Cross-National Evidence on the Burden of Age-Related Transfers

Gary Burtless
The Brookings Institution

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Introduction

The burden of population aging depends critically on the relative sizes of the aged and working-age populations, the relative consumption of aged and working-age households, and the income sources used to pay for old-age consumption. To the extent that elderly households depend on transfers financed out of the current incomes of working-age families, the trend toward an older population can impose heavy financial burdens on active workers. If aged households pay for their current consumption largely out of their own current earnings or past savings, however, the extra burden associated with population aging may be modest.

Much of the cross-national analysis of the potential burden of aging populations focuses on prospective changes in the ratio of retired to working-age populations, that is, the old-age dependency ratio. Less attention has been directed toward measuring cross-national differences in the actual support that aged households derive from working-age households. This paper examines international differences in sources of support for old-age consumption. How much consumption is financed with aged households' own earnings and saving? How much depends on transfers from the working-age population?

Aged households in all industrialized countries derive a large fraction of their incomes from public pensions and government transfers, but countries differ widely in the proportion of old-age income that is provided through public budgets. Older people in the United States obtain a smaller percentage of their cash retirement income from transfers and a larger percentage from private income sources, including property income, employer-sponsored pensions, and labor earnings. In a sample of 10 OECD countries, for example, analysts found that the United States ranks second in the percentage of total elderly household income derived from earnings, third in the percentage derived from property and financial assets, and ninth in the percentage derived from government transfers, including public pensions (Rein and Stapf-Finé 2001). Because a large fraction of older Americans own the homes they live in, they also receive a sizeable flow of private housing services that is not reflected in their money income reports.

This paper distinguishes between three basic kinds of financing for old-age consumption:

- Transfers from the public budget and pay-as-you-go pension and insurance programs;
- Own earnings of aged households; and
- Income from savings (including the service flows from home ownership).

Using micro-census information on income for four countries, I derive comparable statistics on the share of old-age income that is derived from net transfers and from aged households' own current earnings and past savings. As a check on these calculations, I ask whether the micro-census reports of consumption flows out of saving can be reconciled with aggregate national statistics on income flows. The estimates suggest that a generous social welfare system does not necessarily generate steep increases in the tax burden as the population grows older, whereas less generous social welfare systems may generate steep increases in required tax rates depending on the age profile of factor incomes and of government benefit generosity.

Old-age dependency burden

A common way to measure the burden imposed by the aged on the working age population is to calculate the ratio of old to the number of working age adults. Under stylized assumptions regarding the pension formula and work patterns among the young and the old, the trend in the old-age dependency ratio will parallel the trend in the payroll tax rate needed to finance retirement benefits. In a pay-as-you-go pension program, the taxes imposed on current wage earnings are just sufficient to pay for benefits provided to the retired population. Assuming all aged adults receive a pension and all working-age adults are employed, a balanced-budget rule in the pension program requires that current benefit payments must equal tax revenues:

$$(1) \qquad P\, a_2 = t\, W\, a_1$$

where P = Average pension benefit;
W = Average wage;
t = Tax on wages;
a_1 = Proportion of population that is working age; and
a_2 = Proportion of population that is aged.

$$(2) \quad t = \frac{P}{W}\frac{a_2}{a_1}$$

If a pension formula sets the average benefit payment so that it is a fixed percentage of the average wage, the paygo tax rate, t, needed to support the pension program will vary over time in proportion to the old-age dependency ratio, a_2 / a_1. An increasing share of the aged in the population will inevitably boost the percentage of earnings that must be set aside to pay for benefits to the elderly.

Government transfers and other public spending are not provided only to the old. Many children and working-age adults also derive support from government transfers. Nor are the taxes used to pay for transfers imposed solely on wages. Means-tested government transfers and most public health insurance benefits are financed out of general government revenues, which are derived from taxes on personal income, property, and consumption as well as on labor earnings.

If transfers are financed with a proportional tax on all factor income, the balanced-budget tax rate needed to pay for age-related transfers can be expressed as

$$(3) \quad t = \frac{P_{TOT}}{W_{TOT} + R_{TOT}} = \frac{\Sigma\, a_i P_i}{\Sigma\, a_i (W_i + R_i)},$$

where P_i = Average transfer benefit received by persons in age group i;
W_i = Average labor income earned by persons in age group i;
R_i = Average capital income earned by persons in age group i;
t = Tax rate on total factor income, $F_{TOT} = W_{TOT} + R_{TOT}$;
a_i = Proportion of population in age group i.

Note that an age group's average factor income, F_i, is simply the sum of its average wage income, W_i, and average capital income, R_i. It is convenient to express the age profile of factor income by reference to the mean factor income received by the age group that receives the highest factor income, say, F_M. M can be interpreted to mean "middle aged," since income from earnings and capital usually reach a peak when people attain middle age. If there are N age groups and we define $f_i = F_i / F_M$, then the age profile of factor income is indicated by the sequence $f_1, f_2, f_3, \ldots, f_M, \ldots, f_N$, where each f_i is the mean factor income in group i expressed as a fraction of the factor income received by a middle-aged person, and $f_M = 1$. Suppose that the average transfer benefit paid to a

particular age group i is also measured relative to the mean factor income received by a middle-aged person. If $ß_i = P_i / F_M$, we can re-write equation (3) as

$$(4) \quad t = \frac{\Sigma\, a_i P_i}{\Sigma\, a_i F_i} = \frac{\Sigma\, a_i ß_i F_M}{\Sigma\, a_i f_i F_M} = \frac{\Sigma\, a_i ß_i}{\Sigma\, a_i f_i}.$$

The paygo tax rate needed to support the transfer system is therefore a function of the age distribution of the population, $a_1, a_2, a_3, \ldots, a_N$, the age profile of factor income, $f_1, f_2, f_3, \ldots, f_N$, and the relative generosity of transfer payments compared to average factor income of the middle-aged, $ß_1, ß_2, ß_3, \ldots, ß_N$. If the age distribution is skewed toward groups with low benefit payments and high factor incomes, the tax needed to finance paygo transfers will be low. As a graying population increases the proportion of people with high benefit requirements and low factor incomes, t must rise.

