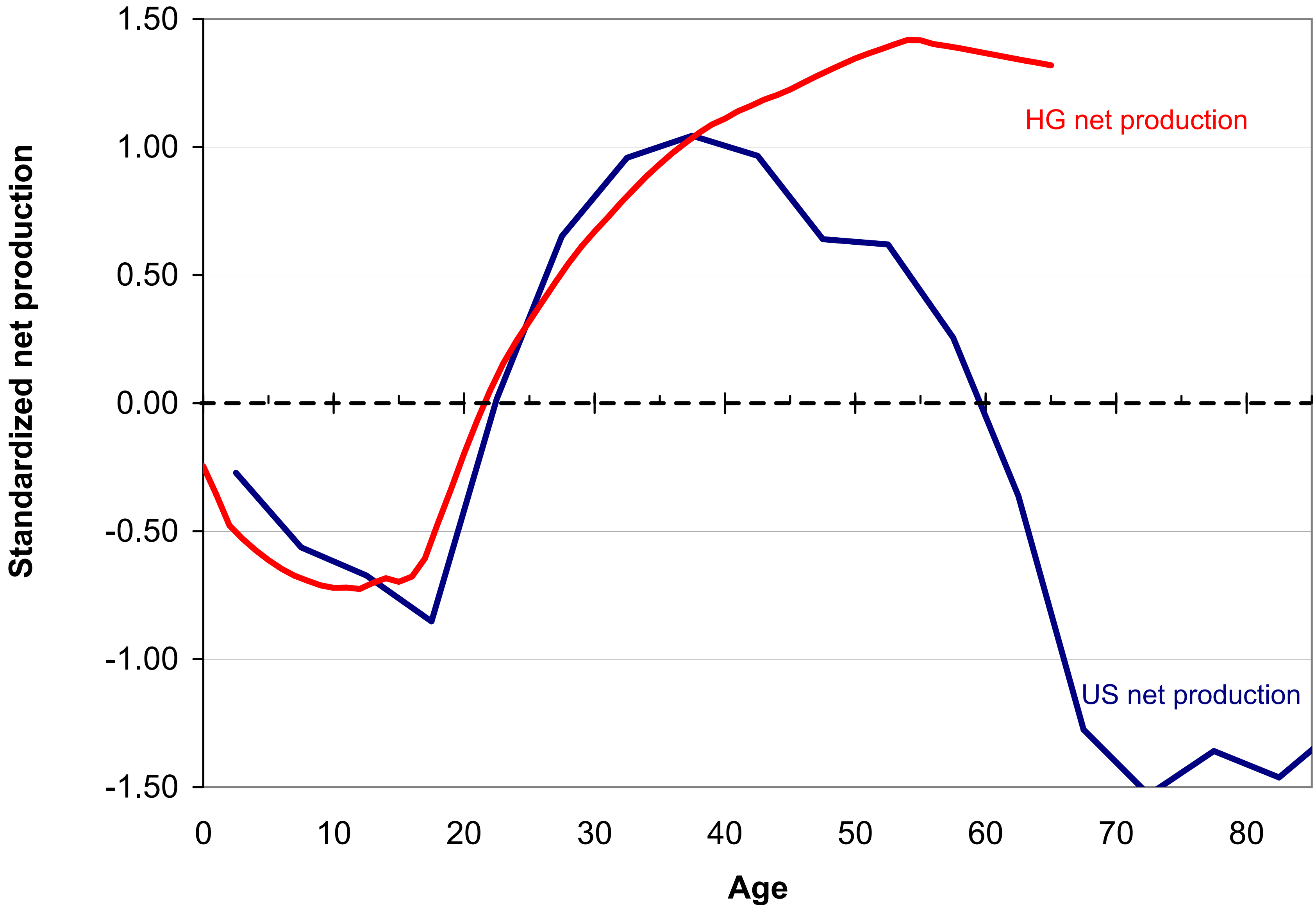
[1] If parents leave intentional bequests to their children, this indicates that they have first invested optimally in their education. The fact that most parents do not appear to intend to leave bequests to their children indicates that they are investing less than the optimal amount in their children's education.

[2] Assume that public education is received over roughly as many years as are pensions and old age health care. Annual public expenditures per elderly person are four times as great as on children. Equality would require a discount rate of ln(4)/60=.023. If we assume that the level of benefits rises the rate of productivity growth over the life cycle, say at .017 per year, then a real discount rate of .04 would equate the present values of transfers received as a child to those received in old age.

Figure 1. Standardized Net Production by Age for Contemporary United States and the Average of Two Amazonia Hunter-Gatherer Groups



Note: Standardized by dividing by average level of consumption at ages 0-49.

