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David A. Wise

One of the most striking economic trends in the United States over the past three decades has been the withdrawal of older persons from the labor force. This trend is common to almost all other industrialized countries as well, although in planning the analysis explained below I did not know that. There had been a great deal of work in the United States aimed at understanding the relationship between the provisions of the Social Security system and the retirement of older workers. I had participated in some of that work.1 The United States Social Security system began in 1935 and expanded over the next four decades.

There was a concurrent trend in the United States. The adoption of employer-provided pension plans was spurred by the Revenue Act of 1942, which clarified the tax incentives to employers who established pension plans. These plans grew rapidly over the 1950s, 1960s, and 1970s. Most of these were so-called defined benefit plans, in which the employee pension benefit at retirement depended on years of service with the employer and earnings, typically earnings in the last years of employment. The first description (of which I am aware) of the incentives inherent in the plan provisions was by Jeremy Bulow (1981). Edward Lazear (1983) also wrote an influential paper proposing that the incentives were intended to induce older workers to leave the labor force, based on the proposition that, when old, they were paid more than their marginal product.

In a series of articles, Laurence Kotlikoff and I (Kotlikoff and Wise 1985, 1987, 1988, 1989a) used data from the Bureau of Labor Statistics—which published information on the precise provisions of a large sample of employer-provided plans—to describe the incentive effects over a broad range of pension plans in the United States, and we emphasized the enormous variation across plans. These data, however, contained no information on
the retirement decisions of individuals covered by the plans. To obtain plan provisions together with data on individual retirement choices, we examined firm personnel records. These data included information on individuals’ retirement decisions and their earnings histories, in addition to a precise description of their firms’ pension plan provisions. Again we (Kotlikoff and Wise 1989b) used such data to describe the striking relationship between pension plan provisions in a firm and retirement from that firm.

James Stock and I (Stock and Wise 1990a, 1990b) used firm data in the development and estimation of the option value retirement model. The central feature of this method is recognition of the important effect on retirement of the future accrual pattern of pension benefits. That is, retirement benefits could be much larger, or much smaller, if retirement is delayed, and thus the “option value” of delaying retirement can have an important effect on individual retirement decisions. Subsequent analyses by Lumsdaine, Stock, and Wise (1992) of the option value model in comparison with a stochastic dynamic programming specification were also based on firm data. Our conclusion was that the option value model seemed to capture the retirement decisions of employees just as well as or perhaps better than the closely related, but more complex, dynamic programming model. This result was confirmed by Ausink and Wise (1996). Several other articles by Lumsdaine, Stock, and Wise (1990, 1991, 1994, 1996, 1997) compared results from several firms, for men and women, and for different types of employees. We found very similar behavioral response to pension plan incentives by men and women and by different types of employees.

Although this work was directed to the retirement incentive effects of employer-provided pension plans, it was clear that the same framework could be used to analyze the incentive effects of public social security plans, which were also typically based on a defined benefit formulation of retirement benefits.

While this work establishing a new framework for analyzing the incentive effects of plan provisions was progressing, there was growing interest in the financial liability of social security systems in the United States, as well as in other countries. Feldstein (1998), for example, focused on this issue. There were three interrelated issues: one was that pay-as-you-go social security systems were under financial pressure in most industrialized countries, a second was that labor force participation rates were falling in many counties, and a third was that the provisions of the plans themselves could be contributing to the decline in labor force participation. The juxtaposition of these three issues led me to believe that by comparing social security systems across countries, it might be possible to learn much more about the retirement incentive effects of plan provisions than was possible from studying one system in isolation. Considering social security systems in different countries would be analogous to considering the effects of dif-
federal employer-provided pension plans—with varying provisions—in the United States.

Thus I set out to organize such a study. Jonathan Gruber agreed to work with me on the project and we have been collaborators in this project ever since. At the outset I wrote the following letter to economists in other countries, most of whom I had known from past contacts and many of whom were friends of long standing.

I am organizing an international project on Social Security and I would like to entice you to participate....

Social Security provisions and benefits vary widely from country to country. Yet in virtually every developed country, population aging has placed increased financial pressure on the social security system. At the same time, labor force participation rates of older people are falling in many countries. Indeed, in some countries at least, incentives inherent in the social security system and employer-provided pensions provide inducement to retire early. Policy discussions and academic deliberations in many countries, including the United States, have considered ways that the financial viability of the systems might be addressed. For example, in the United States, current plans call for an increase in the Social Security retirement age from 65 to 67 and other changes in the calculation of benefits. Because the issue is so widespread, it seems to me that the topic provides a natural opportunity to learn from the experience in different countries.

I have in mind a project that would include papers pertaining to the system in each participating country. The papers would include two components: The first component would describe the system in each country and would present consistent calculations that would allow comparisons between countries. In particular, we would want to describe analytically the benefit generosity, labor force participation incentives, and possibly other features inherent in the provisions of each country. To do this will require precise calculations based on the benefit formulas in each country.... We may also need to describe how the public social security system interacts with employer-provided pensions. We would develop a template that would describe the calculations that would be made for each country.

The second component would be country specific and could bring out empirical or conceptual issues specific to a particular country. For example, it could discuss reform proposals and how they are intended to change the incentives or other features described in the first component....

Jon Gruber has agreed to help me set up the project and in particular will help to develop a template that can be used to provide comparable cross-country comparisons.

This invitation was sent to individuals in ten countries, in addition to the United States. Almost every recipient agreed to participate and in one or two cases where the recipient was unable to do so, the recipient directed
me to another likely participant. By early 1996 we had the team established. (An additional country, Denmark, was added after the first phase of the project.)

From the beginning, the key feature of the project was to prepare papers in each country according to a common template that Gruber and I developed, so that results could be compared across countries.

Three phases of the ongoing project have been completed and we are now working on the fourth. I will describe the results of the first three phases and then comment on plans for the fourth and future phases. For each phase, the country team prepared a paper for that country. The country papers for each phase are grouped into a single volume. An important component of each volume is the summary chapter that Gruber and I prepared. The intent of the summary chapters is to combine the key findings from each of the country papers in a way that facilitates comparison of the findings across countries. The results reported below are drawn largely from these summary chapters.

Phase I: Plan provisions, incentives to retire, and labor force participation of older workers

By the time work began, it had become clear that under pay-as-you-go social security systems, governments around the world had made promises they could not keep. The systems were not sustainable. Social reform discussions were ongoing, and continue, in almost all developed countries. Some proposals sought fundamental reform, often calling for funding through personal social security accounts. Other proposals called for “incremental” reform, suggesting increases in retirement ages and other changes without altering the basic pay-as-you-go structure of the systems.

It has been commonly assumed that the problem of unsustainable systems was caused by population aging. The number of retirees is now increasing very rapidly relative to the number of younger persons in the workforce. In addition, people are living longer, so that workers who reach retirement age will be receiving benefits longer than they used to. The ratio of the number of people aged 65 and older to the number 20 to 64—based on data available at the time this study was begun—is shown in Figure 1, now (in the 1990s) and in future years, for ten countries. The increase is striking in almost every country. In Japan, with the most rapid population aging, the ratio will more than double by 2020 and will almost triple by 2050. These demographic trends have placed enormous pressure on the financial viability of the social security systems in these countries, increasing the number of retirees relative to the number of employees who must pay for the benefits for retirees.

The financial pressure caused by population aging was compounded by another trend. In virtually every country employees were leaving the
FIGURE 1  Population aged 65+ years to population aged 20–64

![Population Ratio Chart](chart.png)

NOTE: Figure for Japan is the ratio of persons aged 65+ to those 15–64. German data for “Now” is based on the average of the ratio in 1990 and the projected ratio in 2000. Canada data shown for 2020 are for 2025.

SOURCE: Gruber and Wise (1999b).

...labor force at younger and younger ages, further increasing the ratio of retirees to labor force participants who must pay for the benefits. The labor force participation rates of men aged 60 to 64 for the years 1960 to 1996 are shown for each of the ten countries in the two panels of Figure 2. The decline was substantial in each of the countries, but was much greater in some countries than in others. In the early 1960s, the participation rates were above 70 percent in all but one of the countries and above 80 percent in several. By the mid-1990s, the rate had fallen to below 20 percent in Belgium, France, and the Netherlands. It had fallen to about 32 percent in Italy, about 35 percent in Germany, and 40 percent in Spain. Although analysts in the United States have often emphasized the “dramatic” fall in that country, the US decline from 82 percent to 53 percent was modest in comparison to the much more precipitous declines in European countries. The decline to 57 percent in Sweden was also large, but modest when compared to the fall in other countries. Japan stands out with the smallest decline of all the countries, from about 83 percent to 75 percent. Labor force participation rates of 45–59-year-old men, as well as those 60 and older, have also declined substantially.2
What had gone largely unappreciated was that, like the retirement incentives built into employer-provided defined benefit plans in the United States, defined benefit social security programs could also induce older workers to leave the labor force. Thus the provisions of the programs could contribute to their own financial insolvency. The goal of the first phase of the
The project was to describe the incentives inherent in the social security provisions in the project countries and to relate the incentives to the labor force participation of older workers. The template for this phase asked that each country paper begin with a description of the historical evolution of labor force participation and then present data on the current age-specific activities and income sources of men and women. The template further asked that each country paper present data for men and women on: (1) labor force participation rates by age interval between 1960 and the present, (2) the proportion of employees covered by the public pension system and the proportion of persons over age 55 receiving public pensions from 1960 to the present, (3) replacement rates (the ratio of social security benefits to earnings just before retirement) under the public pension system from 1960 to the present, (4) current labor force participation rates by age, (5) labor force status—employed, unemployed, disabled, retired—by age, (6) proportion receiving various public “pensions”—e.g., old age, disability, survivor—by age, (7) proportions receiving employer-provided pensions by age, (8) source of household income by age, (9) retirement and public pension hazard rates by age. We asked that each paper then describe the institutional features of the country’s social security system, highlighting any interactions with other public and private programs that might also influence retirement behavior.

The core of each paper is a detailed analysis of the retirement incentives inherent in the provisions of that country’s retirement income system. By making the same analytic calculations and by presenting the same simulations in each of the countries, the individual studies could provide a means of comparing the retirement incentives among the countries.

Each of the country papers in this phase and in the second phase presents parallel labor force participation and other data for men and women. To simplify the exposition in what follows, I discuss only data for men. But the effect of the social security incentives on leaving the labor force, as discussed below, appears to be at least as important for women as for men. This finding is consistent with the aforementioned finding of very similar responses to employer-provided pension plan incentives by men and women, and by different types of employees, in the United States.

**Unused labor force capacity**

The proportion of men out of the labor force between ages 55 and 65 is shown in Figure 3 for 11 countries. The term “unused labor force capacity” is intended to emphasize that incentives to induce older persons to leave the labor force reduce national economic production, recognizing of course that not all persons in these age ranges want to work or are able to work. For the 55 to 65 age group the proportion ranges from close to 0.7 in Belgium to about 0.2 in Japan. Subsequent results will show the relationship between social security plan provisions for leaving the labor force and this
measure of unused labor force capacity. I first describe the measurement of incentives to retire.

Measuring incentives to retire

Three key features of social security systems have important effects on incentives to exit the labor force. The first is the age at which benefits become available. This is called the early retirement age, or the age of first eligibility. Across the countries participating in this study, the first eligibility age ranges from about 53 for some employee groups in Italy to 62 in the United States. The “normal” retirement age—e.g., 65 in the United States—is also important, but typically much less so than the early retirement age. Now in most countries, few people work until the “normal” retirement age.

The second feature of plan provisions, which is strongly related to the extent to which people continue to work after the early retirement age, is the pattern of benefit accrual after the age of first eligibility. The idea can be explained this way: Consider two components of total compensation for working an additional year. One component is current wage earnings. The other is the “increase” in future promised social security benefits. Consider a person who has reached the social security early retirement age and suppose that a person is debating whether to work for an additional year. It is natural to suppose that if benefit receipt is delayed by a year, benefits when they are received might be increased, to offset
the receipt of benefits for one less year. But in most countries this is not the case. Once benefits are available, a person who continues to work for an additional year will receive less in social security benefits over his lifetime than if he quit work and started to receive benefits at the first opportunity. That is, the present-value expected social security benefits decline. In many countries, this loss of social security benefits can offset a large fraction of the wage earnings a person would receive from continued work. Thus there is an implicit tax on work, and total compensation can be much less than net wage earnings.

More formally, consider the difference between the expected discounted value of social security benefits (social security wealth) if retirement is age \( a+1 \) and the present value if retirement is at age \( a \), namely \( \text{SSW}(a+1) - \text{SSW}(a) \). This difference is called the accrual of benefits between age \( a \) and age \( a+1 \). This value is often negative. If the accrual is positive, it adds to total compensation from working the additional year; if the accrual is negative, it reduces total compensation. The ratio of the accrual to net wage earnings is an implicit tax on earnings if the accrual is negative and an implicit subsidy to earnings if the accrual is positive. Thus a negative accrual discourages continuation in the labor force and a positive accrual encourages continued participation. This accrual rate, and the associated tax rate, form a key calculation that was made in the same way for each of the countries. As it turns out, the pension accrual is typically negative at older ages: continuation in the labor force means a loss in pension benefits, which imposes an implicit tax on work and provides an incentive to leave the labor force. In many countries the implicit tax on work is 80 percent or more the first year after benefit eligibility.

This feature of plan provisions is related to a technical term called “actuarial adjustment.” In the United States, for example, if benefits are taken at age 64 instead of 65, they are reduced just enough to offset the receipt of benefits for one additional year. If they are taken at 63 instead of 65, they are reduced just enough to offset the receipt of benefits for two additional years, and so forth.\(^3\)

A third important feature of social security systems is that in many European countries disability insurance and special unemployment programs essentially provide early retirement benefits before the official early retirement age. Where these programs are prevalent they are incorporated in our social security incentive calculations. For example in Germany, many employees retire as early as age 57 under a “disability” program.

In Germany there was no actuarial adjustment before the 1992 reform legislation, and until recently most employees still retired under provisions that did not include actuarial adjustment. The magnitude of the combined effect of early retirement under the German disability program and no actuarial adjustment is illustrated conceptually in Figure 4. The official
social security normal retirement age in Germany is 65. Suppose that at that age, benefits would be 100 units per year. Many employees can receive benefits at age 57 through the disability program. The disability benefits at 57 are essentially the same as normal retirement benefits at age 65. That is, a person eligible for disability benefits at age 57 who did not take the benefits at that age would forego 100 units per year. On the other hand, suppose benefits were reduced actuarially if taken before age 65 and increased actuarially if taken after age 65. Then benefits taken at 57 would be about 60 units instead of 100. And if receipt of benefits were delayed for a year (to age 58), annual benefits would be increased just enough to offset their receipt for one less year. And if the receipt of benefits were delayed past age 65 they would be increased actuarially. Benefits if taken at 70 would be about 140 units instead of 100. There would be no incentive to take benefits early. Indeed there would be no social security incentive to take benefits at any specific age, once benefits were available.

Retirement incentives and labor force participation

To summarize the social security incentive to retire in each country, we propose a simple measure. At each age, beginning with the early retirement age, the implicit tax on work was calculated in each country. These implicit tax rates on work were then summed beginning with the early retirement age and running through age 69. This measure we called the “tax force” to retire. The sum is shown for each of the countries in Figure
5. This tax force to retire ranges from more than 9 in Italy to about 1.5 in the United States.

The tax force to retire and unused labor force capacity

The key finding from this phase of the analysis is shown in Figures 6 and 7. Figure 6 shows the relationship between the tax force to retire and unused labor force capacity—the proportion of men between ages 55 and 65 who are out of the labor force. It is clear that there is a very strong correspondence between the two. Figure 7 shows the same data for all of the countries except Japan, and rescales the tax force measure to achieve a linear relationship between the tax force to retire and unused labor force capacity. The relationship between the two is even more evident. The proportion of variation in unused labor force capacity that is explained by the tax force to retire is 86 percent (as indicated by the R-squared value).

The results of the first phase were reported in Gruber and Wise (1999a). The summary to the volume (Gruber and Wise 1999b) concluded as follows:

... This decline in labor force participation magnifies population trends, further increasing the number of retirees relative to the number of persons who

FIGURE 5  Sum of tax rates on work, from early retirement age to 69

SOURCE: Gruber and Wise (1999b).
FIGURE 6 Unused labor force capacity vs. tax force to retire

![Figure 6: Unused labor force capacity vs. tax force to retire](image)

SOURCE: Gruber and Wise (1999b: 32-33, Figure 17).

FIGURE 7 Unused labor force capacity vs. tax force to retire

![Figure 7: Unused labor force capacity vs. tax force to retire](image)

SOURCE: Gruber and Wise (1999b: 32-33, Figure 17).
are working. Together these trends have put enormous pressure on the financial solvency of social security systems around the world. Ironically, we argue, the provisions of the social security systems themselves typically contribute to the labor force withdrawal.

... We conclude that social security program provisions have indeed contributed to the decline in the labor force participation of older persons, substantially reducing the potential productive capacity of the labor force. It seems evident that if the trend to early retirement is to be reversed, as will almost surely be dictated by demographic trends, changing the provisions of social security programs that induce early retirement will play a key role. (Gruber and Wise 1999b: 34–35)

Phase II: Estimation of the effect of plan provisions on retirement

The first phase of the project established two key results: (1) that the social security systems in many countries provide enormous incentives to leave the labor force at older ages; and (2) that there is a strong correspondence between social security incentives to retire and the withdrawal of older workers from the labor force.

Building on the correspondence between incentives to retire and labor force participation, we wanted to develop estimates of the effect of changes in plan provisions on labor force participation. Thus, in the second phase of the project, we set out a template to estimate how much the retirement age would change if social security provisions were changed, based on within-country analysis of the determinants of retirement. The analysis was to be based on the micro data within each country, considering the relationship between retirement and the incentives faced by individual employees. That is, rather than considering system-wide incentives for representative persons (such as those with median earning histories) and comparing these incentives with aggregate labor force participation across countries, we now turned to micro-econometric analyses within countries. The results of these analyses are based on differences in individual circumstances within a given country.

For this phase, the investigators in each country assembled large micro data files combining information on individual retirement decisions with retirement incentives (together with other individual data). Individual measures of social security retirement incentives—which vary substantially across persons within a country—were calculated on the basis of the methods developed for the first phase of the project. The key incentive measure was the “option value” of delayed retirement. This measure is based on the potential gain (or loss) in social security wealth if receipt of benefits is delayed. That is, this constructed economic variable describes the financial gain
or loss from continuing to work. Estimation using this measure goes back to the Stock and Wise (1990a, 1990b) procedure we used to analyze the effect on retirement of employer-provided defined benefit pension plans in the United States, as discussed above. Results based on this measure are reported below. Estimates were also obtained based on the peak value measure proposed by Coile and Gruber (2001).

As in the first volume, the analysis in each country followed a detailed template, so that results could be compared across countries. The micro analysis in each country was based on a sample of individuals. In some cases, the data come largely from administrative records. In other cases, they were obtained from special surveys. It was possible to estimate the same models in each country, even though the population covered by the country data sets differed in some respects.

The key advantage of the micro estimation is that in each country the effects of changes in plan provisions can be predicted. The first striking feature of the collective analyses based on within-country micro data is that social security retirement incentives have very similar effects on labor force participation in all countries. In particular, the results strongly confirm that the relationship between labor force participation and retirement across countries is not the result of cultural differences that could, for example, yield different norms, or “taste” for work, at older ages. The within-country analyses show similar responses to retirement incentive effects, even though the countries differ with respect to cultural histories and institutions.

The second feature of the micro analyses is that they allow consideration of several features of social security systems, as well as individual attributes, that may simultaneously affect retirement decisions. In particular, the micro estimation results allow us to estimate jointly the effect on retirement of the age at which benefits are first available and the incentive to retire once benefits are available. Both of these features were shown in the first phase of the project to be key determinants of retirement.

Effect of plan provisions demonstrated by simulation

To demonstrate the effect of plan provisions on retirement, we used the estimates for each country to simulate the effect of three illustrative changes in plan provisions. Actually, only two illustrative plan changes were simulated in the second phase of the project, but a third was added in the third phase. Thus all three are described here.

(1) Three-year increment in eligibility ages: This simulation increases all eligibility ages by three years, specifically the early retirement age, the normal retirement age, and the ages of receipt of disability benefits. In countries in which disability, unemployment, or other retirement pathways are important, the eligibility age for each of the programs is delayed by three years.
(2) *Actuarially fair reform:* This reform reduces benefits actuarially if taken before the normal retirement age and increases benefits actuarially if taken after the normal retirement age.

(3) *Common reform:* This illustrative simulation is intended to predict the effect of the same reform (the "common reform") in each country. Under the common reform, the early retirement age is set at age 60 and the normal retirement age at 65. Benefits taken before age 65 are reduced "actuarially," by 6 percent for each year before age 65. Benefits taken after age 65 are increased by 6 percent for each year the receipt of benefits is delayed. In addition, the replacement rate at age 65 is set at 60 percent of (projected) earnings at age 60.

The potential implication of the reforms can be made clear with reference to Figure 4 above and by two additional figures. As in Figure 4, I continue to use a conceptual representation of social security provisions in Germany as an example. Figure 8 shows the effect of a three-year increment in eligibility ages. The assumption is that the first age of eligibility in Germany (for receipt of benefits from the disability program) is 57. Under this illustrative reform, benefits would be zero at ages 57, 58, and 59. Benefits would first be available at age 60. In the United States, for example, this illustrative reform would increase the age of first eligibility from 62 to 65.

Figure 4 illustrated the effect of actuarial reform in Germany. As explained above, such reform in Germany can be very important. On the other hand, actuarial reform in the United States would have little effect since the system is already actuarially fair between 62 and 65, although the de-

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**FIGURE 8  Germany: Base and 3-year increment**

![Graph showing benefit levels over age ranges with base and 3-year increment markers.](image-url)
layed retirement increase is not yet quite actuarially fair. In other countries, the actuarial adjustment could in fact increase average benefits. In France, for example, the normal retirement age is 60, without actuarial adjustment in cases where retirement is delayed. But the actuarial reform would increase benefits taken after age 60.

Figure 9 shows the effect of the common reform in Germany, and, for comparison, shows the three-year increment and the actuarial reforms as well. Since the common reform in Germany would increase the age of first eligibility by three years, the common reform incorporates the three-year increment in eligibility. In addition the common reform incorporates actuarial reduction in benefits before and actuarial increase in benefits after the normal retirement age. Finally, the common reform in Germany implies a substantial reduction in benefits at the normal retirement age of 65. In short, the receipt of benefits is delayed by three years—from 57 to 60 in the conceptual illustration—benefits at the normal retirement age are reduced from 100 to 75 percent, and normal retirement age benefits are adjusted actuarially if taken before or after the normal retirement age. As Figure 9 suggests, the combined effect of these changes can be large in Germany. Benefits before age 60 are no longer available. When they become available at age 60 there is no financial incentive to take benefits then as opposed to some later age. And, when the normal retirement age is reached there is no financial incentive to take benefits at that age as opposed to some later age.

**FIGURE 9** Germany: Base, 3-year increment, actuarial adjustment, and common reform
As our work progressed it became clear that we could not rely on a single estimation method or a single simulation method to obtain results. Thus based on the findings for each of the countries, and based on collective discussions with all of the participants, we concluded that we should make calculations on the basis of two principal estimation specifications and three simulation methods. The goal was to provide estimates that were likely to bracket the actual responses that might be expected if plan provisions were changed. With only one exception, all of the results summarized below are based on the option value estimation method (OV) and are based on the simulation method that I believe gives the most reliable long-run effects of the illustrative changes in plan provisions in most countries.

Three-year increment in eligibility ages and labor force participation

The basic findings can be illustrated in two figures. Figure 10 shows the effect of the three-year increment in eligibility ages, based on the method that we believe is most likely to reflect the long-run effect of such a reform. To help standardize for the wide variation across countries in the age at which retirement begins, each bar shows the reduction in the frac-

**FIGURE 10  Out of labor force percent change, 25% age + 4 years, base versus 3-year delay**

![Bar chart showing the effect of a three-year increment in eligibility ages on labor force participation across different countries.](source: Gruber and Wise (2004b: 28, Figure 15).
tion of the population out of the labor force (OLF) four years after the age at which a quarter of the population has retired (which is an “effective retirement age”). There are two notable features of this figure. The first is that the average reduction in the proportion OLF—47 percent—is very large. The second notable feature is the similarity across countries. The reduction is between 34 and 55 percent in nine of the 12 countries. In Germany and Sweden, the reductions are 77 and 68 percent respectively. (The average reduction is 28 percent using the simulation method that we believe is likely on average to substantially underestimate the response to the three-year increment.)

The common reform and labor force participation

Figure 11 shows the effect on the proportion out of the labor force under the common reform. In this figure, it is clear that the greatest reductions in the proportion OLF under the common reform are realized in the countries with the youngest effective retirement ages. For the six countries with substantial retirement before age 60, the average reduction in the proportion OLF is 44 percent. For the six countries in which most retirement is after age 60, there is a 4 percent average increase in the proportion OLF.

FIGURE 11 Out of labor force percent change, 25% age + 4 years, base versus common reform

![Graph showing the effect of the common reform on the proportion out of the labor force.](source: Gruber and Wise (2004b: 32, Figure 19).}
The systematic pattern of these results shows a strong correspondence with intuition. For the six countries with the youngest effective retirement ages, the common reform represents a substantial increase in the youngest eligibility age, and the actuarial reduction means that benefits at this age are much lower than under the base country plans. Thus, for these countries, the proportion out of the labor force should decline under the reform, and that is the case for every country except Canada. But for the six countries with older retirement ages, the common reform may reduce the earliest eligibility age—as in the United States—and may provide a greater incentive to leave the labor force. In addition, the 60 percent replacement rate at the normal retirement age represents an increase in the replacement rate for some countries, such as the United States, and a reduction in the rate for other countries. Consequently, in three of these six countries, there is an increase in the proportion OLF under the common reform simulation.

A key reason for simulating the common reform was to determine whether the results would correspond with intuition based on current plan provisions. That the correspondence is close adds credence to the estimation and simulation methods and to the overall results.

We concluded the summary of this phase of the project (Gruber and Wise 2004b) with these comments:

In short: the results in this volume provide an important complement to the first volume. The results leave no doubt that social security incentives have a strong effect on retirement decisions. And the estimates show that the effect is similar in countries with very different cultural histories, labor market institutions, and other social characteristics. While countries may differ in many respects, the employees in all countries react similarly to social security retirement incentives. The simulated effects of illustrative reforms reported in the country papers make clear that changes in the provisions of social security programs would have very large effects on the labor force participation of older employees. (Gruber and Wise 2004b: 36)

**Phase III: The fiscal effects of changes in plan provisions**

The third phase of the project focused on estimation of the fiscal effects of changes in the provisions of social security systems. The results in this phase rely on the retirement model estimates obtained in the second phase. We simulate the fiscal effects of the three illustrative reforms.

Our goal was not to calculate the long-run balance sheets of social security systems, as the US Social Security Administration does, for example. Rather the approach we chose was designed to illustrate the fiscal implications by calculating the implications of reform for a specific cohort or for a
group of cohorts. For example, in the United States, the calculations show what the fiscal implications would have been had the social security provisions been changed for the cohort born between 1931 and 1941 (reaching age 65 between 1996 and 2006). As with the first two phases, the calculations were made according to a detailed template so that the results could be compared across countries.

An example for Germany

To help to understand the calculations that were made, I first describe the fiscal implications of actuarial reform in Germany, as reported in Börsch-Supan, Kohnz, and Schnabel (2003, working paper). Germany has a generous social security system, with strong incentives to retire early. In addition to the social security program per se, a large fraction of workers in Germany retire through disability and unemployment programs. These programs essentially provide early retirement benefits before the social security early retirement age of 60. Indeed, these programs provide the principal path to retirement in Germany. In addition, as noted above, once benefits are available, there is no actuarial reduction in benefits taken before the age 65 “normal” retirement age (although reforms in 1992 and more recently have introduced some actuarial reduction). For example, early retirement benefits taken at age 60, or benefits from the disability program taken at age 57, are the same as the age 65 normal retirement benefits. This provides an enormous incentive to take benefits when they are first available. If they are not taken, they are simply lost; there is no offsetting increase in benefits if they are received for fewer years.

Suppose that benefits in Germany were actuarially fair, so that benefits received prior to age 65 were reduced by 6 percent per year, and benefits received after 65 were increased by 6 percent per year. Table 1 shows the effect of this change on the mean retirement age for the sample of workers used in the analysis. The mean retirement age for men under the base (current provisions) is 62. The base simulation yields a mean retirement age very close to the sample mean. Actuarially fair reduction in

| TABLE 1  German illustration: Effect of actuarially fair reduction in benefits on retirement age for men and women (based on OV model) |
|---|---|---|
| **Model** | **Men** | **Women** |
| Sample frequencies | 61.9 | 61.7 |
| Base simulation | 62.1 | 62.0 |
| Actuarially fair simulation | 65.2 | 64.6 |

benefits would increase the retirement age by about three years for both men and women. Figure 12 shows the change in the distribution of retirement ages for men; there is a clear shift to older ages throughout the distribution.

The fiscal implications of this change are shown in Table 2. The total effect of the reform is decomposed into two parts—the "mechanical" effect that would exist if retirement ages did not change, and the behavioral effect that is attributable to change in retirement ages. Benefits received at any age before 65 are reduced actuarially, and benefits received after age 65 are increased ac-

| Table 2: German illustration: Fiscal implications of actuarially fair reform: Change in present discounted value, euros per worker (based on OV model with dummies shifted) |
|---------------------------------|-----------------|-----------------|-----------------|
|                                | Mechanical effect | Behavioral effect | Total effect     |
| Benefits                       | -37,056          | 19,632           | -17,423         |
| Contribution                   | 0                | 16,766           | 16,766          |
| All taxes                      | -1,558           | 50,608           | 49,049          |
| Net change                     | -35,497          | -47,741          | -83,238         |
| Percent change                 | -18.3            | -24.6            | -42.9           |

tuarially—in each case by 6 percent annually. If there were no change in re-
tirement ages, the average benefit per worker would be reduced by some 37,000
euros. But the behavioral response to the reform increases the average retire-
ment age, as shown in Table 1 and Figure 12. This increases the average ben-
efit by nearly 20,000 euros. The total (net) effect on benefits is a reduction of
around 17,000 euros.

In addition to the change in benefits, the reform has further fiscal im-
plications. Contributions to the social security system are increased if em-
ployees continue to work. This behavioral effect is an increase of nearly
17,000 euros. In addition, if employees work longer, they pay more in other
taxes. The total increase in taxes is 49,000 euros per worker (including taxes
for health and other insurance programs, income taxes, and VAT tax). The
net change in benefits minus the change in contributions and minus the
change in taxes is a decrease of about 83,000 euros. This net reduction in
the total government expenditures minus revenues is equivalent to 43 per-
cent of base benefits under the current system, entered as negative to in-
dicate that net government expenditures minus revenues have been reduced
by an amount equivalent to 43 percent of the base cost of the social secu-

FIGURE 13 Fiscal implications of actuarially fair reform
(net): % of GDP 2001

The fiscal effect of the actuarial reform in Germany as a percent of gross domestic product (GDP) is shown in Figure 13. This figure shows the estimated effect for each of six estimation and simulation methods. On balance, the reduction in benefits minus all taxes is about 1.2 percent of GDP.

Across all countries

Similar calculations were made for each country for each of the three illustrative reforms. The effect of the reforms depends of course on the current system in each country. An increase in eligibility ages will reduce expenditures and raise tax revenues in all countries. The actuarial reform, which has large effects in Germany, should have little effect in countries such as the United States and Canada where the system is already actuarially fair.

Results across all countries are shown in the next four figures. As with the results for the first two phases of the project, these results are also taken from the individual country papers. The volume containing the third phase results has not yet been published, however, so these results are taken from the working papers from each country (see the papers referenced under Phase III Working Papers).

Figure 14 Total fiscal effect of 3-year increment, as % of base cost

NOTE: The anomalous positive value of 4.9% for Denmark arises because of an unusual provision of the Danish system that would increase the number of persons receiving benefits from a more generous program when the eligibility ages are increased.

SOURCE: Gruber and Wise (forthcoming).
Figure 14 shows the total fiscal effect of the three-year increment in eligibility ages. For example, in Germany, the increase in government revenue resulting from a three-year increment in all eligibility ages would equal about 36 percent of the current cost of the program. Across all countries, the average increase in revenue is equivalent to 27 percent of current program cost—reported as a reduction in government expenditures minus revenues.

Figure 15 shows the increase in government revenue resulting from the three-year increment as a percent of gross domestic product. The average increase in revenue over all countries is equivalent to 0.72 percent of GDP—again reported as a reduction in government revenues minus expenditures. The result for the UK is not available.

Figure 16 shows the fiscal effect of actuarial adjustment, as a percent of base cost. As expected, there is large variation across countries. In the United States and Canada, for example, where adjustment is close to actuarial already, the effect is small. In Germany, where until recently there was no actuarial adjustment, the effect is very large, as explained in detail above. In France, actuarial increase in benefits after the age 60 normal retirement age would increase costs of the program. The same is true in the United Kingdom. On average the decrease in government expenditure minus revenue is equivalent to 2.8 percent of the base cost across all countries. Excluding the United Kingdom, the average is about 26 percent—reported as a reduction in government expenditures minus revenues.

FIGURE 15 Total fiscal effect of 3-year increment, as % of GDP

NOTE: The value for UK is not available.
SOURCE: Gruber and Wise (forthcoming).
Figure 16 shows the fiscal effect of the actuarial reform, as a percent of base cost. In accord with intuition, the total net government revenue as a percent of program base cost varies greatly. In the United States and Canada for example, benefits under the common reform are more generous than

Figure 17 shows the fiscal effect of the common reform, as a percent of base cost. In accord with intuition, the total net government revenue as a percent of program base cost varies greatly. In the United States and Canada for example, benefits under the common reform are more generous than
current benefits and they are available at age 60 instead of the current age 62 early retirement age. In the United Kingdom as well, the common reform benefits are much more generous than current benefits and the age 60 early retirement age is younger than the current early retirement age for some participants.

This phase of the project makes clear that reforms such as those considered here can have very large fiscal implications for the cost of social security benefits as well as for government revenues generated by changes in the labor force participation of older workers. Some combination of increases in the early retirement age, actuarial adjustment of benefits, and change in the benefit level can change net government revenue substantially. In many countries, the illustrative reforms simulated in this project yield increases in government revenue minus expenditures equivalent to 20 to 50 percent of current program cost. In accord with intuition, the common reform yields both increases and reductions in government revenue equivalent to a large fraction of current program costs.

The advantage of cross-country comparison

The project analysis to date has provided a much greater understanding of the economic costs of current social security policy than could have been provided by individual country-level analysis. Our estimates of the implications of changes in plan provisions are likely to inform policy decisions in all of the countries included here. And, understanding what has occurred in one country may help to redirect policy in another country. To date, the results of our analysis have been widely cited and we believe have already played an important role in policy discussions. More generally, analysis such as described here can promote the methodological advantages of cross-country comparisons.

Going forward

Social security is the largest social insurance program in most developed countries. The vast differences in program provisions have provided a natural laboratory for this ongoing international project to study the influence of program provisions on individual behavior. The findings have made clear that social security provisions in most countries induce older workers to leave the labor force early and that the substantial difference in retirement behavior across countries can be explained largely by the provisions of these programs. The findings also show that much of the inducement to retire comes through programs nominally labeled “disability insurance,” although it is evident that in many countries these programs essentially serve as routes to early retirement before the social security early retirement age.
The finding that social security provisions penalize the decision to continue working and thus distort retirement decisions is a critical foundation for understanding the effects of social security provisions and in particular the implications of system reform. But a comprehensive assessment of the implications of reform also requires an understanding of the relationship between social security provisions and the well-being of both the elderly and the young. If reform to prolong years of work also reduces income, this tradeoff must be considered in evaluation of the reform. If, on the other hand, lower benefits are completely offset by other forms of support such as labor income or greater personal saving, reform may have little detrimental effect on the well-being of the elderly.

Assessment of reform also requires evaluation of the implications of reform for the employment of the young. Indeed, a common explanation of provisions that induce the elderly to retire, and a common argument in opposition to reform, is that the departure of older persons from the labor force will improve the employment prospects of younger workers. To what extent do labor markets operate in this “boxed” fashion?

In addition, to understand the implications of reforming disability insurance programs, one must understand how the genuinely disabled would be affected by such changes. In particular, how do program provisions affect the relationship between health status and employment?

The prospect of comparable longitudinal data for the study of the health and retirement of older persons—through the nexus of the Health and Retirement Study, the English Longitudinal Study of Ageing, and the forthcoming Survey of Health, Ageing and Retirement in Europe—makes such analysis especially timely. Thus we have turned attention to these other issues. In particular, we hope:
—To understand the relationship between social security system provisions and the well-being of the elderly and the young.
—To understand the relationship between social security system provisions and the employment of the young.
—To understand how the relationship between health status and retirement varies with the provisions of social security (including disability insurance) programs, and to understand how the well-being of the disabled and the healthy elderly depends on program provisions.
Notes

This chapter explains the route to discovery of the relationship between Social Security provision and the labor force participation of older workers, through the ongoing project that I am directing with Jonathan Gruber through the National Bureau of Economic Research. The project has been funded through grants P20-AG12810 and P30-AG12810 as well as grant P01-AG05842, from the National Institute on Aging. I draw freely and heavily from the results of our project. I also describe the "near" background to this project, emphasizing how I was drawn to this effort. I do not attempt to summarize the vast amount of related work.

The country participants—most of whom have been active in the project from the beginning while a few have changed over time—are:

Belgium: Arnaud Dellis, Raphaël Desmet, Alain Jousten, Sergio Perelman, Pierre Pestieau, and Jean-Philippe Stijns
Canada: Michael Baker, Jonathan Gruber, and Kevin Milligan
Denmark: Paul Bingley, Nabanita Datta Gupta, and Peder J. Pedersen
France: Didier Blanchet, Ronan Mahieu, Louis-Paul Pelé, and Emmanuelle Walraet
Germany: Axel Borsch-Supan, Simone Kohnz, Giovanni Mastrobuoni, and Reinhold Schnabel
Italy: Agar Brugiavini and Franco Peracchi
Japan: Takashi Oshio, Akiko Sato Oishi, and Naohiro Yashiro

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Phase III Working Papers