Measuring income

This paper takes two approaches to measuring the incomes received by different age groups in the population. Under one approach I rely solely on micro-census data to approximate the capital and labor incomes and the paygo transfer incomes received by people classified according to age. The micro-census tabulations in turn provide estimates of the benefit ratios, $ß_i$, and age profiles of factor incomes, f_i, needed to calculate t. The time trend in tax burdens can then be computed using demographic projections of the future population age structure. If the micro-census survey responses were accurate and complete, they would provide a reliable guide for estimating the current tax on factor incomes needed to support paygo transfers. Their usefulness for predicting future tax burdens is more problematical, since future benefit ratios, $ß_i$, and factor income profiles, f_i, may change as a result of population aging. Nonetheless, the projected values of t offer a starting point for assessing a country's potential burden assuming that its economic and political institutions remain unchanged.

Micro-census data suffer from a number of shortcomings that make them inaccurate or incomplete. To compensate for the shortcomings of the survey data, I take a second step to adjust the survey responses to increase the reported income amounts up

to known totals reflected in a country's national income and product accounts (NIPA). These adjustments are much more important for some income sources, such as self-employment earnings and property income, than they are for others. Moreover, under-reporting in household surveys is a more serious problem in some countries than others. After household survey data are adjusted to reproduce income totals shown in each country's NIPA, the estimates of t will be more comparable from one country to the next.

This paper examines 1999-2000 income patterns in four countries participating the Luxembourg Income Study (LIS): Finland, Germany, the United Kingdom, and the United States. These were the only four LIS countries that provided recent income data of sufficient breadth and accuracy so that I could reliably calculate tax burdens. To estimate the critical parameters in equation 4, it is necessary to measure income separately within age groups and to distinguish between income derived from factor income and paygo transfers. The distinction between factor income and paygo transfers is not the same as the usual distinction between income derived from public and private sources. Retirement income that is obtained from a funded pension system, whether the funds are managed in the public or private sectors, represents factor income. The LIS provides detailed information about a variety of public and private income sources. In most cases it is straightforward to distinguish between income sources that represent factor income and those representing paygo transfers. Wage and salary income and most employer supplements to wages and salary represent a return for labor services. I classify self-employment income as labor income, though entrepreneurs' income partly reflects a return on capital. Means-tested benefits and public pensions from unfunded public programs, including the U.S. and German social security systems, the U.K. basic state pension, and the Finnish flat-rate pension scheme, clearly represent varieties of paygo transfers. In contrast, occupational pensions in Germany, the United Kingdom, and the United States are classified as factor income. This classification seems justified for the United States, even in the case of occupational pensions offered by public employers, because the private and public employer-sponsored pension programs are overwhelmingly capital funded (Bosworth and Burtless 2004). Finland's occupational pension system represents a hybrid or partially funded program. I classify one-quarter of Finnish occupational pensions as factor income and three-quarters as paygo transfers.

It would be desirable to measure all income paid to an individual household (or to its agents) that represents returns on capital or labor services. The total should include all compensation paid in behalf of a wage and salary worker, including money and in-kind supplements to ordinary money wages as well as the compulsory taxes or contributions employers are obliged to pay for public social insurance. Supplements to wage income include voluntary and compulsory contributions for occupational pensions and for health, injury, and life insurance. Unfortunately, very few workers can accurately estimate how much their employers pay for these earnings supplements, so the LIS wage data usually reflect gross money wages before subtractions for the employee's own tax payments and social insurance contributions.

In addition to reported interest, dividends, and rental income, capital returns should include the investment income earned on insurance company and pension fund reserves held in behalf of individual survey respondents. Not surprisingly, few respondents know the value of these income items, so they are not reflected in the LIS data file. The capital income of a homeowner should include all or part of the flow of housing services that the owner derives from ownership of a home. In the case of Finland, Germany, and the United States, the LIS files include estimates of the return that homeowners derive as a result of ownership of a house. Unfortunately, the imputations are based on different procedures in different countries. In Finland and Germany the estimates reflect an assessment of the rental income a homeowner would receive if his or her home were rented in the private market. In the United States, the U.S. Census Bureau imputes equivalent rental income based on the assumed financial return that homeowners could earn on the net equity they hold in their homes (that is, the difference between the market value of their home and the balance on their home mortgage). I was able to make an imputation of rental income for U.K. homeowners based on the same procedure used by the U.S. Census Bureau.