Figure 2. Comparative Direction of Reallocation of Income

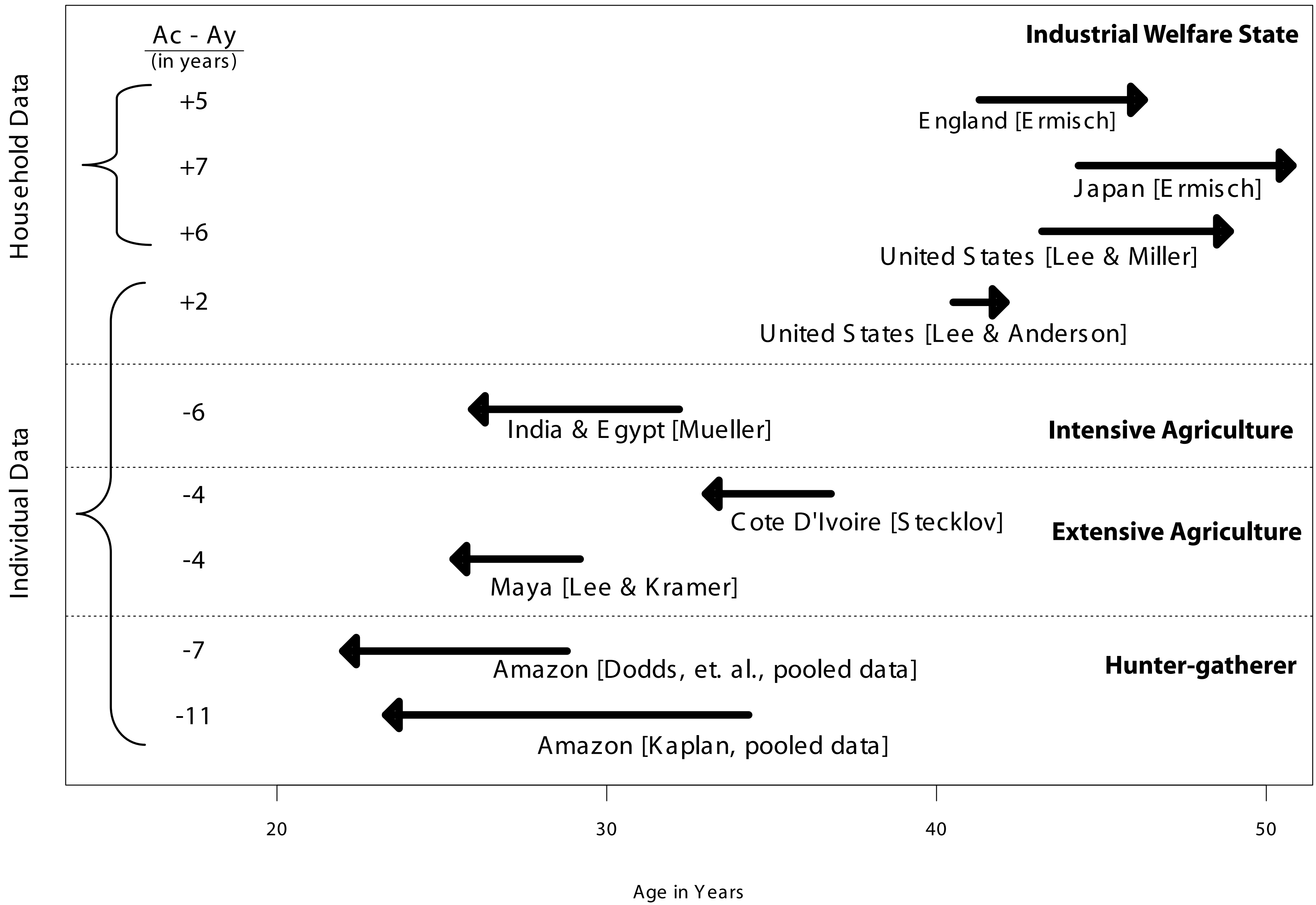
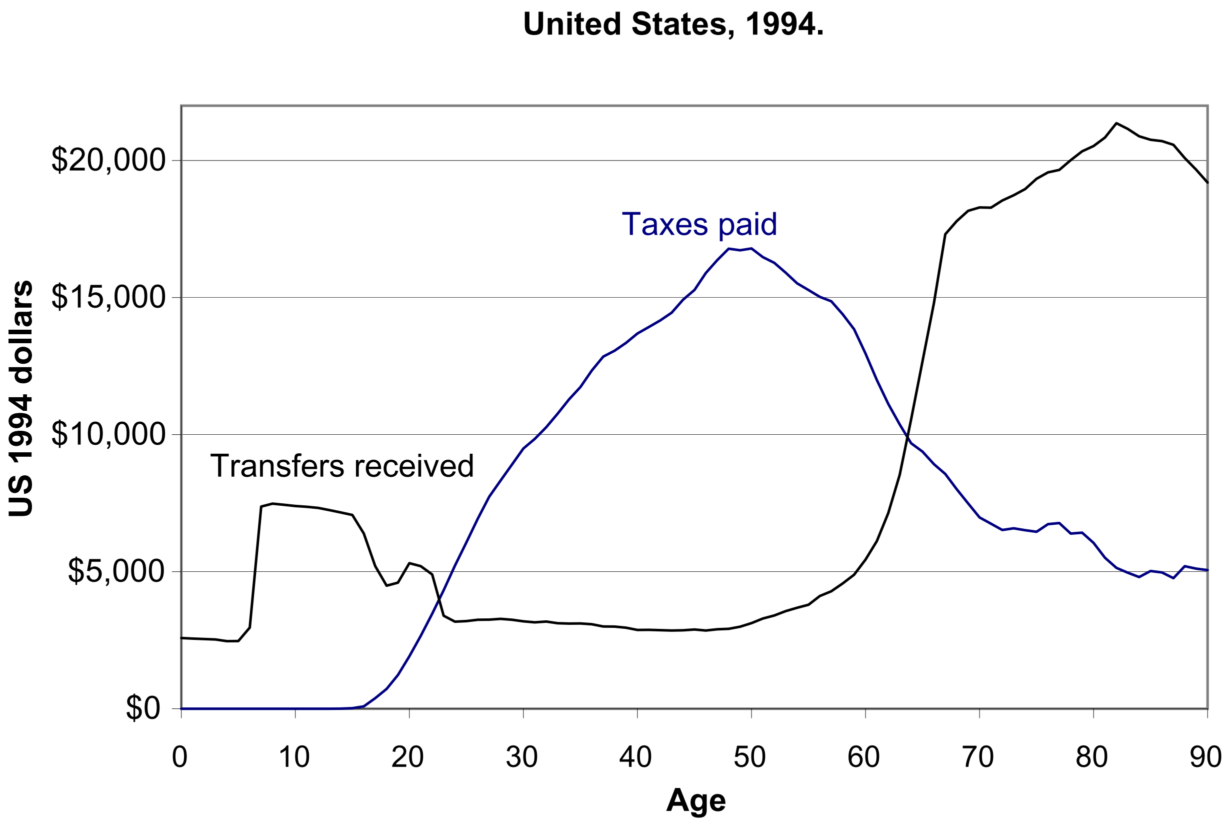


