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SOCIAL SECURITY PROGRAMS AND RETIREMENT AROUND THE WORLD: FISCAL IMPLICATIONS

INTRODUCTION AND SUMMARY

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ABSTRACT

This is the introduction to and summary of Phase III of an international research project to study the relationship between social security provisions and retirement. The project relies on the work of a large group of economists in 12 countries who conduct the analysis for each of their countries. The first phase described the retirement incentives inherent in plan provisions and documented the strong relationship across countries between social security incentives to retire and the proportion of older persons out of the labor force. The second phase illustrated the large effects that changing plan provisions would have on the labor force participation of older workers. This third phase shows the consequent fiscal implications that extending labor force participation would have on net program costs – reduced government social security benefit payments less increased government tax revenues.

The findings are conveyed by simulating the implications of illustrative reforms. One reform increases benefit eligibility ages by three years. Another illustrative reform reduces actuarially benefits received before the normal retirement age. A common reform prescribes the same provisions in each country. The financial implications of the illustrative reforms are very large in many instances, often as much as 20 to 40 percent of current program costs. The savings amount to as much a 1 percent or more of country GDP. The results make clear that reforms like those considered in this volume can have very large fiscal implications for the cost of social security benefits as well as for government revenues engendered by changes in the labor force participation of older workers.

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Social Security Programs and Retirement around the World: Fiscal Implications

Introduction and Summary

by

Jonathan Gruber and David A. Wise

Under pay-as-you-go social security systems most developed countries have made promises they can't keep. The systems in their current forms are not financially sustainable. What caused the problem? It has been common to assume that the problem was caused by aging populations. The number of older persons has increased very rapidly relative to the number of younger persons and this trend will continue. (See Figure 1.[1]) Thus the proportion of retirees has increased relative to the number of employed persons who must pay for the benefits of those who are retired. In addition, persons are living longer so that those who reach retirement age are receiving benefits longer than they used to. The effect of aging populations and increasing longevity has been compounded by another trend: older persons are leaving the labor force at younger and younger ages, further increasing the ratio of retirees to employed persons. (See Figures 2a and 2b.) What has not been widely appreciated is that the provisions of social security programs themselves often provide strong incentives to leave the labor force. By penalizing work, social security systems magnify the increased financial burden caused by aging populations and thus contribute to their own insolvency.

Several years ago we began an international project to study the relationship between social security program provisions and retirement. This volume presents the results of the third phase of the project. The first phase described the retirement

[1] In this figure "Now" varies from country to country but is generally the early 1990s.

incentives inherent in plan provisions and documented the strong relationship across countries between social security incentives to retire and the proportion of older persons out of the labor force (Gruber and Wise 1999a). The second phase illustrated the large effects that changing plan provisions would have on the labor force participation of older workers. This third phase shows the consequent fiscal implications that extending labor force participation would have on net program costs—reduced government social security benefit payments less increased government tax revenues.

The findings are conveyed by simulating the implications of illustrative reforms. One reform increases benefit eligibility ages by three years. Another illustrative reform reduces actuarially benefits received before the normal retirement age. A common reform prescribes the same provisions in each country. The financial implications of the illustrative reforms are very large in many instances, often as much as 20 to 40 percent of current program costs. The savings amount to as much a 1 percent or more of country GDP.

The results of the ongoing project are the product of analyses conducted for each country by analysts in that country. Researchers who have participated in the project are listed below. The authors of the country papers in this volume are listed first; others who participated in one of the first two phases are listed second and shown in italics

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

Sweden	Mårten Palme and Ingemar Svensson
United Kingdom	Richard Blundell, Carl Emmerson, *Paul Johnson, Costas Meghir,* and *Sarah Smith*
United States	Courtney Coile, Jonathan Gruber, and *Peter Diamond*

An important goal of the project has been to present results that were as comparable as possible across projects. Thus the papers for each phase were prepared according to a detailed template that we prepared in consultation with country participants. In many cases the country papers contain analyses in addition to those prescribed in the template, usually pertaining to reforms or reform proposals in individual countries.