Having classified the income items in categories corresponding to labor returns, capital returns, and pay-as-you-go transfers, the next step is to allocate income items to individuals based on their age. Income items representing the great majority of total income, including wages and salaries, self-employment earnings, and occupational pensions, are reported in LIS files on an individual basis. Other income sources,

including many forms of property income and some paygo transfers, are only reported at the household level. Income items reported at the household level were divided equally between the household head and his or her spouse. When a household is headed by a single person, the head is assumed to be the sole recipient of all household income items. If more than one generation of adults lives in the same residence, this procedure can produce a misallocation of some household income items. Since there are comparatively few households containing two generations of adults, it seems unlikely the misallocation will be sizeable.

Table 1 shows estimates of factor incomes and paygo transfers in 1999 or 2000 for the four countries included in this study. The income totals reported in rows 1, 3, 5, 7, and 8 are estimates derived from the LIS files. They were obtained by multiplying LIS respondents' income reports by the population weights contained in the LIS file and then summing to find implied income totals. Lines 2, 4, 6 and 9 show equivalent national income totals derived from the OECD National Accounts data base. A comparison of lines 1 and 2, for example, allows us to see how much of the aggregate employee compensation recorded in the NIPA is reflected in LIS wage and salary reports. The difference between the aggregate totals does not necessarily reflect income under-reporting in the LIS file. As noted above, employee compensation includes employer social contributions and supplements to wages that are not reflected in the money wages received by employees.

The lower panel of Table 1 shows direct comparisons between LIS income items and equivalent items in the NIPA. Wages and salaries reported in LIS represent 76 percent to 81 percent of the compensation recorded in NIPA. This implies that 24 percent to 19 percent of factor income derived from wage and salary employment is missed in the LIS files. The percentage of aggregate income missing in the LIS is often much bigger for other income items. Moreover, the percentage of missing income varies across countries. Self-employment income appears to be very well reported in Finland and the United Kingdom, but it is subject to greater under-reporting in Germany and the United States. The lower panel also shows wide national differences between capital income flows reported in the household surveys and the NIPA. Obviously, any adjustment of the LIS capital income reports to bring them closer to the aggregate income

flows in the NIPA will substantially boost the measured incomes of capital owners in Germany and the United States.

The bottom row in Table 1 shows the percentage of NIPA-recorded government transfer payments that are reflected in the LIS files. Transfer incomes are apparently better reported in Finland and the United Kingdom than they are in Germany and the United States. Part of the reason for the difference between LIS income reports and the NIPA is the difficulty of measuring many government transfers, especially in-kind transfers such as medical insurance and health care. The U.S. Census Bureau imputes estimates of the value of government-provided health insurance under the Medicare and Medicaid programs. If these imputations were included, the total government transfer payments included in the LIS files for the United States would rise to $776.2 billion, or about three-quarters of the government transfers shown in the NIPA. Estimates of this kind are not available for the other three countries. Because health care transfers are one of the most important excluded categories of government benefits and because these transfers are disproportionately received by older citizens, it is likely that the LIS files understate the relative importance of transfer income to aged households. This issue can be examined in the case of the United States, because the LIS / CPS household data files contain estimates of the insurance value of government medical benefits.

Adjustment for under-reporting. The aggregate incomes reported in the LIS income files are smaller than income totals shown in the NIPA (see Table 1). Since the shortfall in aggregate income differs across countries and across different types of income, it is useful to check the LIS estimates using income totals adjusted to reflect possible under-reporting in the household surveys. To perform this check I assume that under-reporting represents a constant proportional share of income across all age groups, while the proportional amount of under-reporting differs across different types of income. Most of the data needed to make this adjustment for under-reporting are displayed in Table 1. The adjustment for under-reporting of wage and salary compensation, for example, can be calculated using information in rows 1 and 2 of the table. Row 1 shows aggregate wage and salary income reported in the LIS data file, and row 2 shows total compensation, including wage supplements and mandatory contributions for social insurance, reported in the NIPA. To compensate for the LIS income shortfall, I multiply

LIS wage and salary income amounts by the ratio of the entries in row 2 and row 1. For example, just 78 percent of the compensation paid to wage and salary workers in Finland is recorded as wage and salary income in Finland's LIS file. By increasing LIS-reported wage and salary income by 29 percent, the adjusted total wage and salary income in the LIS file would exactly match the wage and salary compensation reported in the NIPA. This procedure is used to adjust LIS labor and transfer payment incomes and most income from capital. Except for the United States, I was not able to find NIPA estimates of the flow of rental services from owner-occupied homes. I therefore included LIS and Census Bureau estimates of these flows without any adjustment when calculating a household's total capital income. Thus, except for rental incomes on owner-occupied homes, capital and labor incomes reported in LIS are adjusted to bring the implied aggregate totals up to corresponding estimates in a country's NIPA.

The plausibility of these adjustments depends on the assumption that the aggregate incomes reported in the NIPA are more accurate than those reflected in the unadjusted LIS survey files. The adjustment to LIS incomes will be valid to the extent that income under-reporting in the household data files is proportionately the same, separately for each type of income, across all age groups. If under-reporting of a particular income item represents a more severe problem for aged households, the adjustment will produce an understatement of the relative incomes of the aged.

The age distribution of factor income and transfers

Figure 1 shows the age distribution of factor income in the four countries, using the average factor income received by 45-49 year-olds as a benchmark for comparison. The tabulations reflect LIS income reports after adjustments to reflect the total incomes recorded in the NIPA. Readers interested in comparing these estimates with unadjusted estimates based solely on LIS income reports are referred to the longer version of this paper, cited on the title page. On the whole, the NIPA adjustments have little effect on our interpretation of cross-national differences in the age profile of factor incomes. Average incomes are shown for people in five-year age groups starting at age 15. Children under 15 receive virtually no capital or labor income, and hence they are excluded from these and all subsequent calculations.