Figure 3. Age schedule of public sector transfers received and taxes paid per person in the U.S. and India



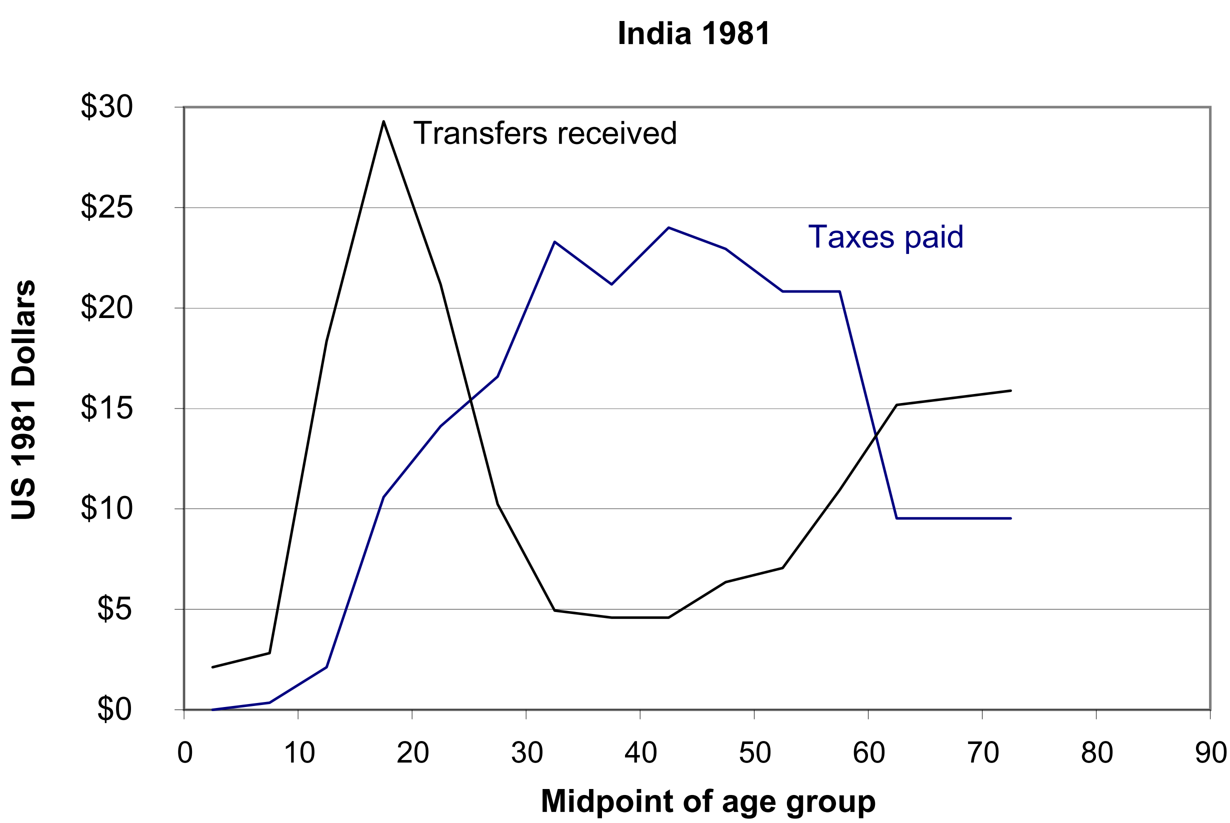


Figure 4. Direction of public sector transfers: Difference between the average ages of receiving public sector transfers and of paying taxes.