Before discussing in more detail the results of this phase of the project we summarize the results of the previous two phases. We give particular attention to the second phase, which provides the empirical base for the analysis in this volume.

PHASE I

The goal of the first stage of the project was to describe the incentives inherent in the social security provisions and to relate the incentives to the labor force participation of older workers across nations. The core of each Phase I paper is a detailed analysis of the retirement incentives inherent in the provisions of that country's retirement income system based on a template that described in detail how the incentives were to be calculated. 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 presents completely parallel labor force and other data for men and women. To simplify the exposition here, only data for men are discussed, but the effect of the social security

incentives to leave the labor force, as discussed below, appear to be at least as important for women as for men.

Unused Labor Force Capacity

The proportion of men out of the labor force between ages 55 and 65 in 11 countries is shown in Figure 3. The term "unused labor force capacity" is used to emphasize that incentives to induce older persons to leave the labor force reduces 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 to leave the labor force and this measure of unused labor force capacity. We first describe the measurement of incentives to retire.

Measuring Incentives to Retire

Three key features of social security systems have an important effect on labor force participation incentives. The first is the age at which benefits are first 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. In none of the countries in this project does a significant portion of persons retire before the first eligibility age. The "normal" retirement age—e.g. 65 in the United States—is also important, but typically much less important than the early retirement age. Now in most countries, few people work until the "normal" retirement age.

The second important feature of plan provisions, which is strongly related to the extent to which people continue to work after the early retirement age—and which we emphasized in this phase of the analysis—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 component is the "increase" in future promised social security benefits. Consider a person who has attained the social security early retirement age (when benefits are first available) and suppose that a person is considering 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 he increased, to offset the receipt of benefits for one fewer years. But in most countries this is not the case. Once benefits are available, a person who continues 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 of expected social security benefits declines. 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.

A bit 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—SSW(a+1) – SSW(a). This difference is called the accrual of benefits between age a and age a+1. It is this value that 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 labor force participation. This accrual rate, and the associated tax rate, is one of the key calcula-

tions 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 the present discounted value of 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 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 of 2 additional years, and so forth.[2] Under some plan provisions there is no actuarial adjustment. The importance of this feature is discussed in some detail below.

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 social security early retirement age. Figure 4 shows the proportion of men collecting disability benefit by age in seven of the countries.[3] At age 45, the proportion of men collecting disability benefits is rather close in all of the countries; the range is from 2 to 5 percent in all of the countries except the Netherlands where the rate is 8 percent. At age 64, however, the range is from about 7 percent in Spain and the United States to over 37 percent in Sweden.[4] In each of the countries with very high proportions, the rate essentially falls to zero at the "normal" retirement age, which is 65 in Sweden, the UK, the Netherlands, and Germany, and 60

[2] Under current law, benefits in the Unites States are actuarially fair between 62 and 65, but are increased less than actuarially if the receipt of benefits is delayed beyond age 65, thus providing an incentive to leave the labor force at 65. Benefits will eventually become actuarially fair after age 65 as well.
[3] To reduce the complexity of the figure, data are shown only for selected countries.
[4] The data for Italy are similar to the data for Spain. The rates for Belgium and Canada are similar and follow a path approximately midway between the path for the United States and the path for Germany.

in France. At the normal retirement age, benefits are obtained from country social security programs rather than disability programs. It is evident that the receipt of benefits from a disability program does not always indicate that a person is physically disabled.

Figure 5 shows the pathways to retirement in Germany from 1960 to 1995. It is clear that the proportion of persons retiring at the age-65 normal retirement age declined substantially over this period, while the proportion retiring under disability and unemployment programs and under the social security age-63 "early" retirement program increased correspondingly. In Germany, many employees retire as early as age 57 under a "disability" program. In 1995, 65 percent of men retired under a disability or special unemployment program. Where these programs are important they are incorporated in the social security incentive calculations.