The age profile of factor income is broadly similar in all four countries. Factor income reaches a life-cycle peak shortly before age 45 in Finland, between ages 45-49 in Germany, and at a slightly older age in Britain and the United States. The age profile shows a characteristic pattern of steep increase between age 15 and early middle age, a leveling out or small increase between the late 30s and early 50s, and then a steep decline after age 55. Nearly all of the decline after age 50 is traceable to a fall in labor earnings. Note that the profiles displayed in Figure 1 reflect only the factor incomes actually earned by adults at successive years of age. Because of income sharing among relatives, the estimates do not necessarily reflect the actual incomes available to pay for consumption in any age group. Young adults earn very little factor income, since many of them are enrolled in school or have just begun to earn wages for the first time. Part or all of their consumption may be financed from the factor incomes received by parents or other middle-aged relatives. Inter-family transfers may also be important to some adults past the age of 65.

The total factor income at each age can be divided between labor and capital income. The LIS interview responses show that labor income falls off more gradually after age 60 in the United States than it does in the other three countries. Americans between 65 and 69 earn labor incomes that are about 20 percent of the average factor income received by Americans who are between 45 and 49 years old. The comparable percentage in Britain, Finland, and Germany is just 5 percent. Even between ages 75 and 79 Americans earn labor incomes that are equivalent to 6 percent of the average factor income of 45-49 year-olds, whereas the comparable percentage in Britain, Finland, and Germany is only about 1 percent. This means that U.S. labor income is somewhat less sensitive to shifts in the old-age dependency ratio than earned income in other rich countries.

Factor income from capital is derived from interest, dividends, rent, funded pension payments, and imputed rent on owner-occupied homes. Unlike labor income, capital income continues to rise through ages 70 or 75. Capital income is relatively more important for older adults in Britain and the United States than it is in Finland or Germany. According the LIS interview responses, in the United Kingdom and the United States the average capital income reported among people past 65 is more than twice as

high as it is among adults between 45 and 49. Capital incomes received by the aged in Finland and Germany are relatively much smaller. One implication of this comparison should be obvious. If the future age distribution of capital income remains similar to the distribution observed in 2000, the trend toward an older population will boost capital income more in the United Kingdom and the United States than it does in Finland or Germany.

Figure 1 shows sizeable inter-country differences in the profile of factor incomes, especially past age 55. U.K. and U.S. residents receive significantly higher factor incomes than residents of Finland and Germany once they reach late middle age. According to income reports in the LIS files, the total factor income received by 70-74 year-olds represents 38 percent of the average factor income of an American between ages 45 and 49. In Germany and Finland the comparable percentages are just 13 percent and 23 percent, respectively. If this age pattern persists over the next half century, Germany and Finland can expect to see a dramatic fall in the availability of factor income as their populations age. The decline in factor income associated with population aging will be more gradual in the United Kingdom and the United States, even if the trend toward an older population is the same in all four countries.

Pay-as-you-go transfers. The tax burden of supporting paygo transfers depends on the relative generosity of the transfer system as well as the age distribution of factor incomes. In equation 4 the age profile of transfer generosity, $ß_1, ß_2, ß_3, \ldots, ß_N$, measures average benefit payments received by an age group, *i*, relative to the average factor income received by a middle-aged person, here assumed to be someone between ages 45 and 49. Consider estimates of $ß_i$ that are based on unadjusted interview responses in the LIS micro-census files (not shown). These estimates suggest that Finnish transfers are uniformly the most generous up through ages 65-69, at least when generosity is measured relative to the average factor income received by 45-49 year-old adults. At ages past 70 German transfers are relatively the most generous. Interestingly, at ages between 15 and 54 British transfers are relatively more generous than those provided by Germany or the United States. By age 65-69 U.K. transfers are significantly less generous than the benefits provided by the other two European countries. Transfers in the United States are notably less generous for working-age adults than they are in the

three European countries, but the relative generosity of U.S. transfers to elderly depends crucially on whether imputed Medicare and Medicaid are included in the estimate of paygo transfers. When Medicare and Medicaid are included, transfers to America's elderly are more generous than those provided to the elderly in the United Kingdom, though less generous than transfers in Finland or Germany.

Any realistic measure of paygo transfers ought to include benefits provided in the form of public health insurance, but as noted above the LIS micro-census files do not include imputations of health insurance transfers for households in the European countries whereas such imputations are available for U.S. respondents. Health insurance transfers are obviously significant in all four countries. Public spending on health in 2000 was 5.0 percent of GDP in Finland, 5.8 percent in the United States, 5.9 percent in the United Kingdom, and 8.3 percent of GDP in Germany (OECD 2004). Most public spending on health care consists of payments to support medical insurance for individuals. Since the cost of providing health care and the value of insurance transfers rises steeply with age in all developed countries, government transfers will be more heavily tilted toward the aged when public health insurance is included than when it is excluded (Cutler and Sheiner 2001 and Sheiner 2004).