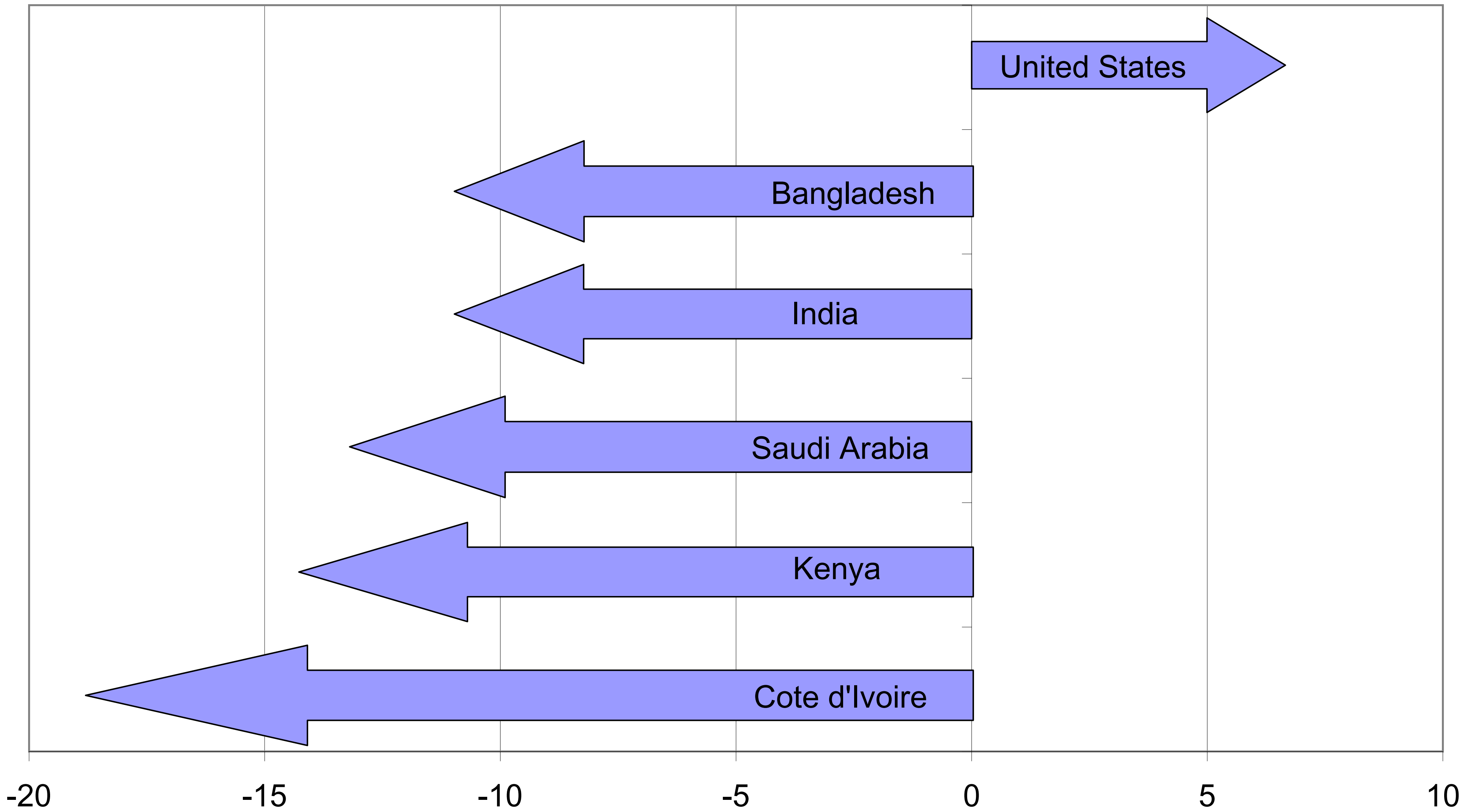
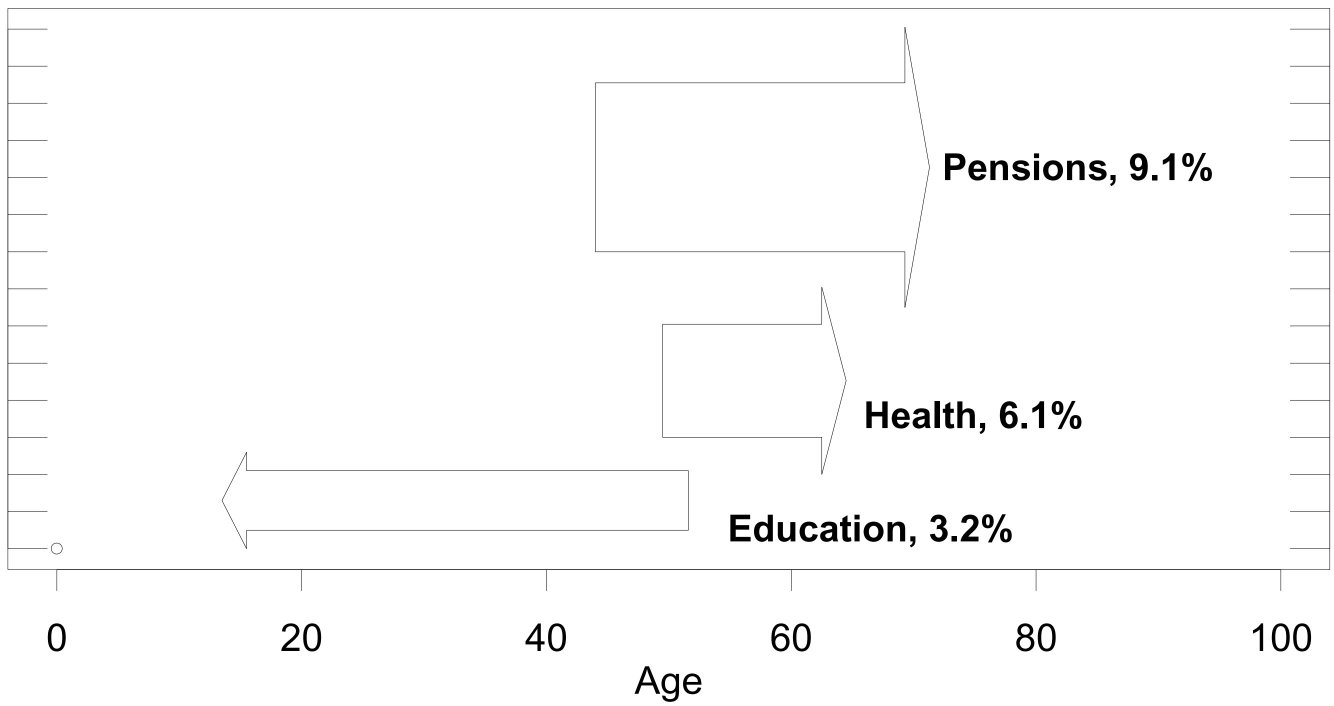
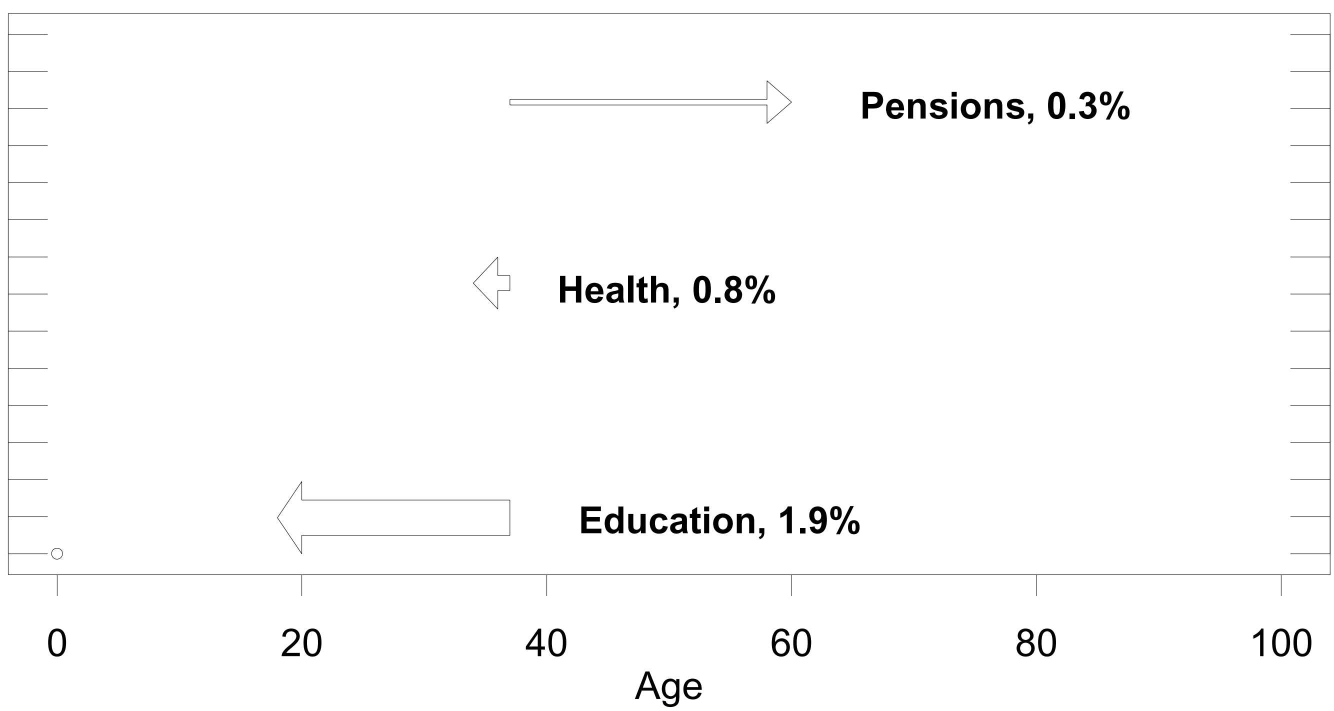