Retirement Incentives and Labor Force Participation

To summarize the social security incentive to retire in each country we proposed 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 6. This tax force to retire ranges from over 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 Phase I of the project is shown in Figures 7 and 8. Figure 7 shows the relationship between the tax force to retire and unused labor force capacity—the proportion of men between ages 55 and 65 that is out of the labor force. It is clear

that there is a very strong correspondence between the two. Figure 8 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 perhaps 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 introduction (Gruber and Wise 1999b) concluded this way:

> *The populations in all industrialized countries are aging rapidly and individual life expectancies are increasing. Yet older workers are leaving the labor force at younger and younger ages. In several countries in our study, participation rates for men 60 to 64 have fallen from over 70% in the early 1960s to less than 20% now. This decline in labor force participation magnifies population trends, further increasing the number of retirees relative to the number of persons who 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.*
>
> *It is clear that there is a strong correspondence between the age at which benefits are available and departure from the labor force. Social security programs often provide generous retirement benefits at young ages. In addition, the provisions of these programs often imply large financial penalties on labor earnings beyond the social security early retirement age. Furthermore, in many countries disability and unemployment programs effectively provide early retirement benefits before the official social security early retirement age. 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.*

PHASE II

The first stage 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. The relationships in the first volume, however, did not provide a means of estimating the magnitude of the effect on labor force participation of changes in plan provisions.

The goal of the second phase of the project was estimate how much the retirement age would change if social security provisions were changed. This analysis was based on within-country analysis of the determinants of retirement, 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 to aggregate labor force participation across countries, we turned to micro-econometric analyses within countries. The results of these analyses are based on differences in individual circumstances within a given country. Persons in a given country who are similar in many respects face quite different retirement incentives. It is these differences in retirement incentives—among otherwise similar persons—and the corresponding differences in individual retirement decisions that are used to determine the effect of the incentives on retirement.

In Phase II, the investigators in each country put together large micro-data files which combined 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 based on the methods developed for the first phase of the project. A key incentive measure was the "option value" of delayed retirement. This forward-looking measure is based on the potential gain (or loss) in wage earnings plus social security wealth if receipt of benefits is delayed. The financial value of retiring at the current age

is compared with the age at which the financial value is the greatest, which could be the current age or could be many years in the future. That is, this constructed economic variable describes the financial gain or loss from continuing to work. Estimation using this measure goes back to the procedure Stock and Wise (1990a, 1990b) used to analyze the effect on retirement of employer-provided defined benefit pension plans in the United States. Estimates were also obtained based on the related peak value measure proposed by Coile and Gruber (2001), which is based on the potential gain (or loss) in social security wealth only if receipt of benefits is delayed Although the focus of the analysis is on forward-looking measures of the incentive to retirement—or for continued work—a natural starting point is a measure that looks ahead only one year, the single year accrual measure. This measure captures the effect of another year of work on future benefits. Thus, as a base for comparison the country analyses present the single-year accrual incentive measure as well.

As in the first phase, the analysis in each country followed a detailed template, so that results could be compared across countries. The micro-analysis in each country is based on a sample of individuals. In some cases, the data come largely from administrative records, while in other cases, the data were obtained from special surveys. The coverage is not precisely the same in each country. Nonetheless, 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 could be predicted. A second key 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 made it possible 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 stage of the project to be important determinants of retirement.

The analysis in Phase II, however, posed several estimation challenges. Perhaps the most difficult was to identify the effect on retirement of the first eligibility age—in particular to distinguish the effect of the eligibility age from the effect of the incentive measure, given eligibility. This was an important consideration because a key empirical regularity across all countries was that retirement before the first eligibility age is rare and there is typically a jump in retirement at successive eligibility ages, in particular the age of first eligibility. This empirical regularity is discussed in some detail in the introduction to the Phase II volume (Gruber and Wise 2004b). To address this and other identification issues, each country estimated two different specifications of the base retirement model with respect to age: a model including a linear age trend and a model including age-specific dummy variables.

Parameter Estimates

The results in Volume II produced a striking finding: in virtually every country, in virtually every specification, the retirement incentives inherent in most social security programs are strongly related to departure from the labor force. In ten of the twelve countries we studied, the incentive measure effects were uniformly negatively related to retirement (a higher option value or peak value of continued work led to less retirement) and significantly different from zero. The results were robust to the use of both linear age and age dummy variables. In two of the countries, Italy and Spain, the peak value

and option value effects were typically not significant and sometimes of the wrong sign.[5] In these two countries the single year accrual effect is negative and significantly related to retirement in four of the six cases.

Thus, overall, we found the results from these 12 separate analyses to be strikingly consistent. The incentives inherent in retirement income programs are clear determinants of individual retirement behavior. The estimates themselves strongly suggest a causal interpretation of the cross-country results presented in our first volume. The results point to an important relationship between incentive effects and labor force participation, independent of cultural difference among countries. The magnitudes of the implied effects are also very comparable across countries, as shown by the simulations discussed below.

Simulations

To demonstrate the effect of plan provisions on retirement, the estimates for each country were used to simulate the effect of three illustrative changes in plan provisions. Two illustrative plan changes were simulated in Phase II of the project, and a third was added in Phase III. All three are described here:

(1) **Three-year increment in eligibility ages:** This illustrative simulation increases all eligibility ages by three years, including 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:** 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

[5] In the United Kingdom the option value incentive measures are significant when a "bootstrap" method that accounts for repeated observations for the same person is used to calculate standard errors. Also in the United Kingdom, both the peak value and the option value incentive measures are very significant–under conventional standard error estimates--when cohort indicator, instead of age indicator, variables are used.

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) age 60 earnings.

It is clear that an increase in eligibility ages will typically increase labor force participation in each country. The implications of the actuarial and common reforms are less obvious, so we illustrate their likely effects across different countries using the examples of Germany and the United States.

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 disability program in Germany and no actuarial adjustment is illustrated conceptually in Figure 9. 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. This results in a baseline profile of benefits that starts at age 57 and remains flat at 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 instead of 100. Benefits if taken at 70 would be about 140 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.

Figure 10 shows a comparable figure for the United States. In both countries the normal retirement age is 65. Benefits in the United States are first available at 62, however, compared to the common receipt of benefits from a disability program at age 57 in Germany. In addition, benefits taken before age 65 in the United States are reduced actuarially. Benefits at 62 are 80 percent of benefits at 65. The increase in benefits after age 65 is less than actuarially fair, however.[6] Thus a reform to adjust benefits actuarially in the U.S. would have no effect before age 65, and only a small effect thereafter. It should be clear from Figures 9 and 10 that increasing the first eligibility age—without any actuarial adjustment—would increase labor force participation in both countries, although the size of the effect is likely to be greater in Germany than in the United States because benefits at the first eligibility age are much larger in Germany than in the United States. Under this illustrative reform, in Germany benefits would be zero at age 57, 58, and 59. Benefits would first be available at age 60. In the United States, this illustrative reform would increase the age of first eligibility from 62 to 65.

Continuing to use a conceptual representation of social security provisions in Germany as an example, Figure 11 shows the effect of the common reform in Germany, and, for comparison, shows the actuarial reform as well. The common reform incorporates actuarial reduction in benefits before and actuarial increase in benefits after the normal retirement age, as described in Figure 9 above. In addition, the common reform in Germany implies a substantial reduction in benefits at the age 65 normal retirement age. And, the common reform in Germany would increase the age of first eligibility by 3 years (and thus incorporates the three-year increment in eligibility). In

[6] Under current legislation, the increase will be gradually increased to be actuarially fair by 2008.

short, the receipt of benefits is delayed from 57 to 60, benefits at the normal retirement age are reduced from 100 to 75, and normal retirement age benefits are adjusted actuarially if taken before or after the normal retirement age.

The diagram suggests that the combined effect of these changes is likely to be large in Germany. Benefits before age 57 are no longer available. When they are available at 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. (The results below show that the actuarial reduction accounts for a large fraction of the labor force participation effect of the common reform in Germany.)

Figure 12 is a conceptual representation of the common reform in the United States. The common reform provides benefits two years earlier than the current early retirement age of 62. In addition, the common reform represents approximately a 33 percent increase in benefits at the normal retirement age. These two features of the common reform should be expected to reduce the labor force participation of older workers in the United States. (In addition, the common reform provides for an actuarially fair increase in benefits after age 65, which would provide some incentive to remain in the labor force for persons who were still employed at ages older than 65.)

The cases of Germany and the United States are representative of the other nations in our sample. Most European nations have a system similar to Germany's, so that we would expect for them very large increases in labor force participation from all reforms. Canada is more similar to the United States, so that raising eligibility ages will raise labor force participation, the common reform will lower participation, and the actuarial reform will have little effect.

In general, specific features of the current plan in each country suggest how the common reform should change labor force participation in that country. Thus in part, the common reform is used to confirm that the simulation results, when compared across countries, conform to expectations based on current plan provisions.

Results

As emphasized above, we made calculations based on two principle estimation specifications (option value, OV, and peak value, PV) and three simulation methods. The three simulation methods are:

- S1: Use the retirement model with linear age
- S2: Use the retirement model with age dummies, and assume that the age dummies effects purely represent taste for leisure and do not change when the system is reformed
- S3: Use the retirement model with age dummies, and assume that the deviation of age dummies from a linear age trend purely represent effects of the retirement system

Arguments can be made for all three of these approaches. The advantage of the first approach is that it allows us to remain neutral on the meaning of age-specific retirement patterns, but at the risk of mis-specifying the regression model. But once age dummies are included, we do not know exactly whether they should be interpreted as variations in taste for leisure by age or as program effects. Thus, in this section, we will rely on the results from simulation approach S1, as a middle ground; the actual chapters in Volumes II and III show the results from all simulation methods.

Three-Year Increment in Eligibility Ages and Labor Force Participation: The basic findings can be shown in two figures. Figure 13 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 to standardize for the wide variation

across countries in the age at which retirement begins, each bar shows the reduction in the fraction of the population out of the labor force 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 OLF proportion is very large—47 percent. The second is the similarity across countries. The reduction is between 34 and 55 percent in 9 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 14 shows the effect on the OLF proportion of the common reform. In this figure, it is clear that the greatest reductions in the OLF proportion 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 OLF proportion is 44 percent. For the six countries in which most retirement is after age is 60, there is a 4 percent average increase in the OLF proportion.

The systematic pattern of these results shows a strong correspondence with intuition. For the six countries with youngest effective retirement ages, the common reform represents a substantial increase in the youngest eligibility age, and the actuarial reduction in most of these countries means that benefits at this age are much lower than under the base country plans. Thus, for these countries, the OLF proportion should decline under the reform, and that is the case for every country but 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 for countries, such as the United States, but a reduction in the replacement rate for other countries. Consequently, in three of these six countries, there is an increase in the OLF proportion under the common reform simulation, and on average there is an increase in the OLF proportion. (The seemingly anomalous result for Canada is explained by the fact that Canada is the only country in which the 25% age is below the nominal social security entitlement age; the 25% age is 58 while the social security entitlement age is 60. In addition, Canada has relatively low benefits at the age 60 early retirement age. Thus the common reform significantly increases benefit levels, providing an additional inducement to retirement.)

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 we believe helps to add credence to the estimation and simulation methods and to the overall results.

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

> *The results of the country analyses reported in this volume confirm the strong causal affect of social security program retirement incentives on labor force participation. But perhaps more important, the results in this volume show the large magnitude of these effects. Across 12 countries with very different social security programs and labor market institutions, the results consistently show that program incentives accord strongly with retirement decisions. The magnitude of the estimated effects varies from country to country, but in all countries the effects are large.*
>
> *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.

PHASE III

Using the estimates from Phase II, Phase III of the project describes the fiscal implications of changes in program provisions. What would be the financial implications of changing the provisions of social security systems? Again, the results are demonstrated by simulating the fiscal effects of illustrative reforms. In this phase, all three illustrative reforms described above are simulated. In addition to the three-year increment and the common reforms, we also simulate separately an "actuarially fair" reform. As noted above, in the United States and in Canada, for example, benefits taken before the early retirement age are reduced actuarially (so that, on average, benefits received over a lifetime do not depend on the age at which receipt of benefits begins), so that this simulation closely parallels existing law. In many European countries, however, there is little or no actuarial reduction if benefits are taken early. This provides a very large incentive to leave the labor force early, so that moving to an actuarially fair system can have very large fiscal implications in many countries.

The goal of the analysis in this phase is not to calculate the long-run balance sheets of a social security system, as is undertaken for example by the United States Social Security Administration (SSA). Rather the approach taken here is 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 estimates show the fiscal implications of changes in social security provisions for the cohort born between 1931 and 1941 (reaching age 65 between 1996 and 2006). The calculations in Phase III, like

those in Phases I and II, are made according to a detailed template so that the results can be compared across countries.

In each country, the simulations proceed in several steps:

1) Using the retirement models estimated in Phase II of the project, predict the distribution of retirement ages under current law (the "base" case).

2) For this distribution of retirement ages, compute the fiscal position of the cohort—total expected benefits paid to the cohort and total expected taxes (both social security and other taxes) paid by the cohort.

3) Use the retirement models to predict the distribution of retirement ages under a reform.

4) For the new distribution of retirement ages, compute the fiscal position of the cohort.

5) Calculate the difference between fiscal positions under the base and the reform systems to obtain the fiscal implication of reform.

6) Divide the fiscal implication into two components: The *mechanical effect* is the effect of the reform assuming no behavioral response (change in retirement ages) to the reform. The *behavioral effect* is the additional incremental effect due to retirement response to the reform.

To illustrate the method used in each of the country papers, we describe key calculations for two countries—the effects of the reforms in Canada, focusing on the three-year increment in eligibility ages, and effects of the actuarial reform in Germany. These examples also help to highlight how the details of the current plan provisions, including the treatment of different components of the current system, influence the effect on the illustrative reform. We then show comparative results across countries.

Canada—Three-Year Increment in Eligibility Ages

We illustrate the results presented in each paper using results for Canada as an example. (Values are shown in Euros, converted from Canadian dollars at the December 31, 2001 exchange rate—C$1.4185 = €1.00.) The Canadian retirement system has three central components:

1) The Old Age Security (OAS) pension is a lump sum that is paid to all citizens 65 and older. (It was $442.66 in March 2002(€312.06) at the December 31, 2001 exchange rate.) The OAS is indexed to the CPI and is fully taxable. (It also includes a "claw-back" provision for very high-income recipients.)
2) The Guaranteed Income Supplement (GIS) is an income-tested supplement for low-income OAS beneficiaries. (In January to March 2002 it was $526.08 for married couples and $342.67 for single persons (€370.85 and €241.57) respectively.) The GIS is indexed to the CPI and is not subject to income taxes. These benefits are not adjusted actuarially.
3) The largest component of the social security system (called the Income Security system in Canada) is the combination of the Canada Pension Plan (CPP) and the Quebec Pension Plan (QPP). The actuarial reduction applies only to the CPP/QPP component, for which the normal retirement age is 65 and the early retirement age is 60. The reduction rate is 0.5 percent per month (6 percent per year), so that those retiring at 60 receive 70 percent of the age 65 benefit. The CPP/QPP replaces at most 25 percent of pre-retirement income.

For this discussion, we focus on the three-year increment in eligibility but show key data for the other reforms as well. The main results are shown in two tables in each of the country papers. The example for Canada shows how these tables are organized and how to interpret the entries.

Table 1 shows the total effect of each of the three reforms. As noted above, reforms were simulated for each country using six methods—three simulation approaches, each implemented based on the option value and the peak value incentive measures. Here we show the results for the option value model and for simulation method S1. Each of the country papers presents a table with six panels—one for each of the estimation-simulation methods—in which each panel looks like Table 1 shown here.

Table 1. Canada illustration: total fiscal effect of reform: OV- S1							
Cost or Revenue Item	Present Discounted Value				Total Change Relative to Base		
	Base	3-Year Reform	Actuarial Reform	Common Reform	3-Year Reform	Actuarial Reform	Common Reform
Benefits	111,084	91,491	111,084	187,796	-17.60%	0.00%	69.10%
Taxes: Payroll	15,182	16,821	15,182	12,537	10.80%	0.00%	-17.40%
Taxes: Income	81,313	85,075	81,313	93,608	4.60%	0.00%	15.10%
Taxes: Consumption	37.54	37,265	37,540	41,314	-0.70%	0.00%	10.10%
Taxes: Total	134,034	139,161	134,034	147,459	3.80%	0.00%	10.00%

The first four columns show the present discounted value (PDV) of benefits and taxes under the base plan and under each of the three illustrative reforms. For example, the PDV of future benefits payments under the base plan is 111,084 Euros. Under the three-year increment the PDV is reduced to 91,491 Euros. Total taxes under the base plan are 134,034 Euros, and are comprised of payroll taxes (15,182), income taxes (81,313) and consumption taxes (37,540).[7] Total taxes increase slightly to 139,161 Euros under the three-year increment.

The last three columns show the total change relative to the base. For example, the three-year increment reduces benefits by 17.6 percent and increases tax receipts by 3.8 percent. The change in benefits minus the change in taxes (-19.593 - 5,127 = -24,720 Euros) is 22.3 percent of the base benefit costs (111,084 Euros) of the program. This percent is shown explicitly in Table 2 below and is the key result of the simulation.

[7] Consumption tax revenues are imputed based on the income associated with each policy. Payroll tax revenues include the share of general revenues that are associated with Social Security programs, as imputed in each country.

The actuarial reform has no effect in Canada because, as mentioned above, benefits are adjusted actuarially under the base (current) plan so the actuarial reform is not a change. The common reform increases program costs substantially in Canada, primarily because benefits under the common reform are much larger than current benefits in Canada.

Table 2 below shows the total effect of the reform, shown in Table 1, decomposed into mechanical and behavioral components. Again each of the country papers presents a second key table with six panels and each of the panels is organized like Table 2 shown here. The mechanical component is the effect of the reform assuming no behavioral—labor force participation—response to the reform. The behavioral component is the additional incremental effect resulting from the labor force supply response to the reform. For example, the three-year increment mechanical effect reduces benefits by 19,452 Euros. The behavioral response—a substantial increase in the typical retirement age—in fact reduces benefits a bit more. (This apparent anomaly is the result of specific features of the Canadian social security system and is explained below.) The mechanical effect reduces total taxes by 4,753 Euros (and is also explained below). The behavioral effect—prolonging participation in the labor force—leads to an increase in taxes of 9,905 Euros. The total effect on taxes is an increase of 5,127 Euros. The net change in benefits minus tax revenues is -24,720 Euros, which is equivalent to 22.3% of the base (current) cost of the program. This change as a percent of base benefits is perhaps the single best summary of the effect of the illustrative reform. Comparable percents apply to each of the reforms in each of the countries and are used below to provide cross-country comparisons.

Table 2. Canada illustration: decomposition of total effect of reform, change in present discounted value: OV-S1									
Cost or Revenue Item	3 Year Increment			Actuarial			Common Reform		
	Mech-anical	Behav-ioral	Total	Mech-anical	Behav-ioral	Total	Mech-anical	Behav-ioral	Total
Benefits	-19459	-134	-19593	0	0	0	79151	-2438	76713
Total Taxes	-4778	9905	5127	0	0	0	36231	-22806	13425
Net Change	-14681	-10039	-24720	0	0	0	42920	20368	63287
Change as a % of Base Benefits	-13.20%	-9.00%	-22.30%	0.00%	0.00%	0.00%	38.60%	18.30%	57.00%

A series of figures help to explain the results in Tables 1 and 2, focusing on the three-year increment. Figure 15 shows the present discounted value of social security wealth by age of retirement, under the base plan and under the three-year increment. Benefits taken at any age are lower under the three-year increment. There are two reasons for the pattern across ages. First, the age-65 normal retirement age under the base plan is increased to 68 under the three-year increment. Thus benefits taken at 55, for example, are lower under the three-year increment because they are discounted actuarially from 68 to 55 instead of from 65 to 55. Second, while the CPP and QPP are actuarially adjusted, so that receiving them later does not affect their PDV, the GIS and OAS are not. So if the age of receipt of these programs is delayed, that lowers the PDV of benefits at all ages.

Figure 16 shows the relationship between total taxes and retirement age. Taxes increase sharply with age, but at any age of exit from the labor force, taxes are less under the three-year increment. This is because the OAS component of the social security benefit—which is taxable—is received for three fewer years under the three-

year increment. Thus prolonging labor force participation yields increased tax revenues from taxes on the increased wage earnings. But this increase is partially offset by the reduction in future taxable social security benefits under the three-year increment.

Figure 17 shows the distribution of retirement ages under the base and under the three-year increment reform. The upward shift in the distribution is clear. The behavioral component of benefits and taxes reported in Table 2 is due to this upward shift in retirement ages.

Figure 18 shows how the total effect reported in Table 2 arises by considering the change in expected totals by age. The bars labeled “total benefits” show the change in expected benefits by age. For example, the expected payment to persons at age 55 is lower because fewer persons retire at this age and because they receive lower payments, as shown in Figure 15 above. The expected payment of benefits to persons age 64 or older, however, is increased under the three-year increment. Even though the benefit per person is lower under the three-year increment, more people retire at these ages, leading to an increase in the expected payment to these older persons. Aggregated over all ages—weighted by the proportion of persons retiring at each age—the reduction is 19,593 Euros, shown under benefits total in Table 2.

The lighter bars show the change in the expected benefit payments by age, less the expected tax revenues of persons who retire at each age. Expected benefits minus tax revenues are lower at each age under the three-year increment. The reduction in the expected value of benefits minus taxes is less than the reduction in benefits at younger ages because persons who retire at these ages pay lower taxes on future social security benefits than they used to, as explained with reference to Figure 15 above. Nonetheless there is a net gain to the government budget. The important

feature shown by this figure is that even at older ages—at which the expected benefits are increased under the three-year increment because more persons are retiring at these ages—the added taxes paid by these persons when they are working more than offsets the greater expected benefits paid to persons at these ages. The net reduction in benefits minus taxes across all retirement ages is 24,720 Euros, as shown in Table 2 above.[8]

Finally, Figure 19 shows the fiscal effect of the three-year increment as a percent of GDP. This figure shows the estimated effect for each of the six methods used to obtain estimates. The reduction in government benefits payments minus revenues ranges from about .30 to .45 percent of GDP, depending on the estimation method.

Figures like those for Canada are shown in each of the country papers, but the figures that the country authors have selected to show vary from country to country. Tables showing results like those in Tables 1 and 2, however, are shown for each country.

Germany—Actuarial Adjustment

Germany has a very generous social security system, with very 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, as described above. These programs essentially provide early retirement benefits before the age 60 social security early retirement age. Indeed, these programs provide the principle path to retirement in Germany. And as described above, once benefits are available, there is

[8] The sum over the values in the figure is not exactly 24,720. Figure 18 shows the average benefits and taxes at each age (Figure 16) times the average retirement rates at each age (Figure 17). The 24,720 in Table 2 comes from taking each individual in the sample and multiplying benefits and taxes by probabilities of retirement, and then taking the average. The bars in Figure 18 sum to 24,193.

no actuarial reduction in benefits taken before the age-65 “normal” retirement age (although recent reforms 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 6 percent per year. What would be the fiscal implication of such a change? