

First Draft
February 9, 2004

Pension Reform and Labor Force Exit: Cross-National Evidence

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February 9, 2004

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* Prepared for the “International Forum of the Collaboration Projects” meetings in Tokyo, Japan, February 2004, sponsored by the Economic and Social Research Institute (ESRI). This is part of a two-year project in collaboration with Barry Bosworth of the Brookings Institution. Financial support for the research was received under a grant from ESRI. We gratefully acknowledge the research assistance of Alice Henriques, Pablo Montagnes, and Dan Theisen. The views are solely those of the authors and should not be ascribed to ESRI or the Brookings Institution.

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The populations of all the industrialized countries are growing older. Over the next three decades the combined effects of declining fertility and rising longevity will significantly increase the proportion of aged and near-aged people in the overall population. Because pensions and old age health insurance are largely funded out of public budgets, increases in the percentage of the population past retirement age must eventually cause steep increases in the fraction of government budgets devoted to old age consumption and a rise in the level of public spending.

Public spending obligations and the burden of supporting an older population have increased not only because the population is growing older but also because of declines in employment among the aged and near-aged. Economists have accumulated persuasive evidence that public pensions have contributed to the trend toward earlier retirement. A pension provides a dependable source of income to workers who have reached a minimum age, such as age 60, but many systems only provide benefits to workers who have substantially withdrawn from the labor force or ceased working in their career job. In these systems, people who continue to work in full-time jobs do not qualify for a pension. This feature of a pension system effectively reduces the net wages workers obtain when they continue to work past the pensionable age. Many of the world's pension systems have the features just mentioned. They provide financial incentives for workers to retire around the pensionable age, and they can inflict sizeable financial penalties on workers who delay their retirement until several years past the pensionable age. Not surprisingly, these features of pension systems have sizeable effects on retirement behavior. They have almost certainly contributed to the trend toward earlier retirement in the world's industrialized countries.

Most people who are knowledgeable about national pension systems recognize they will eventually have to be reformed to restrain the growth of future costs. One possibility is to shrink the size of traditional unfunded defined-benefit programs and replace some or all of their benefits with annuities financed out of a funded defined-contribution retirement program. An advantage of this approach is that it may encourage workers to postpone exit from the labor force. The

structure of defined-contribution pensions provides better incentives for older workers to remain in employment, at least in comparison with the incentives embedded in traditional defined-benefit pensions. Unlike a traditional pension, which can discourage workers from continuing to work after the early or normal retirement age, a defined-contribution pension is more neutral with regard to encouraging retirement at specific ages. Under these circumstances, many advocates of defined-contribution pensions believe that reform of the traditional pension system can improve labor market incentives and encourage workers to remain employed over a longer career. This in turn will reduce the burden of population aging, because fewer old people will be retired and drawing support from active workers; more old people will be working and contributing to the national pension system.

In this paper we survey the trend toward earlier labor market exit in the industrialized world. We examine the evidence that national pension systems have contributed to this trend, and we consider how cross-national evidence can shed light on labor supply responses to incentives in national retirement systems. The paper is organized in four sections. The next section describes trends in labor force withdrawal in OECD countries. The following section briefly considers the likely work disincentive effects of standard pension systems, and it surveys some of the micro-econometric analysis of these incentives. The next section evaluates the cross-national evidence on pension incentives and their impact on labor force exit. We conclude by estimating the potential increase in the economically active population if labor force exit rates return to the patterns of an earlier era.

Trends in participation at older ages

Over the past four decades the labor force participation rate of people over 60 has fallen in almost all OECD countries. Participation rate declines are particularly noticeable among men, and the falloff in participation begins among men as young as 50. Among 50-54 year-olds, declines in participation among men have been more than offset by participation rate gains among women, so the overall activity rate in this age group has typically risen in recent years. At older ages labor force declines among men are often larger than increases among women, implying in many countries that overall labor force participation has fallen among people 55 and older. In all countries except Sweden the decline in activity rates of 60-64 year-old men has been greater than the rise among 60-64 year-old women, so total participation in the age group has declined.

The OECD trends in late-career participation rates are displayed in Figure 1. The tabulations are based on unweighted averages of ILO-reported activity rates in 21 OECD countries for selected years between 1950 and 2000.¹ Activity rates of men, which are displayed in the top panel, show monotonic declines in each of the three age groups covered by the chart. The decline is small for 50-54 year-old men, but it is considerably bigger both absolutely and proportionately in the two older age groups. Between 1950 and 2000 the OECD average participation rate of 60-64 year-old men declined by roughly half.

Participation trends among older women, displayed in the bottom panel, show a strong contrast with trends among men. Female activity rates increased or at least remained roughly constant at older ages, offsetting some of the impact of lower male participation. In one respect the male and female trends are identical, however. The falloff in participation rates as people grow older is considerably faster in 2000 than it was in 1950, and this is true for workers of both sexes. In 1950 the average activity rate of 60-64 year-old men was 13 percentage points (or 13 percent) lower than that of 50-54 year-olds. By 2000 the participation-rate difference between the two age groups was 46 percentage points (or 52 percent). If activity rates in both years are treated as estimates of a stable lifetime participation pattern in the two years, they imply much faster exit rates from the workforce in 2000 than in 1950. In 1950 13 percent of participating men exited the workforce between ages 50-54 and 60-64. Fifty years later the exit rate was 52 percent. A similar change in exit rates occurred among women. In 1950 women aged 60-64 had a participation rate that was 9 percentage points (or 30 percent) lower than that of women aged 50-54. By 2000 the gap was 42 percentage points (or 67 percent). Female exit rates between ages 50-54 and 60-64 increased from 30 percent in 1950 to 67 percent in 2000.²

¹ The 21 countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

² These estimates roughly correspond to time-consistent estimates of the actual exit rates of successive 50-54 year-old birth cohorts. Males between 50-54 years old in 1950 had a participation rate in that year of 95 percent. Their participation rate was 16 percentage points (17 percent) lower when they reached ages 60-64 in 1960. Men who were between 50-54 in 1990 had a participation rate that was 47 percentage points (53 percent) lower when they reached ages 60-64 in 2000. The implied labor force exit rate increased from 17 percent in the 1950s to 53 percent in the 1990s. For women the time-consistent estimates imply that exit rates between 50-54 and 60-64 rose from 27 percent to 64 percent between the 1950s and 1990s. All of these estimates are based on unweighted average participation rates in 21 OECD countries.

The trend in labor force exit differs widely across OECD countries (see Scherer, 2002). Participation rates at older ages have remained relatively stable in a small number of countries, such as Switzerland and Japan, while falling dramatically elsewhere. Figure 2 shows labor force participation rates of older men in four countries. Cross-national differences were comparatively small in the early 1960s but have become progressively larger as participation rates plunged in some countries. Over the past four decades Japanese activity rates increased modestly among 55-59 year-old men and declined modestly among men between 60 and 64. In France and Finland participation rates fell precipitously in both age groups, especially in the period from 1974 to 1989. Male participation rates fell moderately in the United States. In the three countries with declining participation rates there is some evidence the decline has recently slowed and may even have reversed. Nonetheless, participation rates among older men are now far below comparable rates in Japan.

Figure 3 clearly shows that cross-national differences in participation have widened over the post-war period, and this is true both for women as well as for men. In 1950 the OECD unweighted average participation rate of 60-64 year-old men was 82 percent, and the cross-country standard deviation in participation rates was 9 percentage points. By 2000 the mean participation rate in this age group fell to 42 percent but the cross-national standard deviation in participation rates rose to 18 percentage points (see top panel of Figure 3). Cross-national differences in older women's participation rates also increased over the period (lower panel of Figure 3).

One way to summarize a country's preference for earlier retirement is to estimate the percentage of middle-age labor force participants who exit the labor force by subsequent ages. To measure trends in labor force exit, these calculations can be repeated at different historical intervals. Such estimates can be derived with considerable precision for countries which have detailed historical data on labor force participation and usual hours of work for people at successive years of age. For example, labor force exit rates for Americans can be calculated by exact year of age for cohorts born in 1906 and later years (Bosworth and Burtless, 2004). In the absence of detailed labor force data, it is possible to calculate exit rates using activity rate data for five-year age groups. Table 1 shows estimates of exit rates for twenty-one OECD countries

based on activity rate data for 1960, 1970, 1990, and 2000 supplied by the ILO.³ The estimates are intended to reflect the exit rates that would prevail in the long run if the one-decade *change* in labor force participation for given birth cohorts could be assumed to represent a stable pattern of labor market withdrawal. The base for this calculation is the labor force participation rate of men who were 45-49 years old at the beginning of the decade. Estimates in columns 1 and 3 show our estimates of the proportion of these men who withdraw from the labor force in ten years' time, when they reach ages 55-59. Estimates in columns 2 and 4 show the estimated proportion which withdraws in fifteen years' time, when the cohort reaches age 60-64. The two right-hand columns show the change in exit rates between the 1960s and 1990s. Countries are ranked in the table according to their exit rates by age 60-64 for the later decade.

The tabulations show wide disparities in labor force exit across OECD countries. Moreover, the differences have grown much larger over time. All countries have seen an increase in labor force exits by the time workers reach their late 50s and early 60s, but the increases vary widely. In Japan, Norway, Sweden, and Switzerland there are small differences between the exit patterns of the 1960s and 1990s among 55-59 year-olds, and the changes in exit rates among 60-64 years olds are comparatively modest. The changes in other countries, especially in Europe, are often startling. Exit rates through ages 55-59 increased at least 15 percentage points in seven countries, and exit rates through ages 60-64 increased at least 30 percentage points in nine.

Evidence on the impact of public pensions

One reason for earlier labor force withdrawal is the increased generosity of programs that replace lost earnings when older workers leave their jobs. Jobless workers past age 50 are now more likely to qualify for generous unemployment and disability benefits, and larger percentages of older workers are eligible for an early pension. The impact of these benefits has been intensively studied in recent years. Surveys by the Organization of Economic Cooperation and Development (OECD) and National Bureau of Economic Research (NBER) have uncovered sizeable effects of disability and pension programs and special unemployment benefits for older

³ The entries in columns 1 – 4 of Table 1 reflect our best estimates of the steady-state exit rates that would prevail if the one-decade change in labor force participation rates for the cohorts which were 45-49 and 50-54 years old at the beginning of the decade were assumed to be stable. This calculation is less

workers on the activity rates of people past age 55 (see Blöndal and Scarpetta, 1999; Gruber and Wise, 1999; and Duval, 2003).

Incentives. Pension systems can affect the age of labor force withdrawal for three reasons. First, they affect workers' lifetime wealth in comparison with what it would be in a world without pensions. For workers who were active when a public pension program was first established, the system almost certainly increased lifetime wealth. Most OECD countries established pay-as-you-go (PAYGO) pension systems that effectively transferred substantial lifetime wealth to early participants. The wealth transfer increased the capacity of these workers to consume during their lifetimes. Workers could use the extra wealth for higher consumption of goods, services, or retirement leisure. Alternatively, they could increase their bequests to heirs. Many workers probably used the extra wealth to retire at a younger age. The lifetime wealth gains provided by public pension programs have shrunk over time. A smaller percentage of current and future workers will obtain wealth gains under the public pension system. In rich countries with slow growth or actual decline in their working-age populations, workers under a fully mature PAYGO system can anticipate losses in lifetime wealth. Workers will receive smaller lifetime pensions than their contributions would have entitled them to if their contributions had been invested in safe assets. Compared with early generations retiring under a PAYGO system, later generations will be able to consume less goods, services, and retirement leisure over their lifetime as a result of their participation in the pension system. Some may respond to these wealth losses by retiring at a somewhat older age.

Whether they receive wealth gains or losses under the system, workers can be affected by the timing of pension reforms during their work life. Pension reform can have differing effects depending on whether it occurs early or late in a worker's career. If workers receive an unanticipated gain in wealth when they are nearing retirement, they will have accumulated more retirement saving than would have been needed if the wealth transfer had been promised to them at a younger age. This may induce older workers to make large adjustments in their retirement age, inducing earlier withdrawal from the work force than would have occurred if the wealth transfer had been anticipated at a younger age (Moffitt, 1987). It is also conceivable, however, that retirement behavior is driven mainly by social norms rather than carefully calibrated

reliable when the percentage of 45-49 year-olds and 50-54 year-olds in the labor force is changing rapidly, as it was during much of the post-war period in the case of women.

financial calculations. Under these circumstances a big gain in lifetime wealth experienced near the end of a career may have little impact on labor market withdrawal. Workers' may respond slowly to sudden changes in the retirement system, even when the addition to or subtraction from lifetime wealth is large (Axtell and Epstein, 1999).

A second feature of pensions accelerates labor market withdrawal. Public pensions provide earnings replacement for workers who have attained the eligibility age for pensions. This almost certainly hastens labor force exit among workers who do not formulate long-term plans for retirement or lifetime wealth accumulation. Workers with short time horizons or high rates of time preference often accumulate little savings over their careers. A worker with little saving may decide to retire when the earnings replacement provided by a pension is high enough so that the worker does not experience a large reduction in consumption if he stops working. Short-term planners will be more likely to retire the higher is the immediate income replacement provided by a pension.

Third, public pensions can influence the net return from working an additional year. If the net return from work is sufficiently small, many workers will withdraw from the labor force. The fact that a pension becomes available at a particular entitlement age, such as 60, does not directly affect the net return from working at that age, however. The net return is determined by eligibility rules for the pension, the formula that links monthly pension benefits to the worker's past and current earnings, pension contribution requirements, and the relative taxation of wages and pensions.

It is a common misconception to think that when a worker reaches the earliest eligibility age for pensions he must sacrifice one month of potential pensions for every one month that he delays retirement. If this were true, the marginal return to work would drop dramatically at the earliest entitlement age, especially in countries offering generous pensions. But no sacrifice is required in a pension system that allows pensioners to continue working and receive unreduced pensions. When workers attain the pensionable age in this kind of system they can continue to earn their pre-retirement wage and still collect a full pension. The worker's net wage does not change simply because he has become eligible to receive a pension. Under this kind of a system, workers who choose to retire at the pensionable age have done so because the availability of extra unearned income or social custom have induced labor market exit at that age.

Many public pension systems have a retirement earnings test, of course. Workers who attain the pensionable age must stop working or substantially reduce their earnings to become eligible for an unreduced pension. Casey B. Mulligan and Xavier Sala-i-Martin (2003) estimate that over half the world's public pension systems require workers to exit the labor force or limit their earnings in order to collect a pension. Even in this case, however, it is not obvious whether attainment of the pensionable age affects the worker's marginal return to continued employment. This depends on another feature of the pension formula, the actuarial adjustment for deferred retirement. In some pension systems there is no adjustment for deferred retirement. Workers who delay claiming a pension for one year sacrifice forever twelve months of potential pension income. In this kind of a system, a worker who attains the pensionable age and remains employed pays a substantial penalty for continued employment. The worker faces a sharp reduction in his net return to working as soon as he reaches the pensionable age. His lifetime pension wealth is lower if he postpones retirement after the first eligibility age than if he stops working at that age.

A retirement earnings test does not necessarily reduce the net return from working, however. Many public pension programs offer an actuarial adjustment to workers who delay claiming a pension until after the first pensionable age. If the adjustment is large enough, pensions lost as a result of continued employment past the first pensionable age are made up through higher monthly pension payments once workers retire and claim a pension. Even though workers must give up an immediate pension when they continue to work past the pensionable age, they may be fairly compensated with higher monthly pensions in every month after they stop working. If the compensation is actuarially fair, workers enrolled in a pension scheme with a retirement earnings test face no penalty as a result of remaining employed after the first pensionable age.

A benefit calculation rule that is age-neutral for the average worker can still provide strong financial incentives to retire for workers who have below-average life expectancy. These workers may not expect to live long enough for the future benefit increase to make up for the benefits given up by delaying retirement for one more year. Similarly, workers who apply high discount rates when evaluating future benefits may not be impressed that the pension adjustment is "fair" for an average worker. For workers who are impatient to consume, an 10-percent hike

in benefits starting one year from today may not be enough to compensate for the loss of twelve monthly benefit checks over the next year.

This discussion implies that a worker's net return to employment at the earliest eligibility age is affected by two critical features of the pension formula: the presence or absence of a retirement earnings test, and the generosity of actuarial adjustment when a pension is deferred after the earliest eligibility age. Workers only face a reduction in their net wage at the first pensionable age if there is a retirement earnings test *and* if the pension formula does not provide fair actuarial adjustment for deferred retirement.

Evidence for the United States. A large number of studies has now appeared that try to measure the impact of public pensions on retirement, including many cited in the OECD and NBER papers mentioned earlier. Good surveys of the literature have been prepared by Quinn et al. (1990), Hurd (1990), Lumsdaine and Mitchell (1999), and Krueger and Meyer (2002). Many of the most widely cited retirement studies examine the impact of the social security system on U.S. retirement patterns. With a few notable exceptions, most good studies of the U.S. retirement system find rather small effects of social security on older workers' labor force participation. That is, the estimated effects appear to be small compared with the large historical changes in U.S. participation rates that occurred after World War II (see Figure 2).

Krueger and Meyer (2002) distinguish between two broad approaches to estimating the effects of social security on retirement. One class of study relies on time series changes in public pension incentives to identify the impact of incentives on some measure of aggregate labor supply. A second relies on differences among workers at a particular point in time to disentangle the influence of detailed program incentives on individual workers. A few studies use the combination of both time-series and cross-section variation to determine the effects, if any, of pension incentives based on longitudinal data for a representative sample of workers. To this list should be added cross-national studies of the effects of different retirement systems on aggregate supply.

The aggregate time series evidence for the United States sometimes suggests a large effect of the program. Participation rates of full-career workers fell after social security became an important source of retirement income. Participation rates fell particularly rapidly during the 1970s when social security benefits were greatly liberalized. Participation rates of Americans older than 61 began to rise after the mid-1980s when work-discouraging features of the U.S.

social security system were removed or modified. There are two problems with this kind of aggregate time-series evidence. First, participation rates of older men were declining even before social security benefits began to be paid, suggesting that other factors besides social security lie behind at least some of the trend toward earlier U.S. retirement. Second, if workers were induced to earlier retirement by windfall increases in wealth provided by social security, it is surprising that much of the decline in U.S. labor force participation occurred after 1970. As pointed out by Robert Moffitt (1987), the unexpected windfall gains in lifetime wealth produced by the U.S. social security system were mainly concentrated in the 1950s, not in the 1970s. This implies that the largest labor supply effects of the program should also have been concentrated in the 1950s and early 1960s, and Moffitt finds little evidence for this in the data.

The second kind of analysis focuses on differences between individual workers to identify the effects of detailed social security incentives on labor supply. An advantage of this approach is that incentives can be measured much more accurately in micro-census data sets than is possible using aggregate data about the national pension system. Another advantage of micro-econometric studies is that other influences on labor supply, including workers' health status, wealth accumulation, and private pension entitlements, can also be taken into account. The studies based on micro-census surveys typically analyze the cross-sectional distribution of retirements within a group of workers who reach old age around the same time. The behavior of workers with a large amount of social security or private pension wealth is compared with that of workers who have less wealth. The analyst takes account of differences in the rate at which workers can accumulate additional social security and private pension wealth and can earn additional wages.

Most studies based on this kind of evidence find that even big changes in social security caused only modest changes in participation rates. Burtless and Moffitt (1985) predict, for example, that raising the normal retirement age in U.S. social security from 65 to 68 would add only a little more than 4 months to the full-time working careers of American men who are not disabled. Although a few of the micro-econometric studies find large effects of social security, most find very modest effects. In a recent assessment of the impact of social security changes on male labor force participation in the 1970s and 1980s, Anderson, Gustman, and Steinmeier (1999) use cross-sectional evidence from the Retirement History Survey to estimate a sophisticated and forward-looking retirement model based on the experiences of 3,300 men who

retired in the late 1960s and 1970s. They obtain behavioral estimates that are plausible and quite precisely estimated. When they use their estimates to simulate the aggregate response to the sizeable U.S. social security changes over the 1970s and 1980s they find only small predicted changes in male participation rates. Between 1969 and 1989, U.S. male participation rates fell 14 percentage points at age 60, 25 points at age 62, and 17 points at age 65. According to Anderson et al., the change in social security incentives can explain only one-seventh of the decline at ages 60 and 62 and none of the participation-rate decline at age 65. In fact, the authors find that social security reforms should have induced a small increase in male participation rates at age 65 (Anderson et al., 1999, p. 777).

Another way to analyze the influence of a public pension program is to examine behavioral differences among people who face different incentives because the pension system has been suddenly changed in an unanticipated way. In 1969 and again in 1972 U.S. social security benefits were increased much faster relative to wages than at any time in the past 50 years. By 1973 benefits were 20 percent higher in inflation-adjusted terms than would have been the case if social security pensions had grown with wages as they did during the 1950s and 1960s. In 1977 the U.S. Congress passed amendments to the Social Security Act that sharply reduced benefits to workers born in 1917 and later years in comparison with benefits payable to workers born before 1917. (Americans born between 1917 and 1922 are sometimes referred to as the “notch” generation as a result of this benefit cut.) Burtless (1986) examined the first episode, and Krueger and Pishke (1992) examined the second. In the period analyzed by Burtless, older workers in the sample planned their retirements when social security was comparatively less generous; younger workers planned their retirements when social security benefits were 20 percent higher. Krueger and Pischke analyzed a period in which younger workers received significantly less generous pensions than those available to older workers. Both studies reached an identical conclusion. Major changes in social security generosity produced small effects on the retirement behavior and labor force participation of older men. Burtless estimated, for example, that the 20-percent benefit hike between 1969 and 1973 caused only a 2-month reduction in the work career of men who were fully covered by the more generous formula. This was equivalent to a reduction in the labor force participation rates of 62-year-old and 65-year-old men of less than 2 percentage points. The effects of the 1977 amendments found by Krueger and Pischke were even smaller. Even if we accept their largest

estimated effects, less than one-sixth of the drop in labor force participation during the 1970s can be explained by changes in U.S. social security. These findings imply that most of the decline in older males' participation rates between 1968 and 1985 were due to factors other than social security reform.

International evidence

In recent years the evidence from single-country studies has been supplemented by evidence based on cross-national comparisons of retirement behavior. Gruber and Wise (1999) have performed one of the best known studies of this type. It reaches a very different conclusion from the one based on cross-sectional and panel data from the United States. Gruber and Wise and their expert collaborators examined pension systems and retirement incentives in 11 industrialized countries. Some of these countries allow workers to begin drawing public pensions at age 60 or even earlier, while others do not make old-age benefits available until later. There is also wide variation in the treatment of labor earnings once workers reach the pensionable age. Some countries, like the United States, do not heavily penalize workers for delaying their retirement beyond the early and normal pensionable ages. Other countries, like France and Belgium, provide much more generous pensions and may impose heavy financial penalties on workers who remain employed after the pensionable age. Gruber and Wise find a strong correlation between national retirement patterns and the labor supply incentives that are embodied in national pension systems. Countries with modest pensions and generous treatment of earned income after the pensionable age have high rates of participation among people between 55 and 70 years old. Countries that offer generous pensions and impose heavy penalties on earnings after the pensionable age have lower participation rates at older ages.

These findings imply that the trend in labor force participation at older ages may have been decisively influenced by incentives in national retirement systems. While all the rich countries have seen major declines in older males' activity rates, the extent of decline has been affected by the details of the national pension system. Compared with the cross-sectional and panel data studies discussed above, the Gruber and Wise (1999) analysis implies a much bigger impact of the public pension system on activity rates at older ages.

Limitations of micro-econometric evidence. It is conceivable that the cross-national comparison is uncovering a long-run effect of generous pensions that is impossible to see in

microeconomic studies of people who retire within a few years of one another. In particular, more generous income support programs for the retired may influence the trend in average workers' preferences regarding the desirability of work in old age. More generous pensions encourage earlier retirements among a few workers, and this development may then affect opinions regarding retirement among a much wider class of workers. Longer retirement becomes an acceptable, even highly desired part of a typical worker's life. This impact of social security and pensions is hard to detect in cross-sectional and panel studies of the kind discussed above. Those studies attempt to find a correlation between workers' choice of retirement age and the financial incentives (or change in incentives) that might motivate workers to retire at one age rather than another. If the average worker's preferences for retirement versus consumption have gradually changed as a result of a social-security-induced shift in preferences, this change would be missed in cross-sectional and panel studies, although it might be detectable in a cross-national study where the analyst can see the long-term impact of stable differences in the retirement system.

Some evidence suggests that behavior is slow to change in the face of changing financial incentives. It took a number of years after the introduction of early social security pensions in the United States before retirement at age 62 became common. The financial incentives that eventually induced American men to retire at age 62 were presumably present from the first day early social security pensions became available in 1961. It was only in the late 1960s, however, that a sharp fall-off in labor force participation at age 62 became noticeable. By the late 1970s, the fall-off in participation was greater at age 62 than at age 65. This evidence may imply either that workers are slow to recognize the financial implications of a pension innovation or that their preferences are formed, in part, by indirect effects of the financial incentives facing them.

Figure 4 shows labor force withdrawal patterns among U.S. men over the period from 1940 to 2000. The figure shows the percentage of men leaving the labor force at each age from 55 to 73, computed as a fraction of the men in the workforce at age 54.⁴ In light of the participation trends shown in Figure 2 it is not surprising that the retirement distributions for

⁴ If the labor force participation rate at age 63 is designated LFP_{63} , the retirement rate at age 63 is calculated as $(LFP_{62} - LFP_{63}) / LFP_{54}$. This calculation ignores the complications involved in computing true cohort distributions and the effects of mortality rates, immigration, and temporary withdrawal from the labor force. It offers a picture of the timing of labor market withdrawal based on the participation choices of men aged 54 through 73 in a particular year.

1970 and especially for 2000 are skewed toward the left. Labor force withdrawal occurred at earlier ages in those years than in 1940 or 1960. The withdrawal distributions in all four years show evidence of clustering in retirement at particular ages. In 1940, 1960, and 1970 the peak rate of retirement occurred at age 65. By 2000 the peak in retirements occurred at age 62. While there are peaks in the distribution of retirements in 1940 at ages 65 and 70, the clustering of retirements in that year is far less pronounced.

The incentives in the U.S. public retirement system provide an explanation for the clustering of retirements at age 65, at least in years after 1941 when social security benefits first began to be paid. In 1960, for example, workers who postponed their retirement after age 65 did not receive any compensation for pension deferral. The pension they were offered if they delayed claiming a pension to age 66 was the same as the one they were offered at age 65.⁵ Moreover, pensioners who earned more than \$80 per month – about 30 percent of the U.S. average wage – lost their entire monthly pension. The combination of a strict retirement earnings test and lack of actuarial compensation for benefit deferral meant that workers who deferred retirement after age 65 faced sizeable losses in pension wealth for every year of pension deferral. This feature of the U.S. benefit formula encouraged retirement at age 65, and it is reflected in the labor market exit patterns shown in Figure 4 for 1960 and 1970.

Note that retirement at age 65 is now much less common in the United States than it was in 1960 or 1970. In part this is because retirement at younger ages has become much more common, but it is also a result of changes in the U.S. benefit formula that encourage work past the standard retirement age. For example, the very strict retirement earnings test was progressively liberalized between 1961 and 1999, allowing pensioners to earn much higher wages or self-employment income without loss of their public pensions. In 1999, for example, a 65-year-old pensioner could earn 51 percent of the U.S. average wage without any loss in benefits. Every dollar of earnings above this threshold resulted in the loss of only \$0.33 in social security benefits rather than the loss of the entire monthly benefit check. In 2000 the retirement earnings test was eliminated completely for pensioners attaining the standard retirement age. As

⁵ This is not strictly true because workers' pensions were based on their average wages over the period from 1951 to the year they claimed a pension. This average could be raised by wages a worker earned after attaining the standard retirement age. However, in 1960 U.S. workers did not receive any direct compensation for deferred claiming of pensions past the standard retirement age. Compensation for pension deferral was not introduced until the 1970s, as explained below.

the retirement earnings test was liberalized, the pension formula was also modified to provide some compensation to workers who deferred retirement after the standard retirement age. At first the compensation was very small, just 1 percent of basic benefits per year of deferral. But the adjustment was gradually increased until it is now almost actuarially fair. U.S. workers reaching 65 in 2004 receive a 7-percent increase in basic benefits if they defer claiming a pension to age 66. (The actuarial adjustment for pension deferral continues until age 70.) The liberalization and eventual elimination of the retirement earnings test for workers reaching the standard retirement age and fair compensation for benefit deferral after the standard retirement age mean that few workers reaching the U.S. standard retirement age face any penalty for delaying their retirement.

The clustering of U.S. retirements at age 62 raises a different set of questions. Labor force exit patterns in 1940 and 1960 show no evidence that male retirements clustered at age 62. To a modest degree in 1970 and much more noticeably in 2000, age 62 became a favored age of labor market withdrawal. The explanation for this development may seem straightforward. Starting in 1961 early social security pensions were first made available to U.S. men between ages 62 and 64. Before 1961 there is no evidence of clustering in male retirements at age 62, but by 1970 retirement was more common at 62 than at any other age except 65. By the mid-1990s, age 62 was by a wide margin the most popular age of retirement for both men and women. A simple explanation for this development is that early retirement benefits provided an inducement for workers to leave the labor force at age 62. American workers who claim early pensions face a retirement earnings test, so many workers have to leave their career jobs in order to claim an early pension.⁶

In fact, this explanation is not so obvious in the case of far-sighted workers with adequate savings. Workers who have ample savings or easy access to borrowed funds have little reason to retire exactly at the early entitlement age (see Crawford and Lilien, 1981). If they defer retirement until after age 62, they must temporarily give up some pension benefits, but this does not reduce the lifetime value of their pensions. U.S. workers who claim social security benefits before the standard retirement age must accept permanently reduced pensions, and the

⁶ Although the retirement earnings test was eliminated in 2000 for U.S. workers who attain the standard retirement age, the test remains in effect for workers who claim an early pension. Workers who receive a pension and are between age 62 and the standard retirement age face a reduction in their social security pension if they earn more than about 33 percent of the U.S. average wage.

adjustment in benefits is approximately actuarially fair for a worker who has average life expectancy. Therefore, a worker who delays retirement and pensions for one year after the early entitlement age does not incur a loss in pension wealth. Peter Diamond and Jonathan Gruber (1999) calculate that workers who defer retirement from 62 to 64 actually *gain* lifetime pension wealth or face lower net taxes on their annual earnings compared with workers who stop working at ages 61 or 62. Other analysts have found even more generous social security pension subsidies for Americans who defer retirement from 62 to 64 or 65.⁷ As noted earlier, however, a worker with little savings and a high rate of time preference or short life expectancy might not regard the compensation (or “work subsidy”) in the early pension formula as fair. In these circumstances, workers may claim a pension and retire as soon as they become eligible to do so.

The evidence in Figure 4 suggests that U.S. workers did not respond quickly or completely to the availability of early social security pensions in 1961. Only gradually after 1961 did age 62 become a popular retirement age. Of course, the clustering of retirements at ages 62 and 65 may be due to some other factor besides social security. It is hard to believe, however, that health or work opportunities decline abruptly at a particular age. Another explanation is that some workers are affected by mandatory retirement rules. This explanation could be valid before 1978, when employers were permitted to dismiss 65-year-old workers under mandatory retirement rules, but it is not convincing today. The Age Discrimination in Employment Act passed in 1967 prohibited U.S. employers from imposing mandatory retirement before age 65. Amendments to the Act in 1978 prohibited mandatory retirement before age 70, and another amendment in 1986 prohibited mandatory retirement at any age.

The simplest alternative explanation for the clustering of retirement ages is that U.S. workers are affected by employer-sponsored pension plans. Almost two-thirds of 45-64 year-old U.S. workers are employed by a public or private employer that offers an occupational pension plan, and about 90 percent of covered workers currently participate in their employer’s plan.⁸

⁷ Blinder, Gordon, and Wise (1980) evaluated the implicit subsidies to continued work between ages 62 and 64 both before and after the indexing formula in U.S. social security program was reformed in the late 1970s. The pre-reform formula contained very generous subsidies for continued work past age 62, but the subsidies ended for workers postponing retirement after 65.

⁸ U.S. Census Bureau tabulations, http://ferret.bls.census.gov/macro/032001/noncash/nc8_001.htm.

Among workers who are covered by a private pension plan, about 4 out of 10 are enrolled in a defined-benefit plan (Munnell and Sundén, 1999). Several features of this kind of plan may encourage workers to retire early or at a particular age (Anderson et al., 1999).

Defined-benefit occupational pension plans are structured similarly to standard public pensions. Workers who are covered under such a plan earn pension credits for as long as they work for the employer that sponsors the plan (sometimes up to a maximum number of years). The longer they work for the employer, the higher their monthly pension. Most defined-benefit plans are structured to encourage workers to remain with the employer for a minimal period – say, 10 years – or until a critical age – say, age 55. Workers who stay for shorter periods may receive little or no benefits under the plan, while workers who stay in the job too long can see the value of their pension accumulation shrink. This would happen if the plan offered benefits to workers starting at age 55 but then failed to make a fair actuarial adjustment to monthly benefits for workers who delay retirement after age 55. If a 55-year-old worker can collect a monthly pension of \$500 when she retires immediately and a monthly check of \$501 if she delays her retirement one year, she will clearly lose a substantial amount of lifetime benefits – nearly \$6,000 – for each year she postpones claiming a pension. The worker essentially suffers a pay cut when she reaches age 55, and the cut is equal to the loss in lifetime benefits she suffers by postponing retirement. Many employers find this kind of pension formula to be an effective way to push workers off company payrolls when they reach a designated age. Workers enrolled in this kind of plan do not have to retire when they leave the company payroll, of course. They can collect their pension and go to work for a new employer.

At one time most American workers covered by an employer-sponsored pension were automatically enrolled in defined-benefit plans, but the structure of employer pensions has changed over the past quarter century. Almost 80 percent of covered workers are now offered defined-contribution plans, and two-thirds of covered workers are offered nothing but a defined-contribution plan.⁹ Many defined-contribution plans are voluntary. Workers who do not choose to contribute to some plans do not receive an employer subsidy for pensions. Defined-contribution plans are age-neutral by design, and therefore they have few of the age-specific retirement incentives that are common in traditional defined-benefit plans. Because a growing

⁹ Slightly more than 20 percent of workers enrolled in an employer-sponsored plan are covered by *both* a defined-contribution *and* a defined-benefit plan. See Munnell and Sundén, 2001.

percentage of U.S. workers are reaching retirement age under defined-contribution rather than defined-benefit plans, a shrinking percentage will feel pressure to leave their jobs to avoid a loss in lifetime retirement benefits. It is nonetheless the case that a sizeable minority of older American workers is enrolled in traditional defined-benefit plan, and these worker often face incentives to leave their job at a particular age, such as 55 or 62.

Measuring work incentives in national pension systems

As noted earlier, the three main incentives for retirement offered by pensions are the change in lifetime wealth they provide to participating workers, the replacement of earned income they offer at the early entitlement age, and the implicit tax or subsidy they provide for continued work in old age. So far as we know, no systematic analysis has been performed to calculate the impacts of a cross-section of national pension systems on the net lifetime wealth of successive cohorts of workers. Analysts at the OECD, NBER, and elsewhere have tried to assess other aspects of pension incentives in a cross-section of OECD countries. One striking feature of these summaries is their disagreement about basic features of individual pension systems, including the age of first eligibility for pensions, the availability and generosity of actuarial adjustment for deferred pension acceptance, and the presence of a retirement earnings test for people claiming early or late pensions.

Table 2 shows alternative assessments of the early and standard retirement ages for men in twenty-one OECD countries according to summaries in five recent surveys. One of the surveys provided assessments of the standard or normal retirement age for two recent years – 1989 and 2003 – and both of these estimates are shown. In the two right-hand columns we show whether the different sources agree on the early entitlement age and standard retirement age, respectively. In some cases the discrepancy between the different summaries is easily explained. Legislative reform caused the retirement age to change between the time that different authors performed their assessments. In other cases the differences arise because analysts focus on different features of the pension system when making their assessment. For example, Gruber and Wise (1999) define the early retirement age in the German pension system as 60, whereas Blöndal and Scarpetta (1999) list it as 63. In the late 1990s long-term unemployed German workers were eligible for an early pension at age 60 if they had accumulated enough insurance credits by that age. Employed German workers were not eligible for early retirement benefits until age 63 if they accumulated enough insurance credits. Thus, the early retirement age in the

German pension system depended on the employment status of potential pension claimants. In several countries the government offers two kinds of pension, and eligibility for initial or standard pensions may occur at different ages under the two programs. All sources agree that Italy provides public pensions at a relatively young age, while initial pensions are available in Switzerland and the United States slightly later than they are available elsewhere. There are wide differences in the reported initial eligibility ages of Australia, Austria, Denmark, Ireland, the Netherlands, Norway, Portugal, and the United Kingdom. These differences mainly occur because various authors have a different view about the most likely route that workers will follow into retirement.

A number of analysts have attempted to measure pension replacement rates at some standard age, such as 65 or the standard retirement age in a country's main public pension program. Table 2 shows estimates reported in or derived from five recent studies. The most common calculation is to assume that workers earn a standard wage every year, such as the average earnings of typical production worker in the economy. The pension is then calculated under the assumption that workers in all countries begin working at a common age, such as 20, and work steadily to the indicated age. The pension replacement rate is the ratio of the worker's pension entitlement at the standard retirement age to the wage he was assumed to earn in the year before retirement. Three studies included in the Table, by Blöndal and Scarpetta (1999), Duval (2003), and Whitehouse (2002) calculated replacement rates using the pre-tax values of a worker's pension and wage. Casey et al. (2003) estimated the replacement rate using the after-tax value of pensions and pre-retirement wages. We have used pre- and post-retirement tax burden estimates reported in Keenay and Whitehouse (2002) to estimate the after-tax replacement rates implied by the pre-tax replacement rates shown in Whitehouse (2002). The replacement-rate estimates of Duval (2003) represent a useful addition to the literature on pension incentives. Instead of measuring the replacement rate in a single year, such as age 65 or the standard retirement age, Duval estimates the average replacement rate a worker would obtain between ages 65 and 69 if he ceased working on his 65th birthday. In the handful of countries where the standard retirement age is 66 or 67, this calculation reflects a zero replacement rate in the year or two after age 65 combined and a much more generous rate in the following years, after the worker has actually claimed a pension.

Even though the estimates of replacement rates are derived using different assumptions and are sometimes calculated under different pension formulas, the estimates usually yield similar rankings of pension generosity. Australia, Canada, Ireland, the United Kingdom, and the United States usually rank toward the bottom of the scale, while Austria, France, Italy, Portugal, Spain, and Sweden rank near the top. Japan offers low to intermediate replacement rates to average workers, and Finland, New Zealand, Norway, and Switzerland are usually found to rank near the middle of the scale. The ranks of Belgium, Germany, and the Netherlands are sensitive to the exact methods used to evaluate replacement rates near the standard retirement age. The bottom five rows in Table 3 show the correlations of the five replacement-rate estimates. Not surprisingly, the strongest correlation is between the estimates reported in columns 4 and 5 of the table, both of which are based on Whitehouse's estimates of the gross pension replacement rate. Note that the post-tax replacement rate is about one-quarter higher than the pre-tax replacement rate. The correlation between the gross and net replacement rate under these definitions is 94 percent. The correlations among most of the other measures of income replacement are lower, but the correlation is never less than 58 percent, indicating that these measures are relatively consistent in ranking the generosity of different national pension programs.

It is more difficult to measure the change in social security wealth that workers experience if they delay their retirement from one age to a later one. The calculation depends crucially on whether a worker qualifies for unemployment or invalidity benefits before or in addition to a standard public pension. In several countries, older workers who suffer lengthy spells of involuntary unemployment qualify for early pensions under concessionary terms. The pension may be offered at an earlier age than is available to steadily employed workers, or it may be calculated under a formula that is much more advantageous to the pensioner. Table 4 contains two analysts' calculations of the losses in social security wealth that workers experience if they delay retirement from age 55 to age 70. These losses are calculated relative to the assumed annual gross wage a worker could earn if he remained employed. Obviously, this calculation is somewhat theoretical in the case of a worker who enters retirement through the route of involuntary unemployment. If a worker has been dismissed from his job at age 58 it seems highly unlikely that he faces a choice between accepting a new job that pays exactly his old wage or accepting an unemployment insurance payment and follow-on pension benefits. In this case it is uncertain what wage will be available in the worker's next job. On the other hand,

workers who remain steadily employed actually face a choice between continued work and retirement under the standard pension system.

Blöndal and Scarpetta (1999) calculate wealth changes under alternative assumptions about the social security benefits a worker would be offered as he grows older. Column 1 shows wealth losses connected with late retirement when a worker is eligible only for the nation's standard pension package. The bottom entry in this column shows, for example, that a U.S. worker who delays retirement from age 55 to 70 gives up social security pension wealth equivalent to 2-½ years of gross wages as a result of the delay. This loss represents some combination of taxes he must pay to the pension system and the loss of pension wealth connected with deferring pensions from age 62, when they are first available, to 70. Since the worker will earn 15 years of wages between ages 55 and 70 if he continued to work, this represents an implicit tax on his gross earnings of approximately 17 percent. Blöndal and Scarpetta's calculations show the implicit tax on French and Italian workers' wages is much higher. Column 2 in Table 4 adds the wealth losses a worker would incur if he became eligible for unemployment-insurance-related benefits at age 55. In many countries these benefits can last for several years or until a worker attains the standard pension age. If a worker decides to accept a job instead of remaining on the unemployment rolls, he would sacrifice a substantial stream of unemployment insurance and early pension benefits. Some countries formally or informally relax the eligibility criteria for invalidity benefits when older workers apply for such benefits. This policy allows workers to exit the labor force long before the early or standard retirement ages. The social security wealth losses associated with leaving the disability rolls to accept a job are shown in column 3. Finally, several countries offer special early-retirement benefits to older workers who have suffered lengthy spells of unemployment. Early pensions remove these workers from the unemployment rolls and from the active work force. In the fifth column of Table 4 we show the maximum value of the entries in columns 1 to 4 providing some indication of the potential tax a worker faces if he defers retirement from age 55 to 70.

The sixth column in Table 4 shows estimates of the "tax force" to retire between ages 55 and 69 calculated by Gruber and Wise (1999). This calculation essentially sums the annual implicit tax rates a worker faces between ages 55 and 69 if he should decide to decline social security benefit acceptance at each of those ages. Like the measure proposed by Blöndal and Scarpetta (1999), this assessment of the implicit tax takes into account required social security

contributions and the pension wealth a worker gives up if he defers his retirement past the early and normal retirement ages under the national pension system. For selected countries, the estimate also takes account of the benefit payments a worker gives up if he could enter retirement through another common route, such as special early pensions for the unemployed. Gruber and Wise's 1999 study covered only 11 of the 20 countries included in the Blöndal and Scarpetta (1999) assessment. The bottom two rows in Table 4 show the correlation among the different estimates of implicit taxes. For the 11 countries included in both studies, the correlation between the estimates in columns 5 and 6 is 62 percent. Both studies agree in showing high implicit tax rates in Belgium, Italy, and the Netherlands and low tax rates in Canada and the United States. If Swedish workers enter retirement through the standard pension system, the two analyses show a similar implicit tax rate. If a Swedish worker can enter retirement through the disability system, however, the Blöndal-Scarpetta estimates imply a much higher implicit tax on earnings.

An interesting discrepancy between the two studies is the estimated implicit tax on wages in Japan. The Gruber-Wise estimates imply that the Japanese social security system imposes the lowest implicit taxes of any of the 11 countries in their survey. Japan's tax rate is one-half or less of the rates faced by workers in Canada and the United States, and it is one-third or less the rates in Sweden and Spain. In contrast, the Blöndal-Scarpetta estimates suggest Japanese workers face higher implicit tax rates than Canadian and U.S. workers and higher rates than Swedish or Dutch workers who enter retirement through the standard national pension system. An important reason for this difference is that Blöndal and Scarpetta assume workers can potentially earn a level wage throughout their late careers, whereas Gruber and Wise assume Japanese workers must accept a sizeable wage reduction when they reach the standard retirement age (60) under Japanese employers' personnel plans. (Gruber and Wise do not make this assumption when calculating implicit tax rates in the other 10 countries they examine.) This assumption is probably important in explaining the difference between the Gruber-Wise and Blöndal-Scarpetta estimates. The Japanese pension system has historically imposed a retirement earnings test that reduces pension payments available to 60-64 year-old workers who have substantial wages. If wages are high enough, workers lose their entire pension. Moreover, the Japanese pension system does not provide 60-64 year-old workers with a generous adjustment

for pension deferral.¹⁰ This implicit tax on earned income after the Japanese early-retirement age appears less onerous if it is calculated for workers who face a sharp loss in their potential wages when they reach the early retirement age. In this case, the retirement earnings test appears less costly to workers, and the implicit tax imposed by the Japanese pension system seems smaller.

While Gruber and Wise (1999) are surely correct in believing Japanese workers must accept lower wages after age 60 if they hope to remain employed, this also applies in many countries besides Japan. According to OECD tabulations cited in Disney and Whitehouse (1999), older workers in Australia, Canada, and the United Kingdom face even larger relative wage reductions than workers in Japan.¹¹ Taking the loss of potential pay into account, Japanese workers face substantial reductions in the pay-off to working after age 60 compared with their earnings before that age. In many countries this loss in earning power is an important reason that workers leave work and claim a pension, but in Japan a high percentage of workers accepts the loss of pay and continues to work. To attribute this difference in behavior to low social security taxes is probably incorrect. The social security taxes appear low in part because they are calculated using a new and lower level of assumed wages. Under the assumption that Japanese workers can maintain a level wage throughout their 50s and 60s, the implicit taxes imposed by the Japanese system seem more in line with taxes in other OECD countries which offer reasonably favorable treatment of pensioners' earned income.

Impacts of the system. Analysts who have recently examined cross-national differences in pension incentives generally find they have predictable and significant effects on labor force withdrawal. Countries with early pension ages, generous income replacement, and heavy implicit taxes on earnings in old age tend to have earlier exit from the labor force than countries with pension systems that provide fewer work disincentives. The association between one measure of the pension replacement rate and labor force exit is displayed in Figure 5. Estimates of the replacement rate are taken from the net replacement rate tabulations published by Casey et al. (2003), and the estimated withdrawal rates are those shown in column 4 of Table 1. The

¹⁰ The Japanese system provides very generous adjustments for deferral of the basic pension past age 65, however.

¹¹ Disney and Whitehouse (1999), Figure 16, shows the ratio of average pay received by 55-64 year-olds to pay received by 45-54 year-olds in selected OECD countries. In all countries except France the average earnings of the older group is lower. The reductions in pay are similar in Canada, Japan, and the United States.

scatter plot shows a clear pattern of increasing exit rates as net income replacement at the standard retirement age rises. Cross-national differences in replacement rates account for 25 percent of the variance in cross-national male exit rates. The regression line implies that an increase in the replacement rate of 10 percentage points (the approximate gap between the U.S. and Spain) will increase the proportion of 45-49 year-olds who exit the labor force by age 60-64 by an additional 6 percentage points. When we use other measures of income replacement, however, we obtain smaller and less significant estimates of the impact of the replacement rates on labor force exit.¹² In every case, however, there is a positive association between exit rates and the level of income replacement provided to older workers.

Analysts have also found large effects of the implicit social security tax on earned income. Probably the most striking estimate of this impact was uncovered by Gruber and Wise (1999). They regressed their preferred measure of “tax force” on labor force participation rates between ages 55 and 64 and found that 82 percent of the variance in the latter could be explained by cross-country differences in implicit social security taxes. A variant of the Gruber-Wise estimation is displayed in the top panel of Figure 6. It shows a scatter plot of the implicit tax rate and the labor force withdrawal rate of older males. The horizontal axis indicates the logarithm of Gruber and Wise’s estimate of “tax force” and the vertical axis measures the labor force exit rate between ages 45-49 and 60-64 during the decade of the 1990s. The chart shows a powerful association between the two variables. For purposes of comparison, the same exercise is repeated using estimates of social security implicit taxes reported by Blöndal and Scarpetta (1999).¹³ In panel (b) of Figure 6, the scatter plot includes the same 11 countries analyzed by Gruber and Wise (1999). Panel (c) uses all 20 countries for which Blöndal and Scarpetta report implicit social security tax burdens. Both charts support the conclusion reached by Gruber and

¹² Measured at the mean replacement rate in the different samples of countries, the elasticity of labor force withdrawal rates to changes in the replacement rate varies from a low of 0.23 percent (using the Blöndal-Scarpetta estimates of replacement rates) to a high of 0.76% (using the Casey et al. estimates). The elasticities estimated using the other three measures of replacement rate range between 0.31% and 0.39%, although none is precisely determined. The estimates are difficult to compare because they each cover a somewhat different sample of countries. The countries included to produce different response estimates can be inferred from the replacement rate estimates shown in Table 2.

¹³ We use the estimates of implicit social security taxes shown in column 5 of Table 3 above. These estimates seem more comparable to the ones used by Gruber and Wise (1999) in their analysis. If we instead use Blöndal and Scarpetta’s estimates shown in column 1 of Table 3, which refer to the implicit tax in the standard pension system alone, the association between implicit taxes and labor force exit is somewhat weaker.

Wise, although as noted by Blöndal and Scarpetta the apparent effect of implicit social security taxes is smaller than found by Gruber and Wise. The three estimates can be compared by calculating the elasticity of labor force withdrawal with respect to changes in the implicit social security tax rate. Calculated at the mean value of tax rates in each sample, this elasticity is 0.41 in panel (a), 0.23 in panel (b), and 0.28 in panel (c) of the chart. The reason for the difference does not seem to be the countries included in the sample, since the biggest and smallest elasticity estimates are obtained using the same sample of countries. The main difference between the estimates thus appears to be the procedures used to obtain measures of the implicit tax faced by workers who delay retirement under a social security system. Different procedures and assumptions yield a different pattern of cross-country differences, and these in turn provide a different picture of the influence of retirement incentives on exit rates.

Limitations of the cross-national analyses. Cross-national evidence on the influence of social security incentives on labor force withdrawal confirms many of the findings from single-country studies based on aggregate time series data or panel data for a representative sample of workers. The summary here suggests there are some weaknesses in the cross-national evidence, however. First, different sources do not agree on the precise character of the retirement incentives created by particular national systems. The differences in characterizing a particular system's retirement incentives occur for understandable reasons. Public pension systems are frequently reformed, and this makes it difficult to describe completely and accurately the relationship between a worker's earnings and his current and future benefits. Pension systems often contain several sub-systems, and one analyst may emphasize one component of the system while other analysts focus on another. The rules of a particular pension system may leave room for administrative discretion in awarding or denying pensions. If careful researchers do not agree in their descriptions of a national retirement system it is not easy to decide which measures of pension incentives are the most reliable.

Second, many national systems have been extensively reformed over time. While this offers researchers an opportunity to determine whether particular reforms have induced a behavioral response, it also means that labor force participation patterns in a given year will reflect responses not only to incentives in the current system but also to now-defunct provisions

of the old system.¹⁴ As noted earlier, the U.S. social security system once imposed confiscatory taxes on workers who attained the standard retirement age. It offered no actuarial adjustment for retirements deferred after age 65, and it imposed a strict retirement earnings test on current pensioners. The program has eliminated the retirement earnings test for workers who attain the standard retirement age, and it will soon adjust benefits on an actuarially fair basis for retirements that are deferred between ages 62 and 70. The United Kingdom public pension system has also been reformed to allow pensioners past the standard retirement age to work while collecting a pension. The implicit tax imposed by the system on late-career earnings has been reduced. Many people who are now aged made career choices when the work-discouraging features of social security were still in effect, however. They may have chosen their jobs and selected their saving strategies based on an expectation that social security would always impose heavy taxes on workers once they reached the pensionable age. Under these circumstances it is not obvious whether labor force patterns among today's elderly are the product of the system's current generous treatment of pensioners' earnings or of the system's past taxation of such earnings.

An advantage of cross-national evidence is that it allows researchers to statistically identify the impact of radically different program features on aggregate behavior. However, the statistical identification would be more persuasive if researchers could be certain that workers are fully informed about the provisions of their retirement system and are actually responding to the incentives known to the analyst. When pension systems are constantly changing it seems likely that many workers and pensioners are choosing their behavior on the basis of an imperfect understanding of the current incentives or an excellent understanding of rules that no longer apply.

A third problem with cross-national studies is that workers leave employment and enter retirement through many routes in addition to the standard pension system. Judged only by the incentives provided by its public pension system, the Netherlands should have a comparatively

¹⁴ Richard Johnson (2000) offers a detailed examination of several historical episodes in which national pension systems were reformed. He estimates the impact of the reforms by comparing aggregate behavioral trends in a country undergoing reform with trends in a similar country which left its pension system largely unchanged in the period. The analysis confirms that pension reform can have measurable effects, but it does not always offer consistent evidence on which features of the pension system have the biggest work-discouraging effect.

high labor force participation rate among its elderly. Its main public pension begins at a relatively late age (65), the pension system imposes modest implicit taxes on earned income, and according to some calculations its system provides mid-level gross replacement rates to workers who leave their jobs at the standard retirement age. In spite of these work-encouraging features of the Dutch pension system, the Netherlands has an exceptionally high rate of labor force exit (see Table 1). One reason is that occupational pensions in the Netherlands encourage retirement at age 60. Another is that other components of the Dutch social insurance system subsidize labor force exit for people who are involuntarily unemployed. In characterizing the retirement incentives offered by the Dutch social security system, both Gruber and Wise (1999) and Blöndal and Scarpetta (1999) correctly emphasize the work-discouraging effects of these alternative routes out of the labor force. Yet the occupational pension system is partly a product of negotiations between unions and employers. The social partners could adopt provisions that are more favorable to later retirement if they chose to do so. (Voluntary occupational pensions in the United States often have a similar effect in encouraging early retirement.) If workers and employers have voluntarily decided to arrange compensation so that it encourages early labor force exit, it is not obvious whether reform that reduces public pensions and gives greater scope to funded occupational pensions will lead to later retirement. The Dutch case makes it plain that reform of the public pension system by itself may have quite limited effects on the timing of retirement. Many Dutch retirees withdraw from the labor force as a result of incentives that are created outside the public pension system.

System reform and future labor supply

The cost of most public retirement systems is mounting rapidly, and many observers believe it will be necessary to make them less generous in order to keep them affordable and politically acceptable. For two reasons it is important to know whether scaling back benefits will cause retirement patterns to change. Policymakers have a practical reason for wanting to know whether labor force exit patterns are likely to change and, if so, by how much. If they cut benefit levels or raise the early retirement age, they need to know how much overall benefit payments are likely to fall. This will be determined, in part, by the work responses of people affected by the cut. If the response is large, the budgetary impact and wider economic consequences will also be large. Both policymakers and the general public also need to understand how much

income and consumption levels among the elderly will fall if benefits are scaled back. In most countries public retirement benefits account for a large percentage of the cash income received by elderly families, and the percentage is particularly large for families with below-average incomes. If benefits were scaled back and the average retirement age remained unchanged, low income retired workers would face large reductions in their old-age income and consumption.

The cross-national studies we have considered contain abundant evidence confirming some of the main findings from earlier micro-econometric research. They show that public pensions encourage earlier retirement. But like the earlier micro-econometric studies they do not provide a complete explanation for the decline in labor force participation at older ages. Moreover, they do not offer precise guidance about the likely response of labor supply to specific changes in national social security systems. International evidence may nonetheless be helpful in suggesting the possible extent of labor supply change that would follow a major overhaul of pension and related programs. The increase in future aggregate supply obviously depends on the amount of labor exit that is postponed as a result of reform and on the relative size of the affected population. Population aging is proceeding at a faster rate in some OECD countries than in others (see Casey et al., 2003, p. 34). National populations which in the future will contain a higher proportion of older people can expect the largest gains in aggregate labor supply if there is an increase in participation among the aged.

One way to estimate the potential change in aggregate supply is to calculate how much participation in the 15-64 year-old population would change if labor force exit rates returned to the pattern of some past year. Figure 7 implements this strategy for selected OECD countries. Using population projections prepared by the U.S. Census Bureau for 2030 and alternative estimates of age-specific labor force participation rates for the population between 50 and 64, we made alternative predictions of the future labor force aged 15-64.¹⁵ There are several possible approaches to adjusting future participation rates so that past labor force withdrawal patterns are

¹⁵ Detailed predictions are presented in two appendix tables. We did not predict changes in the labor force 65 and older. Cross-national data on participation rates after age 65 is comparatively poor. We only have detailed participation rate information by age group for this population in a handful of countries. Since participation rates among people 65 and older have declined substantially in most OECD countries, it seems reasonable to predict that major pension reform could increase participation rates in this population. The estimates in Figure 7 and the appendix table refer solely to participation changes in the population under 65, however.

restored. We experimented with two approaches, and in this conclusion we will report the results of one of them. The estimates presented in Figure 7 leave some participation rates unchanged from their levels in 2000 and increase participation rates among the aged. In particular, we assume that participation rates in the population between 15 and 50 years old will remain at the levels observed in 2000. At the same time, we assume that the relative participation rates of people between 50 and 64 will increase. This assumption does not mean that the predicted age pattern of 2030 participation rates will mirror the rates observed in some past year. It means that the rates of *decline* in labor force participation between ages 45-49 and 60-64 will mirror the pattern observed in a past year. In many countries, the overall adult participation rate predicted for 2030 will be higher than it was in any past year, primarily because participation rates of women are predicted to be higher than they were in the past.¹⁶

The estimates presented in Figure 7 show changes under two assumptions about the future profile of labor force exit. Under one assumption, exit patterns among men and women will be identical to the patterns observed in 1980. Under the second, exit patterns will mirror the patterns observed in 1960. Not surprisingly, the latter assumption produces a higher estimate of future labor supply. In all cases the percentage change in aggregate supply is calculated relative to the size of the 2030 labor force assuming that participation rates and labor force exit patterns are the same as those actually observed in 2000. In view of the big cross-country differences in labor force exit documented in Table 1 it should not be surprising that predicted labor force changes differ widely across countries. Countries that saw the biggest increase in labor force exit during the past forty years are predicted to have the biggest increases in aggregate supply. The importance of participation rate gains in the 50-64 population obviously depends on the relative size of that population. In Japan this population will constitute 38 percent of the population aged 15-64, while in the United States only 27 percent of the 15-64 population will be between 50 and 64. This obviously implies that participation-rate gains in the older population can have proportionally larger effects in Japan compared with the United States. Japanese labor

¹⁶ An alternative procedure is to use estimated exit rates like those shown in Table 1 to forecast labor force participation rates in future years. For reasons mentioned earlier, this estimation procedure is more practical for men than it is for women, because the strong upward trend in female participation makes it difficult to estimate reliably the dynamic exit pattern among women. In the case of men, using this alternative procedure produced estimates of aggregate labor supply growth that were almost indistinguishable from the projections shown in Figure 7 and the appendix tables.

force exit rates declined only modestly over the past forty years, however, so even if Japanese exit patterns returned to their old level their would be little change in participation rates.

The potential effects of slower exit rates are much bigger in continental Europe. The Netherlands would see its aggregate labor force grow 7 percent if exit rates declined to the rates observed in 1980, and the gain in aggregate labor supply would be twice as large if exit rates returned to the pattern of 1960. If the labor force participation rates of 2000 persist through 2030, current population forecasts suggest that the Dutch labor force will decline 6 percent (see Appendix Table A1). The estimates in Figure 7 imply that this reduction would be entirely offset if Dutch labor force exit rates returned to the levels of 1980. Dutch supply would *increase* 7 percent if exit rates returned to the pattern of 1960. Even if 50-64 year-old workers earn less than workers under 55, the increase in labor supply could significantly lighten the burden on active workers of supporting a retired population.

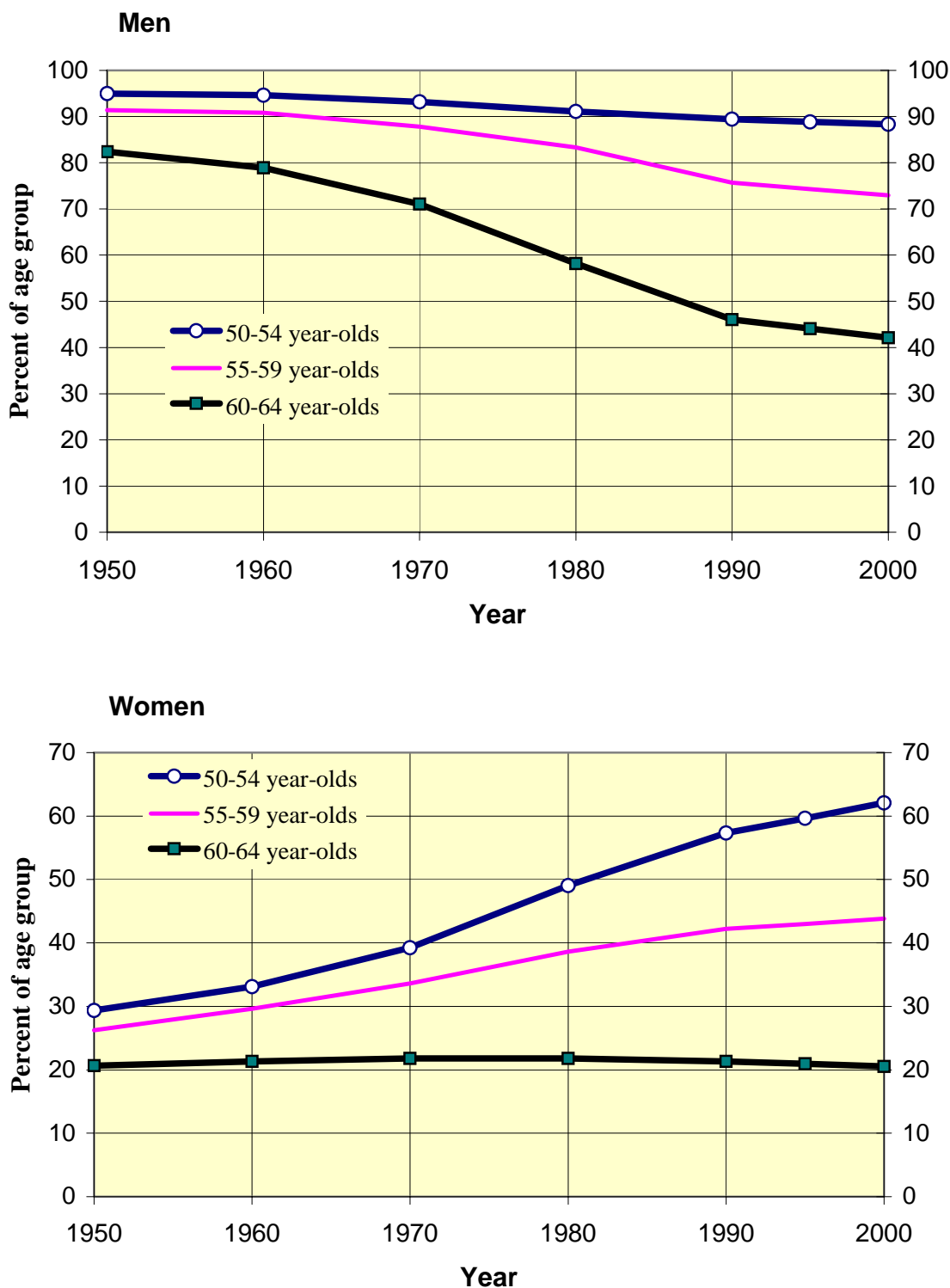
The tabulations displayed in Figure 7 suggest that increases in participation among the aged cannot offset the impact of population aging in several OECD countries. Older people in Japan, Switzerland, and Sweden already have participation rates that are comparable to those of past generations, so it is unlikely that changes in participation can substantially reduce the burden of supporting a larger aged population. The tabulations also suggest that participation-rate increases can significantly boost labor supply in continental Europe. Both the cross-national and micro-econometric studies show that lower replacement rates and reduced implicit taxes on earnings in old age will increase participation rates in old age. What is far less certain is the size of the increase that would follow a particular set of reforms.

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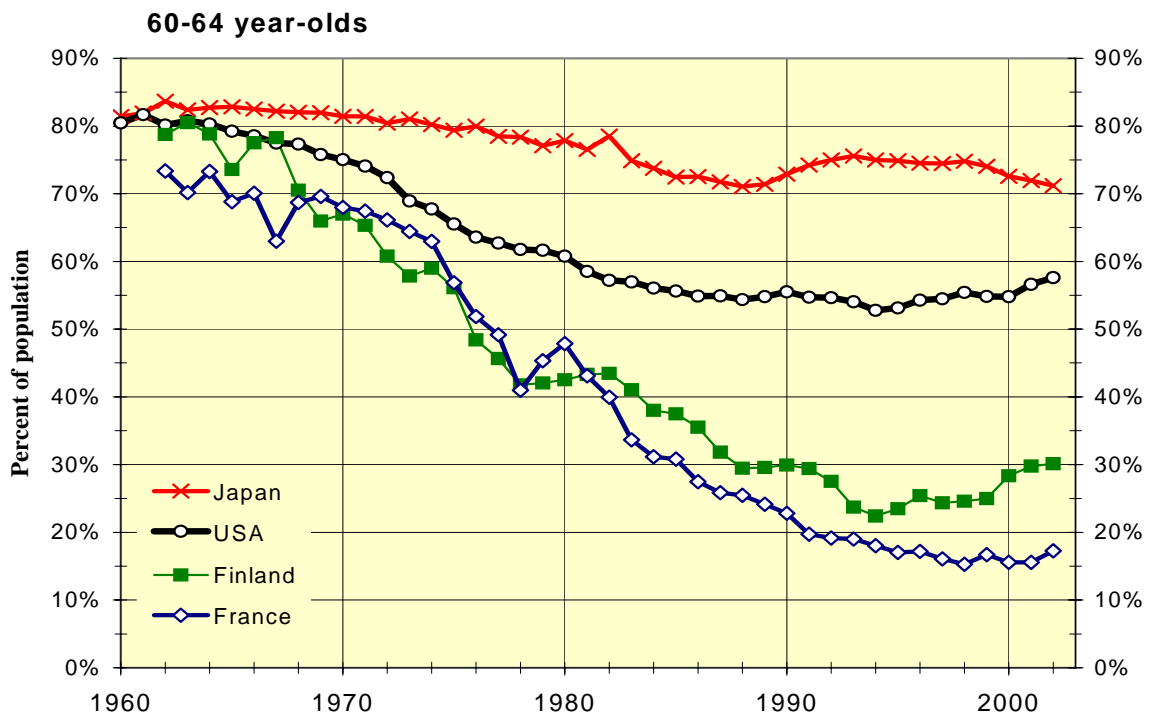
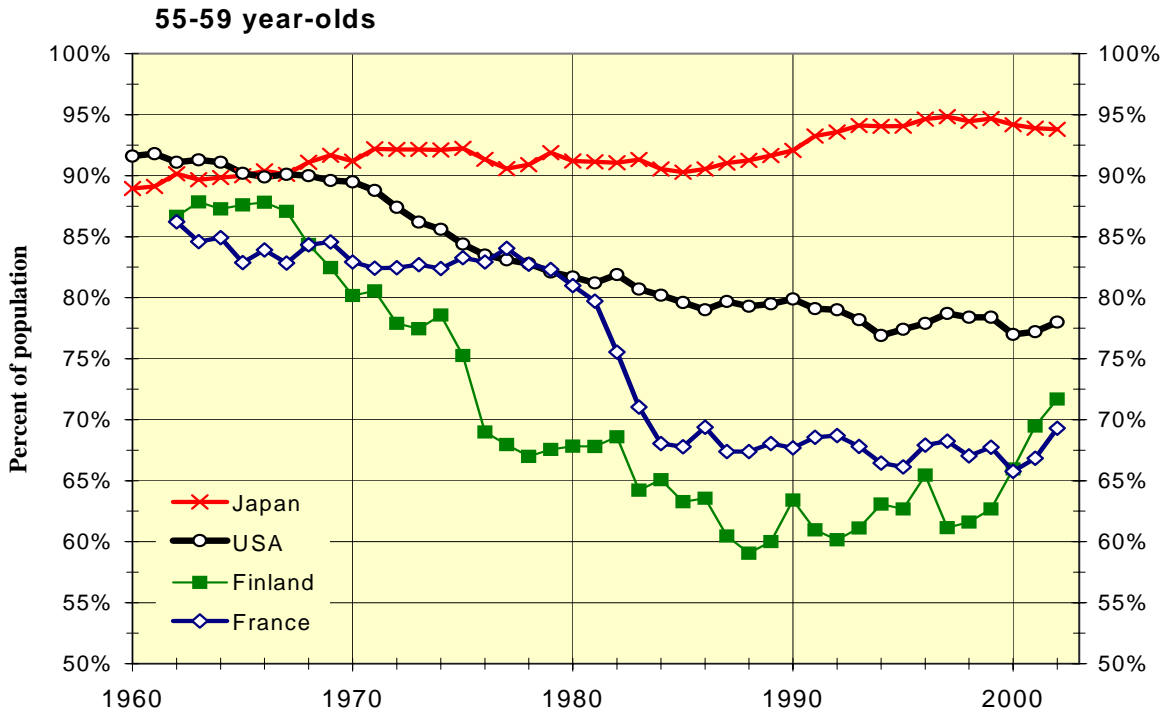
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Figure 1. Trend in Economic Activity Rates at Older Ages in 21 OECD Countries, 1950-2000



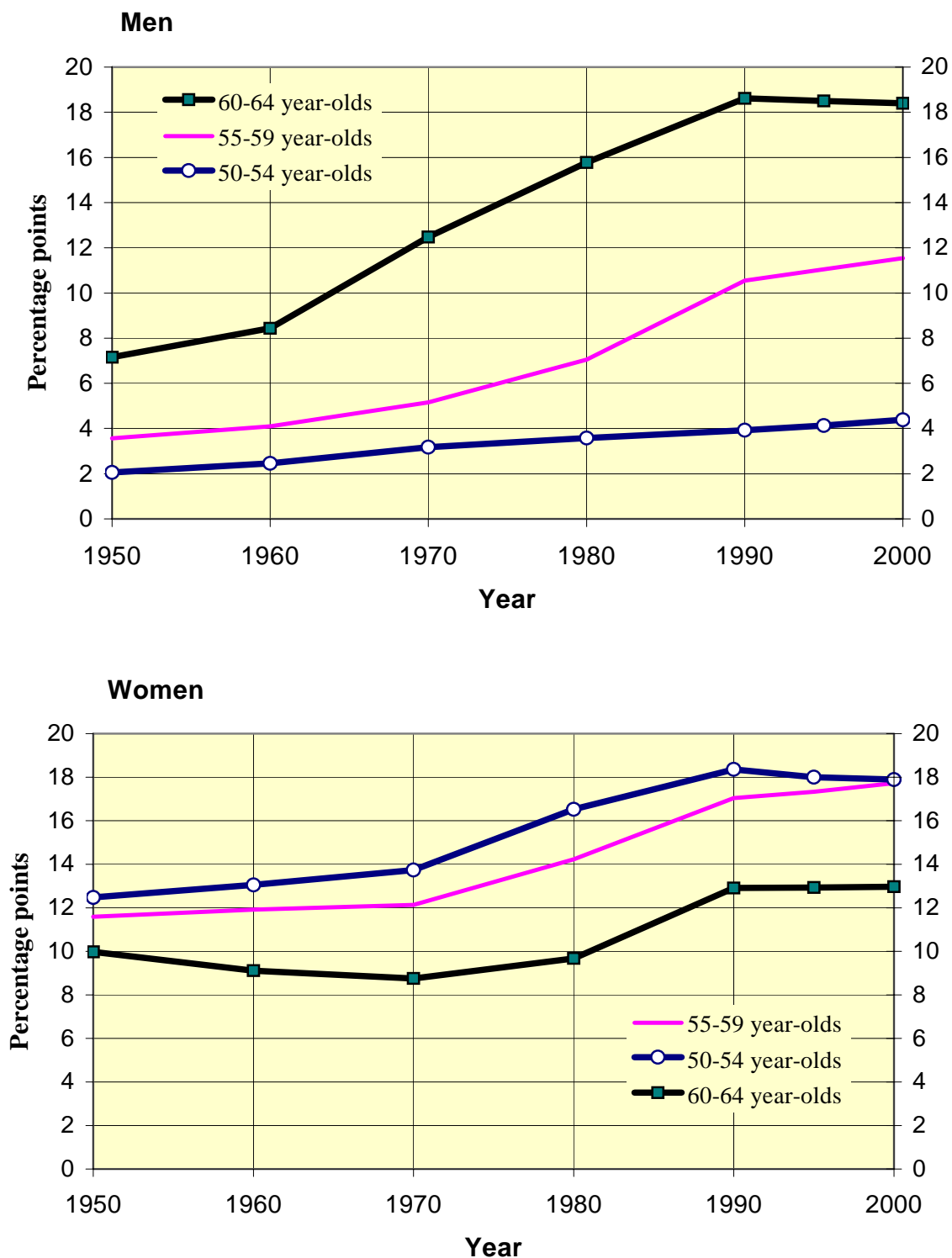
Source: ILO data base.

Figure 2. Labor Force Participation Rates of Older Males in Four Countries, 1960-2002



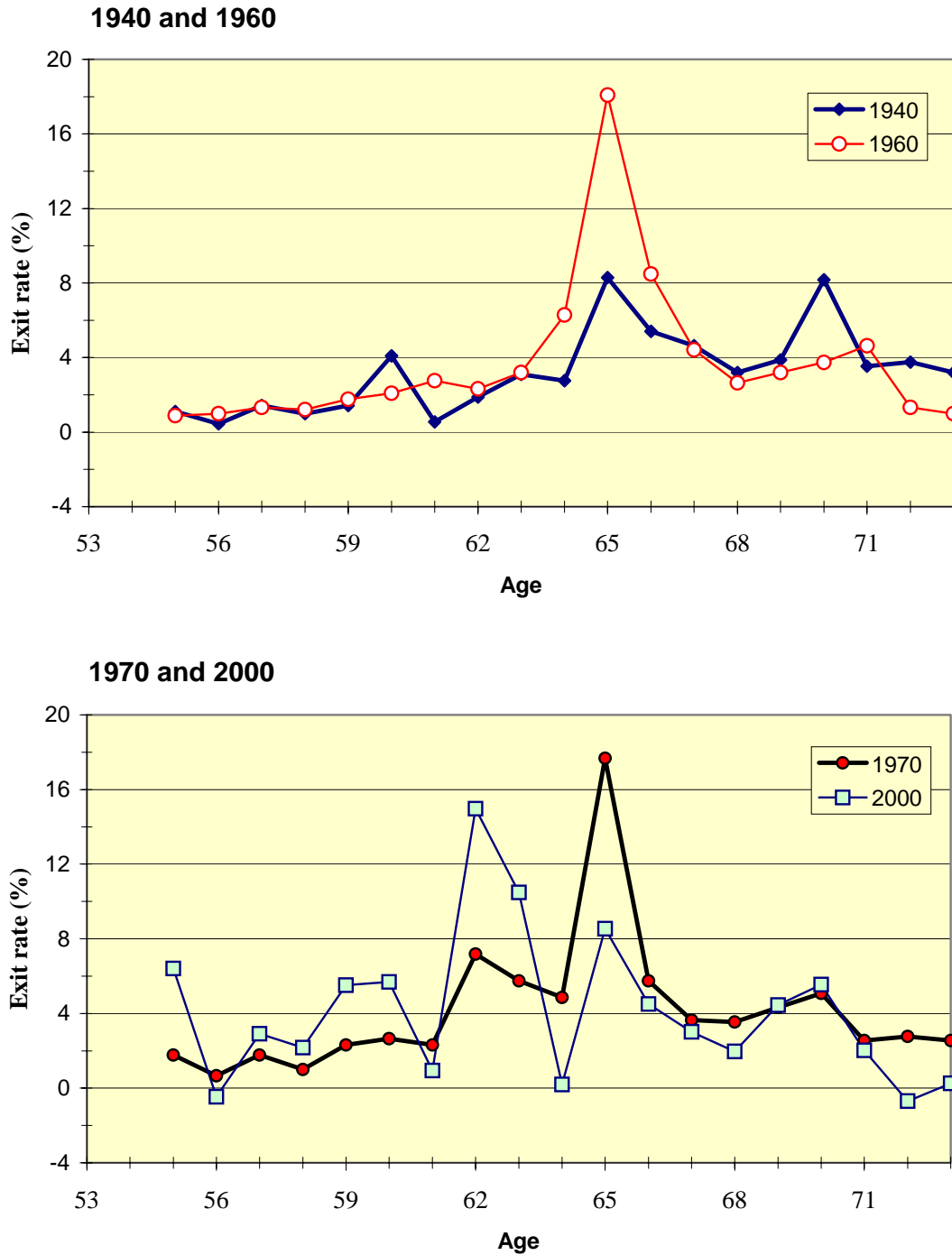
Source: OECD and U.S. Bureau of Labor Statistics.

Figure 3. Standard Deviation of Economic Activity Rates at Older Ages across 21 OECD Countries, 1950-2000



Source: ILO data base.

Figure 4. Labor Force Exit Rates among U.S. Males by Exact Year of Age, 1940-2000

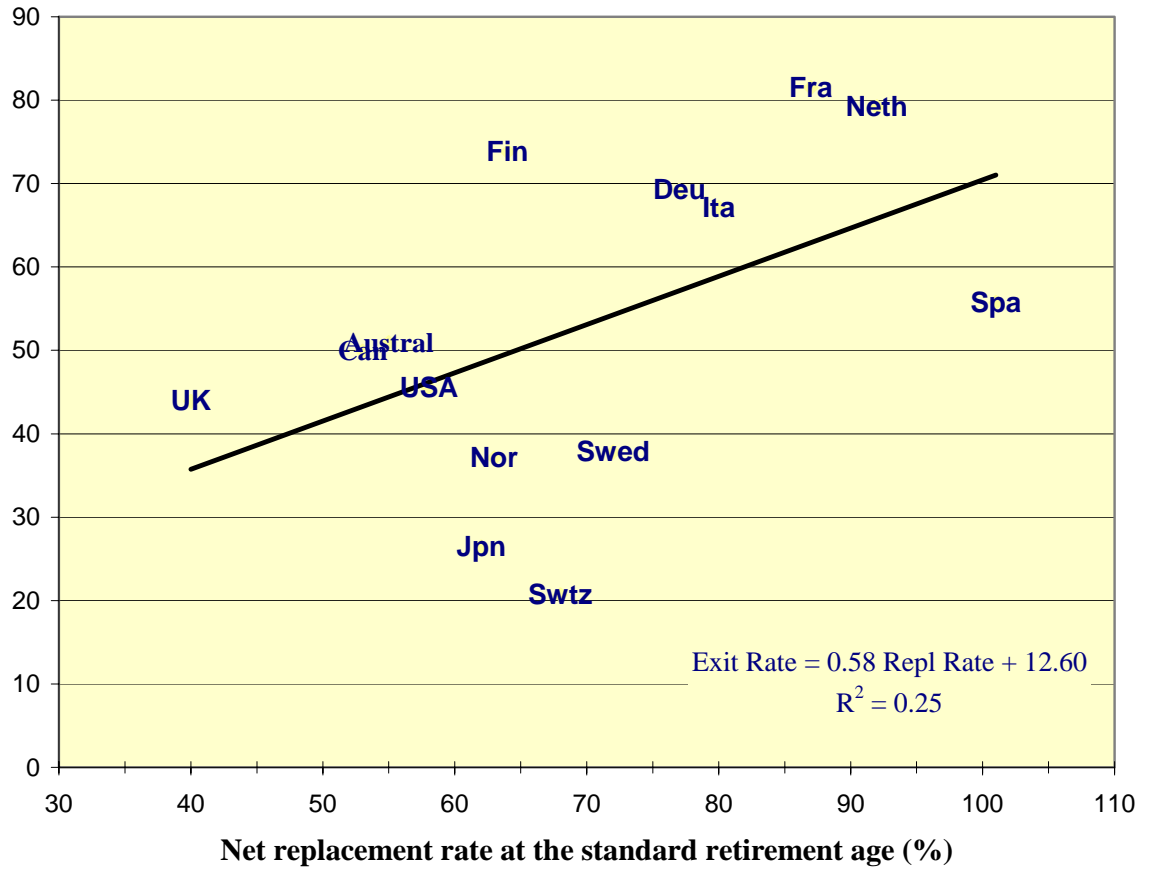


Note: In a given calendar year, y , the exit rate at age a is calculated as $[LFP(a-1) - LFP(a)] / LFP(54)$, where LFP is the labor force participation rate at the indicated age in year y .

Source: Author's tabulations based on 1940, 1960, and 1970 decennial Census and monthly CPS files for 2000.

Figure 5. Male Exit Rates and Net Earnings Replacement at the Standard Retirement Age in Fourteen OECD Countries

Exit rate through
age 60-64



Sources: Casey et al. (2003) and author's estimates of male labor force exit rates as described in the text.

Figure 6. Labor Force Exit Rate and Implicit Social Security Tax on Earnings in Selected OECD Countries, Late 1990s

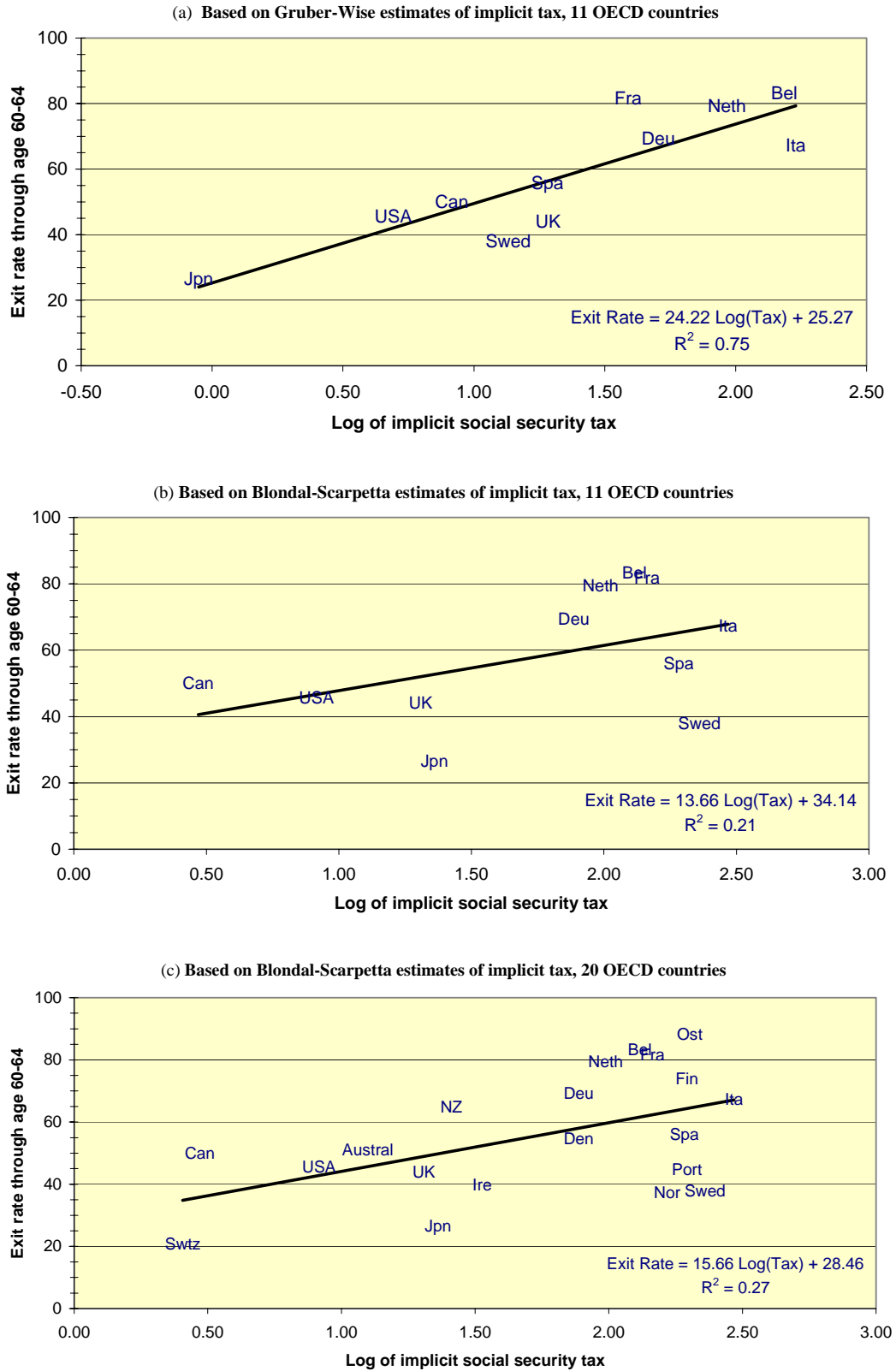
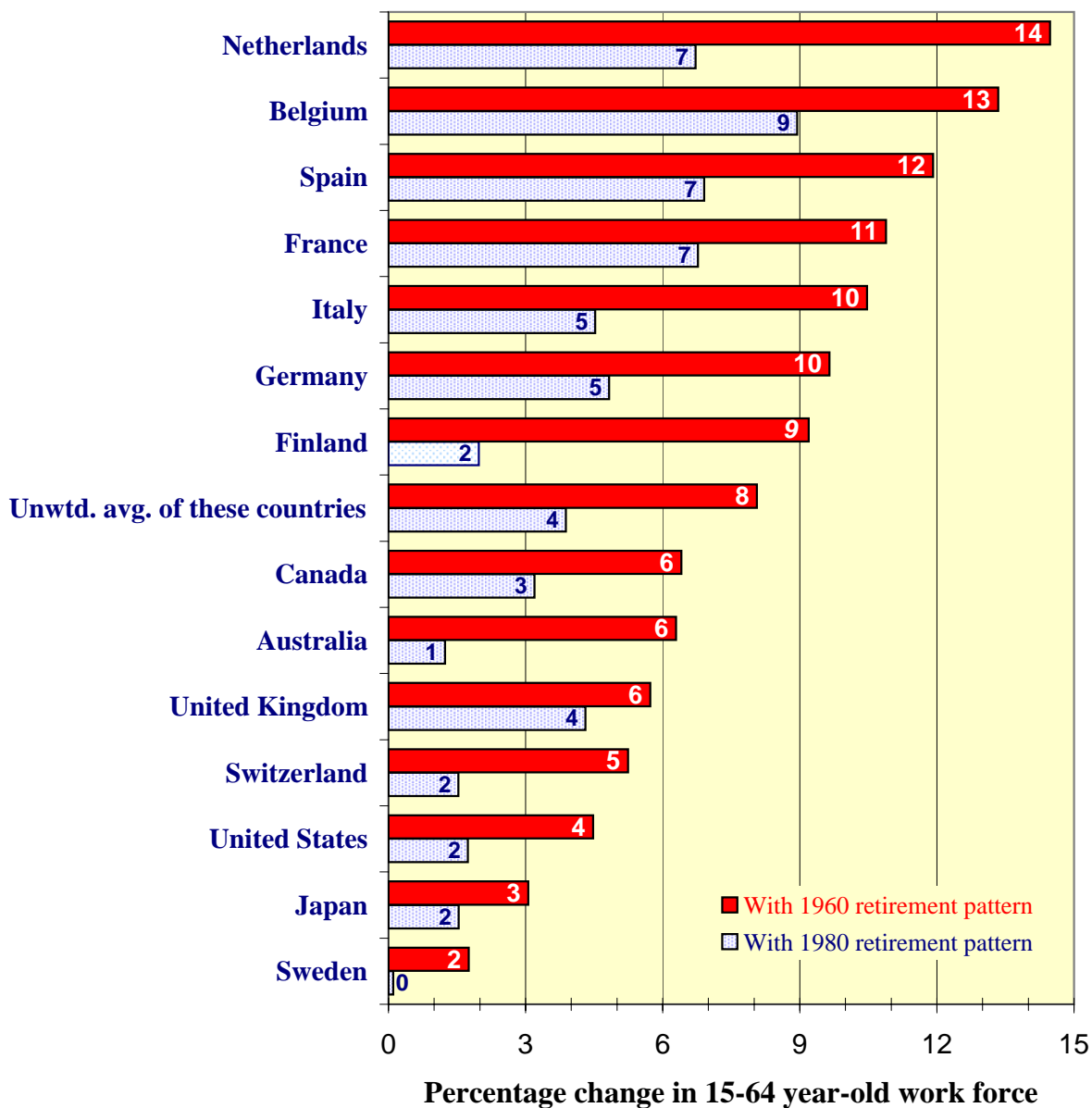


Figure 7. Estimated Change in 2030 Labor Force under Alternative Retirement Scenarios, Selected OECD Countries



Note: Percentage change is calculated relative to the 2030 labor force under the assumption that 2000 age-specific participation rates continue unchanged.

Source: Author's estimates based on ILO estimates of labor force participation and U.S. Census Bureau forecasts of the future population.

Table 1. Male Labor Force Exit Rates in Twenty-one OECD Countries, 1960s and 1990s

Percent

	1960s		1990s		1960s to 1990s	
	Exit rate through age		Exit rate through age		Change in exit rates	
	55-59 (1)	60-64 (2)	55-59 (3)	60-64 (4)	55-59 (3) - (1)	60-64 (4) - (2)
Austria	13	54	38	88	+25	+34
Belgium	14	41	50	83	+36	+42
France	17	43	32	81	+15	+39
Netherlands	12	32	35	79	+23	+47
Finland	18	40	36	74	+18	+33
Germany	8	25	23	69	+15	+45
Italy	14	50	32	67	+18	+18
New Zealand	6	31	17	65	+11	+33
Greece	12	30	27	56	+14	+26
Spain	11	24	23	56	+12	+31
OECD average	9	27	23	56	+13	+29
Denmark	5	15	14	54	+9	+40
Australia	8	23	21	51	+13	+28
Canada	7	24	20	50	+13	+26
United States	9	24	17	46	+9	+21
Portugal	9	18	23	45	+14	+26
United Kingdom	5	18	17	44	+12	+26
Ireland	5	14	18	40	+13	+26
Sweden	7	23	11	38	+4	+15
Norway	6	17	15	37	+9	+21
Japan	3	11	4	26	+1	+15
Switzerland	3	11	4	21	+0	+9

Note: The exit rate is the proportional drop in economic activity rates from age 45-49 to the indicated ages over the course of the decade. Countries are ranked from highest to lowest by their exit rates through ages 60-64 in the 1990s.

Source: Author's estimates based on ILO data base.

Table 2. Early and Standard Retirement Ages in Twenty-one OECD Countries, 1989-2003

	Early eligibility age for men				Standard retirement age for men					Agree on early entitlement age?	Agree on standard retirement age?
	Kalisch & Aman (1998)	Blondal-Scarpetta (1999)	Gruber-Wise (1999)	Duval (2003)	Std. Age Whitehouse (2002)	Kalisch & Aman (1998)	Blondal-Scarpetta (1999)	Duval (2003)			
								(Circa 1989)	(Circa 2003)		
Australia	60	65		65	61 => 65 /a/	65	65	65	65	No	Yes
Austria	60	60		65		65	65	65	65	Yes	Yes
Belgium	60	60	60	60		65	65	65	65	Yes	Yes
Canada	61	60	60	60	65	65	65	65	65	No	Yes
Denmark	60 /b/	67		67 / 65		67	67	67	65	No	Yes
Finland	60	60		60 / 62	65	65	65	65	65	Yes	Yes
France	60	60	60	60		60	60	60	60	Yes	Yes
Germany	60 /c/ or 63	63	60	63	63 / 65	60	65	65	65	No	No
Greece	60					65	62			n.a.	No
Ireland	55	66		65		65/66	66	66	66	No	Yes
Italy	52	52	55	55 / 57	57 / 65	63	62	60	65	No	No
Japan	60	60	60	60	60 => 65 /a/	60/65	60	65	65	Yes	Yes
Netherlands	65	65	60	60	65	65	65	65	65	No	Yes
New Zealand	62	63		65		62	62	60	65	No	No
Norway	62	65		67	67	67	67	67	67	No	Yes
Portugal	60 /c/	65		65		65	65	65	65	No	Yes
Spain	60	60	60	60	35 yrs. Contrib.	65	65	65	65	Yes	Yes
Sweden	60	60	60	60	65	65	65	65	65	Yes	Yes
Switzerland	63	65		63	65	65	65	65	65	No	Yes
United Kingdom	50	65	60	65	65	65	65	65	65	No	Yes
United States	62	62	62	62	65	65	65	65	65	Yes	Yes

Notes:

/a/ Standard retirement age gradually being increased.

/b/ Partial pension available. "Needs contribution of over 10 yrs in last 20 yrs and needs to continue working as part-time" (p. 76).

/c/ Available to insured workers who are long-term unemployed.

Sources: Blondal and Scarpetta (1999); Duval (2003); Gruber and Wise (1999); Kalisch and Aman (1998); and Whitehouse (2002).

Table 3. Alternative Estimates of Pension Replacement Rates Near Standard Retirement Age, Twenty-one OECD Countries

Percent of net or gross earnings before retirement

	Blondal-Scarpetta (1999)	Duval (2003)	Casey et al. (2003)	Whitehouse (2002)	Keenay-Whitehouse (2002)
	Gross replacement rate at standard retirement age	Gross replacement rate between ages 65-69	Net replacement rate at standard retirement age	Gross replacement rate at standard retirement age	Net replacement rate at standard retirement age
	(1)	(2)	(3)	(4)	(5)
Australia	41	64	55	42	53
Austria	80	72			
Belgium	68	51			
Canada	52	58	53	38	52
Denmark	56				
Finland	60	60	64	60	67
France	65	70	87	66	81
Germany	55	47	77	36	58
Greece	120				
Ireland	40	39			
Italy	80	97	80	58	83
Japan	52	46	62	50	60
Netherlands	46	62	92		
New Zealand	61	51		70	92
Norway	60	35	63	48	62
Portugal	83	75			
Spain	100	84	101	84	93
Sweden	74	75	72	70	80
Switzerland	49	65	68	51	61
United Kingdom	50	46	40	33	41
United States	56	46	58	42	57
Average of above countries:	64	60	69	54	67

Correlation of column entries with --

Column 1	1.00	0.68	0.61	0.80	0.80
Column 2		1.00	0.58	0.59	0.60
Column 3			1.00	0.80	0.91
Column 4				1.00	0.94
Column 5					1.00

Note: Entries left blank were not calculated in the indicated sources.

Sources: Blondal and Scarpetta (1999); Casey et al. (2003); Duval (2003); Keenay and Whitehouse (2002); Whitehouse (2002); and author's calculations.

Table 4. Loss in Social Security Wealth as a Result of Postponing Retirement from Age 55 to Age 70, Selected OECD Countries, Late 1990s

Multiple of worker's gross annual earnings

	Blondal and Scarpetta (1999)					Gruber-Wise (1999)
	Old-age pension system (1)	Unemployment-related benefits (2)	Disability benefits (3)	Special early-retirement benefits (4)	Maximum of four disincentives, (1) - (4) (5)	"Tax force" from ages 55 to 69 (6)
Australia	-0.9	*	-3.0	*	-3.0	
Austria	-7.0	-7.0	-10.0	*	-10.0	
Belgium	-5.0	-6.4	-7.1	-8.3	-8.3	-8.9
Canada	-1.6	*	*	*	-1.6	-2.5
Denmark	-0.8	-6.6	-5.0	-3.7	-6.6	
Finland	-4.9	-7.1	-9.9	*	-9.9	
France	-6.3	-7.2	*	-8.7	-8.7	-4.9
Germany	-3.4	-5.7	-6.6	*	-6.6	-5.5
Ireland	-2.6	-4.6	-4.6	*	-4.6	
Italy	-11.8	*	*	*	-11.8	-9.3
Japan	-3.9	*	*	*	-3.9	-1.0
Netherlands	-2.9	-7.3	-5.7	*	-7.3	-7.2
New Zealand	-2.3	-4.0	-4.1	*	-4.1	
Norway	-3.3	*	-9.2	-4.3	-9.2	
Portugal	-3.7	-6.6	-9.9	*	-9.9	
Spain	-5.9	-7.8	-9.8	*	-9.8	-3.6
Sweden	-3.3	*	-10.6	*	-10.6	-3.1
Switzerland	-1.5	*	*	*	-1.5	
United Kingdom	-1.5	-2.6	-3.7	*	-3.7	-3.6
United States	-2.5	*	*	*	-2.5	-2.0
Correlation of column entries with --						
Column 1					0.72	0.60
Column 5					1.00	0.62

* Small or not applicable.

Note: Entries in the table show cumulative losses in social security benefits if workers postpone retirement from age 55 to age 70, measured as a multiple of the worker's annual gross earnings. Entries left blank were not calculated in the indicated source.

Sources: Blondal and Scarpetta (1999); Gruber and Wise (1999); and author's calculations.

Table A1. Growth of Labor Force under Alternative Assumptions about Exit Patterns in Twenty-one OECD Countries, 2000-2030

Percent of labor force in 2000

	Male labor force with exit			Female labor force with exit			Total labor force with exit		
	pattern of --			pattern of --			pattern of --		
	2000	1980	1960	2000	1980	1960	2000	1980	1960
Australia	12	14	18	9	9	16	10	12	17
Austria	-17	-14	-6	-17	-12	-6	-17	-13	-6
Belgium	-11	-2	2	-14	-9	-4	-12	-5	-1
Canada	11	14	17	8	11	16	9	13	16
Denmark	-6	-3	0	-4	-2	4	-5	-3	2
Finland	-14	-11	-5	-15	-14	-8	-14	-12	-6
France	-4	2	5	-7	0	5	-5	1	5
Germany	-17	-14	-9	-19	-15	-12	-18	-14	-10
Greece	-9	-4	-1	-12	-9	-5	-10	-6	-3
Ireland	28	32	34	16	25	32	24	30	34
Italy	-15	-12	-7	-26	-21	-17	-19	-15	-11
Japan	-19	-18	-18	-22	-21	-18	-20	-19	-18
Netherlands	-6	0	7	-6	0	7	-6	0	7
New Zealand	22	25	28	18	18	25	20	22	27
Norway	1	5	6	3	-1	19	2	2	12
Portugal	-7	-5	-1	-15	-8	-4	-10	-6	-2
Spain	-13	-8	-3	-23	-16	-12	-16	-11	-7
Sweden	-4	-3	-2	-3	-5	-3	-4	-4	-2
Switzerland	-5	-5	-4	-6	-3	4	-6	-4	-1
United Kingdom	1	6	7	-1	3	4	0	5	6
United States	17	19	22	14	17	19	16	18	21
OECD average	-3	1	4	-6	-2	3	-4	-1	4

Note: Estimates refer to the labor force aged 15-64.

Source: Author's estimates based on ILO data base and national population projections of the International Data Base, U.S. Census Bureau <<http://www.census.gov/ipc/www/idbnew.html>>, downloaded January 15, 2004.

**Table A2. Change in Labor Force Compared with the Baseline
Forecast under Alternative Exit Rates, 2030**

Percent of baseline forecast of 2030 labor force

	Male labor force under exit pattern in --		Female labor force under exit pattern in --		Total labor force under exit pattern in --	
	1980	1960	1980	1960	1980	1960
Australia	2	6	0	7	1	6
Austria	5	14	5	12	5	13
Belgium	11	15	6	11	9	13
Canada	3	6	3	7	3	6
Denmark	3	7	1	7	2	7
Finland	3	10	1	8	2	9
France	6	10	7	12	7	11
Germany	4	10	5	9	5	10
Greece	6	9	4	8	5	8
Ireland	4	5	8	14	5	8
Italy	4	10	6	11	5	10
Japan	1	1	2	5	2	3
Netherlands	7	15	6	14	7	14
New Zealand	3	5	0	6	1	5
Norway	4	5	-4	16	0	10
Portugal	2	7	8	13	5	9
Spain	6	11	9	14	7	12
Sweden	2	3	-2	0	0	2
Switzerland	0	1	3	11	2	5
United Kingdom	4	6	5	5	4	6
United States	1	4	2	5	2	4
OECD average	4	8	4	9	4	8

Note: Estimates refer to the labor force aged 15-64. See text and Table A1.

Source: Author's estimates based on ILO data base and national population projections of the International Data Base, U.S. Census Bureau <<http://www.census.gov/ipc/www/idbnew.html>>, downloaded January 15, 2004.