Figure 5. Direction and size (% of per-capita GDP) of public sector transfers in the United States and India

United States, 1994



India, 1981.



Calculations of resource flows in the US are based on a stationary population, while those for India are based on a stable population.

Figure 6. The trade-off between life cycle benefits and taxes

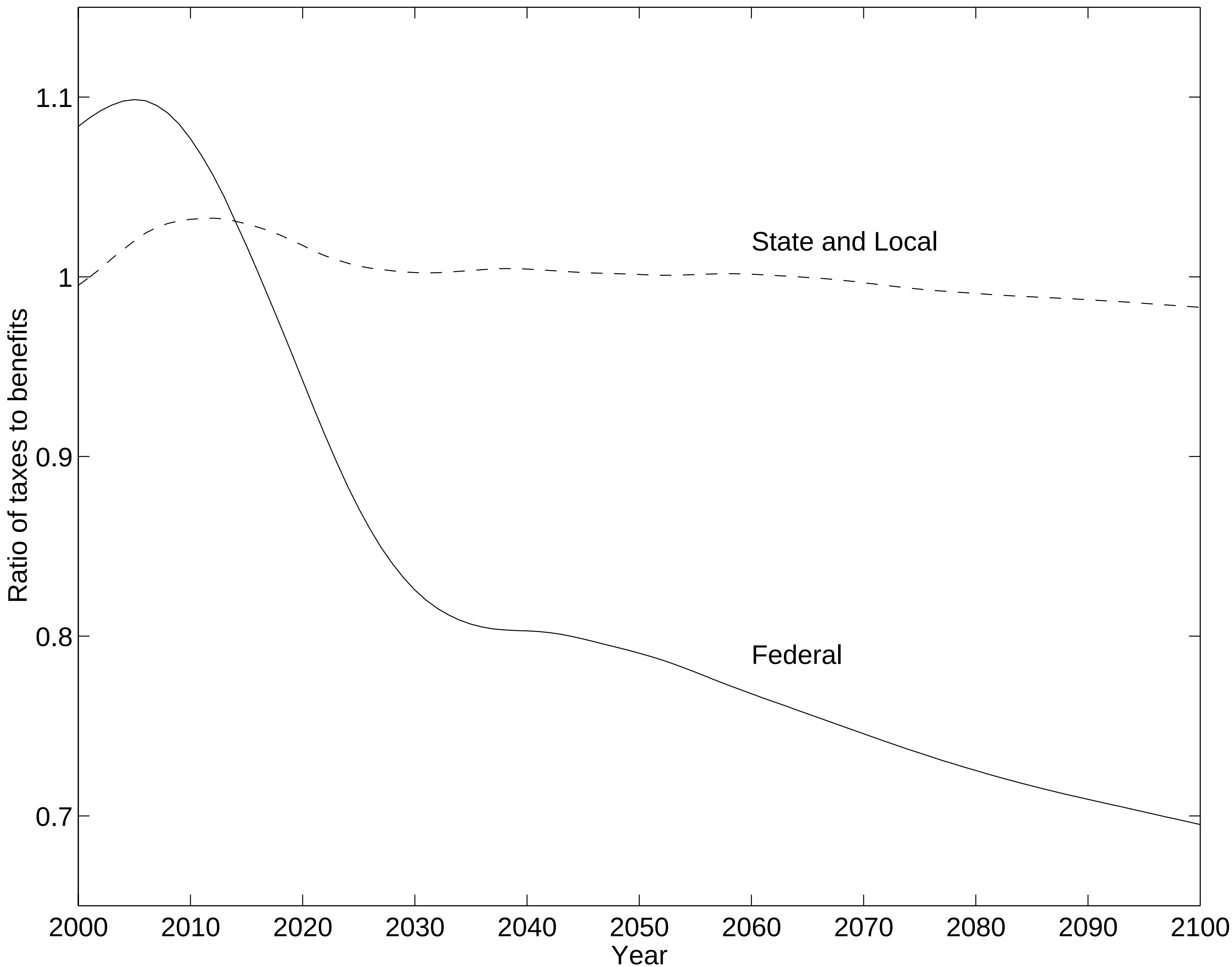
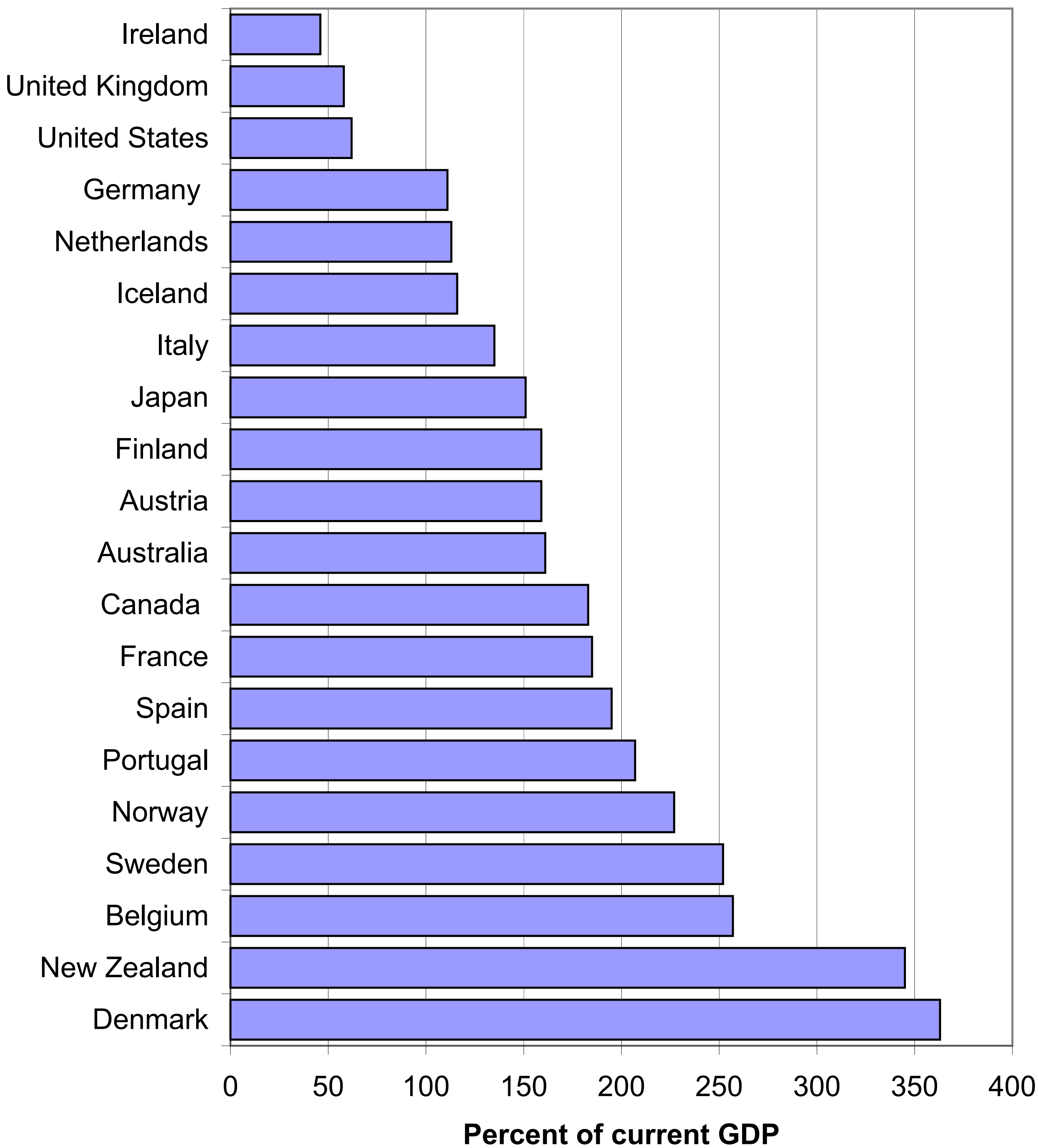
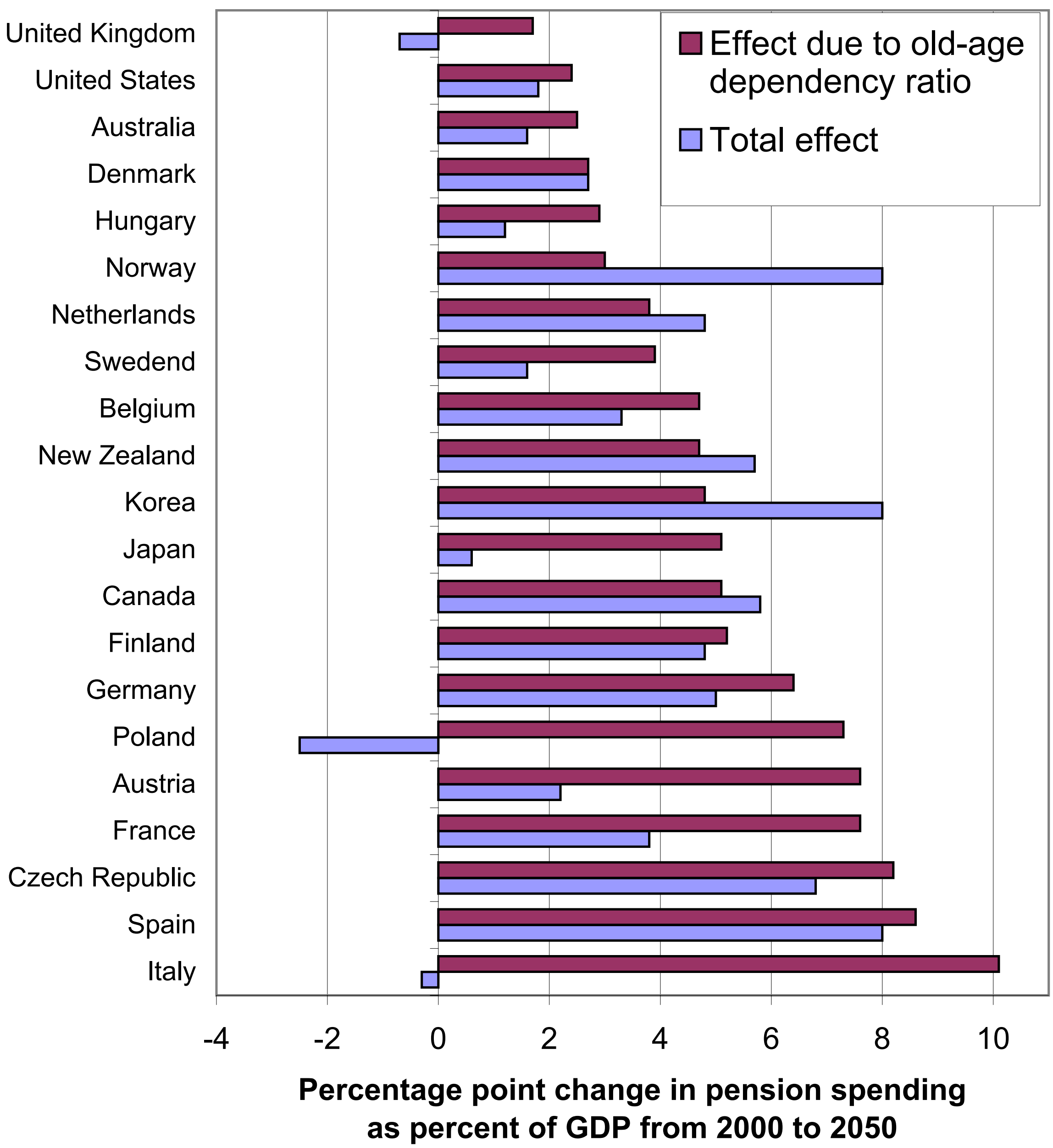


Figure 7. Net present value of pension debt over 75 years as percent of GDP



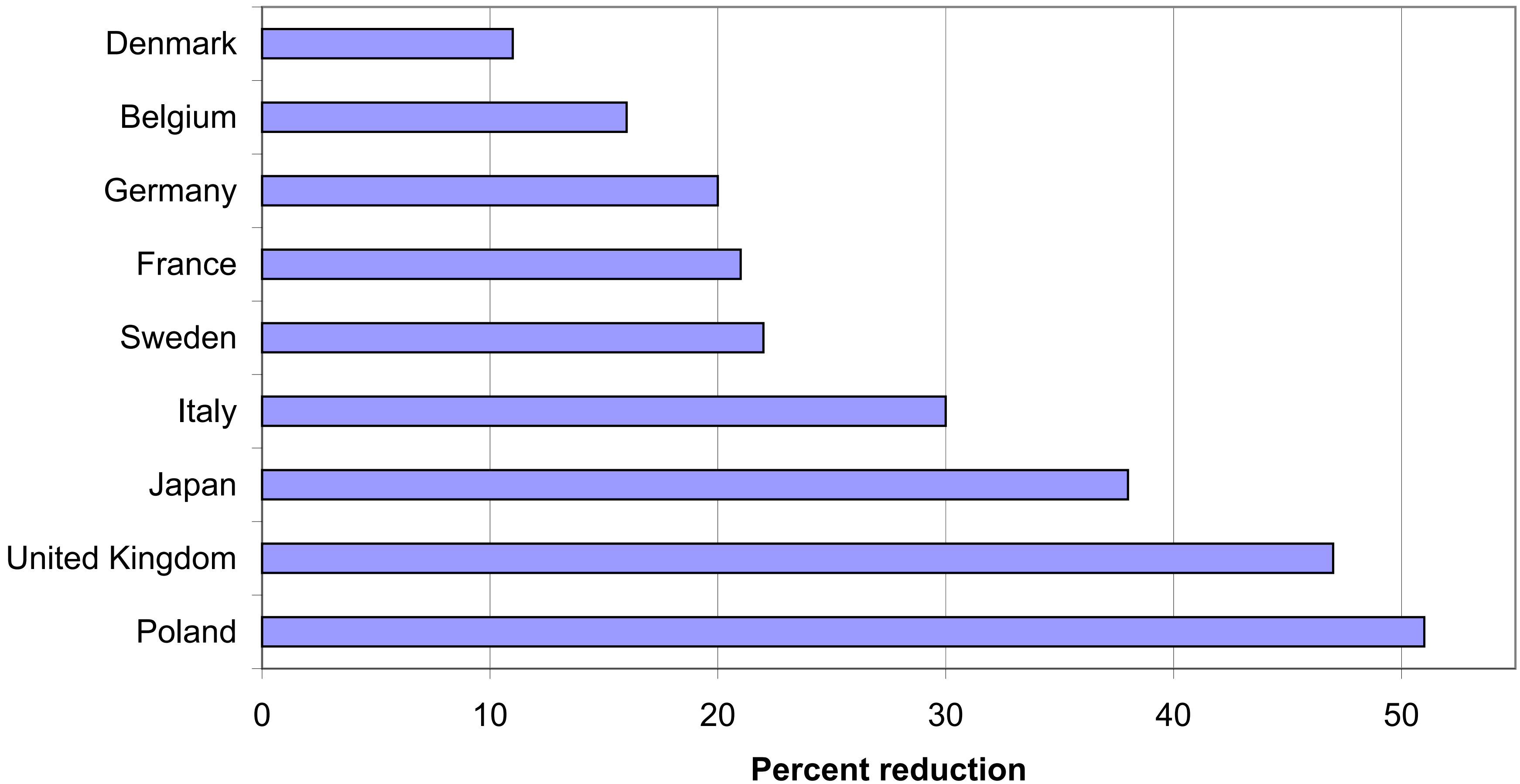
Note: The discount rate is assumed 2 percentage points greater than the rate of GDP growth. Based on Roseveare et al (1996) OECD.

Figure 8. OECD projections of the effect of rising OADR on pension spending are much greater than the total projected pension spending, reflecting anticipated offsets in benefits, eligibility, and employment



Note: Based on OECD projections, reflecting assumption of unchanged policy, including reforms legislated but not yet implemented (Dang, Antolin, & Oxley, 2002, Table 5, page 26).

Figure 9. Projected reductions in the generosity of pension benefits relative to per-capita GDP in selected OECD countries, as incorporated in the OECD projections



Note: Based on OECD projections, Dang, Antolin, & Oxley, 2001, p. 26.