To reflect the potential importance of health insurance transfers, I made two estimates of the age profile of transfer income in the United States. My basic U.S. tabulation, labeled "USA," is based solely on the age profile of respondents' cash and near-cash transfer income, and ignores the Census Bureau imputations of insurance benefits under the Medicaid and Medicare programs. These baseline U.S. estimates are therefore calculated in the same way as the equivalent estimates for Finland, Germany, and the United Kingdom. My alternative estimate of the age profile of U.S. transfers, labeled "USA (2)," includes the value of Medicare and Medicaid health insurance for people who are insured by those programs. When these estimates of health insurance transfers are added to other paygo transfers, it is possible to obtain a more complete assessment of the age profile of U.S. public transfers. In both cases, the LIS data on transfer income are adjusted to the same total amount of transfer income, namely, to the aggregate amount of "social benefits, receivable" recorded in the NIPA.

Figure 2 shows that Finland and the United Kingdom are the most generous countries in transferring incomes to the young and the middle-aged, but Britain ranks lowest in generosity toward the elderly. Both the United States and Germany appear more generous toward their aged populations than Britain. Note, however, that a very large upward adjustment of transfer incomes is needed to bring LIS incomes in the United States and Germany up to totals recorded in their NIPA statistics (see bottom row in Table 1). In contrast, transfer incomes are reasonably well reported by Finnish and British respondents in the LIS household surveys. Obviously, the relative generosity of transfer incomes received by the aged appears greater when the age profile is measured using information on Medicare and Medicaid payments as well as other cash and near-cash transfers. Thus, the line labeled "USA (2)" shows a steeper age profile than the line labeled "USA."

Although the income adjustments have some effects on estimates of the age profile of transfer generosity, a couple of conclusions seem valid regardless of whether adjusted or unadjusted income estimates are used. First, the United States offers less generous benefits than Finland or Germany at every age. This implies that the tax on factor income needed to support transfers will be higher in Finland and Germany than in the United States irrespective of the demographic profile of the population. So long as the countries have the same population age structure, the tax burden of supporting paygo transfers will be higher in Finland and Germany that it is in the United States, and this will be the true whether the average age of the population is 25, 45, or 65. Second, the age profile of public transfers is more heavily tilted toward the aged in Germany than it is in Finland, and it is more heavily tilted toward the aged in the United States than in the United Kingdom. British transfers to working-age adults are relatively more generous than are equivalent transfers in the United States, but the *increase* in benefit generosity after adults reach age 65 is relatively greater in the United States than it is in Britain. These differences in the age pattern of benefit generosity imply that a shift in the age structure toward an older population will cause a proportionately faster increase in the dependency burden in Germany compared with Finland and in the United States compared with the United Kingdom.

The dependency burden of an aging population

The results in the previous section can be used to derive estimates of the tax on factor income needed to support paygo transfers. The calculations can be performed based on the current population age structure or on the predicted age structure in some future year. As a starting point it is informative to compare tax burdens when countries are assumed to share a common population age structure. This kind of comparison eliminates differences in measured tax burdens caused by fact that the age distribution of the population differs across countries. To perform the required calculations, I computed the unweighted average population age structure of Finland, Germany, the United Kingdom, and the United States using the population weights reported in the 1999-2000 LIS data files. An appendix table shows the results of these calculations when estimates of factor and transfer incomes are based on the income reports in the LIS files adjusted to reflect NIPA income totals.

The appendix table shows the age distribution of factor income, transfer income, LIS-reported tax payments, and net disposable income when the population is divided into four age groups – young adults (ages 15-34), the middle-aged (ages 35-54), the near-aged (ages 55-64), and the elderly (ages 65 and older). Estimates of average income and tax payments in a particular age group are measured relative to the average factor income received by a middle-aged person, that is, someone between ages 35 and 54. (The average factor income received by people between 35 and 54 is always equal to 100, by definition.) The estimates of factor income reported in the appendix table confirm the results displayed in Figure 1. Aged adults in Britain and the United States receive higher factor incomes than their counterparts in Finland and Germany. The factor income advantage of aged Britons relative to Finns and Germans is entirely due to higher capital income, while that of older Americans is due to both higher capital income and higher labor income. Among near-aged adults, Americans earn significantly higher factor incomes than their counterparts in all three European countries. Most of their income advantage reflects the fact that Americans between 55 and 64 receive much more labor income, mainly because of higher employment rates. The LIS survey files show that 54 percent of Americans between ages 60 and 64 derive income from working. The

comparable employment rates in Finland, Germany, and the United Kingdom are 29 percent, 36 percent, and 31 percent, respectively.

The results in the appendix table also confirm the sizeable role of paygo government transfers as an income source in Finland and Germany as compared with the United Kingdom and the United States. Britons older than 54 can expect to receive significantly smaller government transfers than their counterparts in Finland or Germany. Young, middle-aged, and near-aged adults in the United States receive very small transfers, but America's aged fare better. Government transfers to the aged are relatively more costly in the United States than they are in Britain, though less costly than old-age transfers in Finland and Germany.

The LIS information on tax withholdings permits us to calculate average disposable income, that is, gross factor income and government transfers minus tax payments. Interestingly, the net incomes of the aged and near-aged are higher than those of young adults in all four countries (see the appendix table). Average citizens 65 and older receive relatively high disposable incomes in Germany and the United States and relatively low incomes in Britain and Finland. In Britain and the United States, a much larger percentage of disposable income received by the aged and near-aged is derived from factor income, while in Finland and Germany a much larger fraction is received as government transfers. In all four countries the aged pay very low taxes. The information about factor income and government transfers can be combined to calculate the tax rate on factor income needed to pay for transfers (see appendix table). When a common population age structure is assumed for the four countries, the implied tax rates are 30 percent in Finland, 28 percent in Germany, and 17 percent in the United Kingdom. The implied U.S. tax rate is slightly less than 14 percent.

To see how these tax rates will be affected by anticipated population aging, we can derive estimates of t using forecasts of the future age distribution of national populations. My estimates are based on population projections of the U.S. Census Bureau (2004). Results for the four countries are summarized in Table 2. Two sets of estimated tax rates are shown for each country. The rates listed in the columns labeled "a" are the paygo tax rates a country would face if its population age structure in each indicated year is the unweighted average age structure of all four countries. The rates

listed in columns labeled "b" are the tax rates countries will face given the national population age structure predicted by the Census Bureau for the indicated year. By comparing the tax rates in the "a" columns for the four countries, we can see which countries have the most burdensome transfer systems and which have an age distribution of factor incomes and paygo transfers that is particularly sensitive to population aging.

As should be obvious from the discussion so far, Finland and German have the most burdensome benefit systems, and Germany and the United States have a combination of f_i and $ß_i$ that makes their tax burdens more highly sensitive to increases in the average population age. Assuming a common age structure and common trend toward population aging, t would rise 46 percent in Finland and 45 percent in the United Kingdom between 2000 and 2050, but it would increase 55 percent in the United States and 64 percent in Germany. The faster increase in taxes in Germany and the United States is mainly the result of a public transfer system that is more heavily tilted in favor of the aged. That is, the gap between transfer benefits received by the aged, on the one hand, and the non-aged on the other, is proportionately bigger in Germany and the United States than it is in Finland or the United Kingdom. The tilt in the U.S. benefit structure is large enough to offset an age profile of U.S. factor income that is also unusually tilted toward the aged. Compared with their counterparts in the other three countries, Americans older than 55 receive unusually large factor incomes. This means factor income (and the tax base) will fall more gradually in the United States than in Finland or the United Kingdom when the population grows older. Nonetheless, the tax needed to support paygo transfers will rise proportionately faster in the United States than in either Finland or Britain.

The Table 2 entries under columns labeled "b" show the trend in tax rates required to support paygo transfers based on each country's predicted population change. In spite of a paygo benefit structure that is tilted toward the aged, the United States is predicted to see the smallest proportional rise in tax burdens. Between 2000 and 2050, t will rise just 41 percent in the United States compared with 45 percent in Finland, 57 percent in the United Kingdom, and 63 percent in Germany. The main reason for the faster rise in Finnish and U.K. tax rates is the faster aging of their populations compared with that of the United States. The German tax rate will rise faster than the U.S. rate

because of faster population aging and because the age distribution of factor incomes and transfer benefits in Germany makes the tax rate more sensitive to a shift in the population age structure.

Conclusion

While all industrial countries will grow older over the next half century, the burden of providing public support to their aging populations will not rise by the same fraction. One reason is that their populations will grow older at different rates. Countries with comparatively high fertility and immigration, such as the United States, will see a slower shift in the age structure compared with countries where fertility rates are lower and immigration is less common. Even ignoring the effect of differences in the pace of population aging, industrial countries would experience widely varying burdens as a result of population aging. This paper has highlighted the role of differences in the age structure of factor incomes and of transfer payment generosity in determining the future burden of public support for the aged. The elderly and near-elderly in some countries earn comfortable incomes from their own labor and investments. In other countries the aged receive much smaller factor incomes, and they depend more heavily on transfer payments from the government. The age profiles of factor income and of transfer payment generosity taken in combination determine the taxes that citizens must pay out of their capital and labor incomes to support transfer recipients.

Generous social welfare states in continental Europe offer more costly and burdensome paygo transfers to their aged citizens than comparable benefits provided by the United Kingdom or the United States. The generous package of benefits offered in continental Europe will require heavier taxes on factor incomes than are needed in the English-speaking countries regardless of the age structure of the national population. At the same time, factor incomes in continental Europe tend to fall off much more rapidly in late middle age than is the case in either Britain or the United States, in part because labor incomes decline faster after age 55 than they do in the United States and in part because the capital incomes of Continental Europe's aged population are significantly smaller than is the case in either Britain or the United States. This pattern of factor income

payments will mean that the future availability of factor income will fall off faster in Continental Europe than in the English-speaking countries as the population grows older.

The estimates reported in this paper show, however, that population aging will have a relatively bigger impact in countries where the age profile of benefits is more heavily tilted in favor of the elderly. Countries with relatively low overall generosity in social welfare, such as the United States, may have benefit systems that are steeply tilted in favor of the aged. High-generosity systems, including the one offered in Finland, may offer public benefits that are less favorably structured in behalf of the elderly. Among the countries considered here, Germany and the United States have social insurance and assistance systems that provide relatively generous benefits to the aged and less generous transfers to the non-aged.

My estimates of future tax burdens are based on the assumption that the current age profiles of factor incomes and transfer benefits will remain unchanged in the future. Although this assumption provides a sensible starting point for comparing countries and transfer systems, it is not very credible in the long run. Estimates in this paper imply that the tax on German factor income needed to support paygo transfers could approach 50 percent within the next half century. The actual tax burden to support all state spending would be higher than this, because German taxpayers will also need to pay for public schools, national defense, and other government obligations. The age profile of factor incomes and paygo transfers will probably change long before German tax rates reach the level implied by these calculations. Public pensions could be scaled back or delayed, and workers could be encouraged to accumulate more savings to help pay for their own retirement. On the other hand, some trends may boost the tax rates needed to support paygo transfers. In the United States, expenditures on medical care are rising faster than spending on other kinds of household consumption. Since much of this spending, especially by the elderly, is financed out of public budgets, it is conceivable that the future age profile of transfer benefits will become even more tilted in favor of the aged.

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Table 1. Aggregate Incomes Reported in LIS Data Files and in National Income and Product Accounts, 1999-2000

	Finland Bil. Euros (2000)	Germany Bil. Euros (2000)	United Kingdom Bil. Pounds (1999)	United States Bil. Dollars (2000)
(1) Gross wage and salary income (LIS)	48.8	839.4	377.0	4,701.5
(2) Employee compensation (NIPA)	62.8	1,099.1	495.8	5,782.7
(3) Self-employment income (LIS)	5.1	122.5	53.1	345.2
(4) Surplus of unincorporated businesses owned by households (NIPA)	5.3	231.4	54.2	728.4
(5) Income derived from capital, including funded pensions (LIS)	6.3	60.0	60.8	583.9
(6) Property income, receivable (NIPA)	7.8	309.0	119.0	1,461.6
(7) Imputed income from owner-occupied homes (LIS) /a/	5.0	43.8	53.1	459.9
(8) Government transfers, except funded pensions (LIS)	19.6	312.4	102.8	533.6
(9) Social benefits, receivable (NIPA)	23.5	532.7	120.8	1,044.1
Income recorded on LIS as a percentage of amount in NIPA:				
Wage and salary compensation: *Row (1) / Row (2)*	78	76	76	81
Self-employment income: *Row (3) / Row (4)*	96	53	98	47
Capital income: *Row (5) / Row (6)*	81	19	51	40
Total factor income: *[Rows (1) + (3) + (5) + (7)] / [Rows (2) + (4) + (6)]*	86	65	81	76
Government transfers or social benefits: *Row (8) / Row (9)*	83	59	85	51

Source: Author's tabulations of LIS data files and OECD and U.S. estimates of national income and products accounts.

/a/ Ignores cost of property taxes. U.K. estimates derived from author's tabulations of 1999 British Household Panel Survey.

Table 2. Effect of Population Aging on Tax Rate, t, Needed to Finance Paygo Transfers, 2000-2050

Percent

	Finland		Germany		United Kingdom		United States	
Year	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
2000	29	29	28	30	17	17	14	13
2010	32	34	31	33	18	19	15	13
2020	36	39	36	37	20	20	17	15
2030	41	41	42	44	22	23	19	17
2040	42	42	45	47	23	26	21	18
2050	43	42	46	49	24	27	21	18
t in 2050 as a percent of t in 2000	146	145	164	163	145	157	155	141

Source: Author's tabulations of LIS and NIPA data files as explained in text and population projections of the U.S. Census Bureau.

(a) The predicted age structure is assumed identical for each country and reflects the four-country average age structure.

(b) Estimated t is based on the predicted age structure for the indicated country.

Appendix Table. Gross and Net Incomes by Age Group in Four Countries: Estimates Based on LIS Income Reports Adjusted to Reflect NIPA Income Totals

Percent of average factor income received by 35-54 year-olds

	Age group				
	15-34	**35-54**	**55-64**	**65-94**	**15-94**
Finland (2000)					
Factor income	49	100	62	14	63
of which -- Labor	47	87	47	2	53
Capital	3	13	15	12	10
Transfer income	9	12	28	42	19
Taxes	-22	-45	-31	-9	-29
Net disposable income	36	67	59	47	53
Memo: Implied tax on Finland factor income for Paygo transfers				29.7%	
Germany (2000)					
Factor income	41	100	72	23	63
of which -- Labor	38	86	52	3	51
Capital	3	14	20	20	12
Transfer income	5	9	23	55	18
Taxes	-17	-42	-25	-2	-24
Net disposable income	28	67	69	76	57
Memo: Implied tax on German factor income for Paygo transfers				28.1%	
United Kingdom (1999)					
Factor income	55	100	69	29	69
of which -- Labor	51	84	40	2	52
Capital	4	16	29	27	16
Transfer income	6	8	11	26	11
Taxes	-22	-38	-22	-5	-25
Net disposable income	39	71	58	51	55
Memo: Implied tax on U.K. factor income for Paygo transfers				16.6%	
United States, Including Imputed Public Health Insurance (2000)					
Factor income	45	100	89	46	71
of which -- Labor	41	83	61	11	54
Capital	4	17	28	35	17
Transfer income	3	4	8	35	10
Taxes	-11	-24	-21	-6	-16
Net disposable income	37	80	77	74	65
Memo: Implied tax on U.S. factor income for Paygo transfers				13.8%	

Source: Author's tabulations of LIS data files and OECD and U.S. estimates of national income and product account data as explained in the text.

Note: Age distribution of population is normalized using average population structure in the four countries.

Figure 1. Age Profile of Transfer Income in Four Countries with Adjustments to Reflect NIPA Total Income, 1999-2000

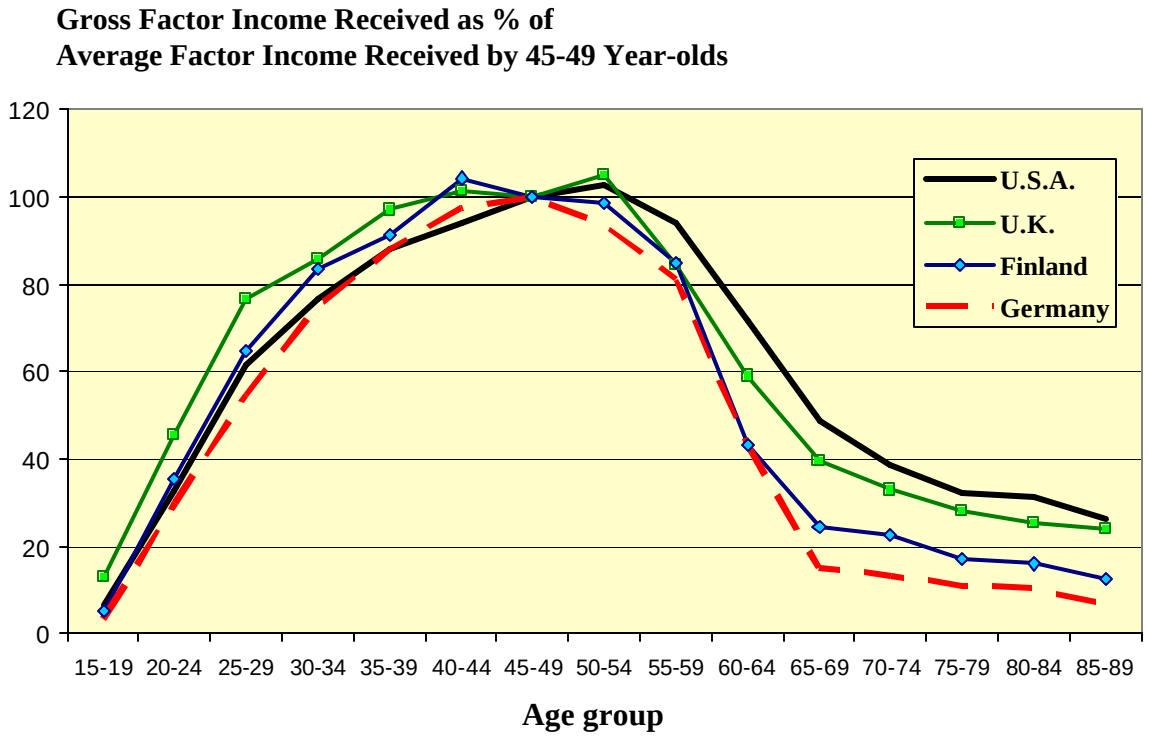
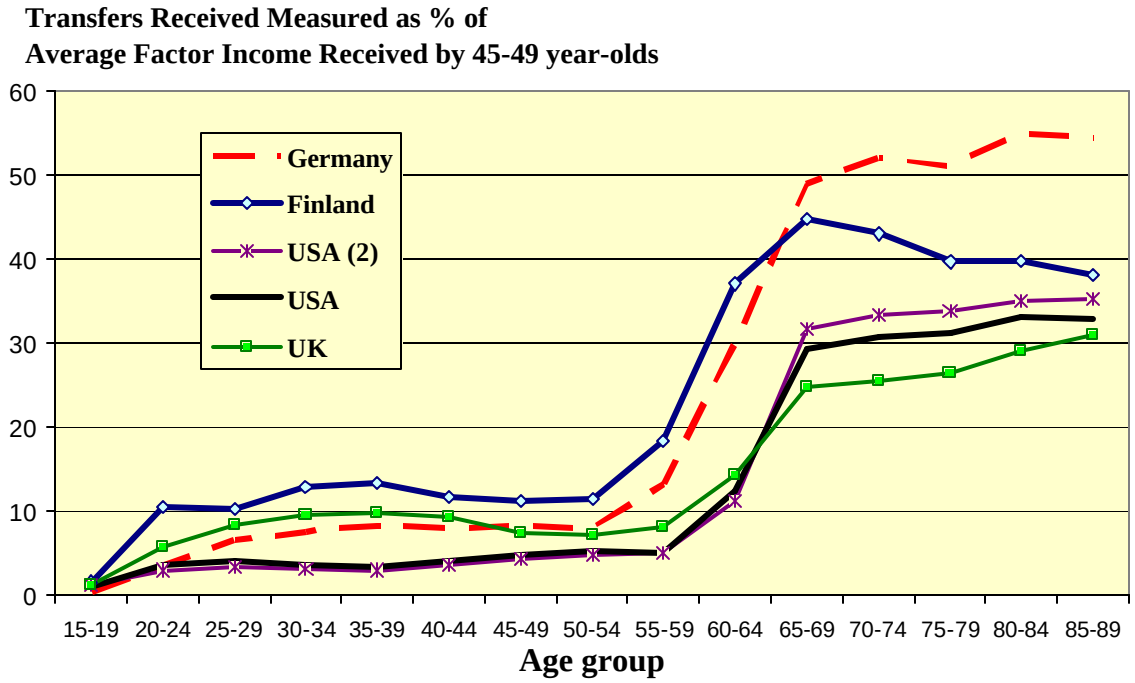


Figure 2. Age Profiles of Factor Income in Four Countries with and without Adjustments to Reflect NIPA Total Income, 1999-2000



Source: Author's tabulations of LIS and NIPA data files as explained in text.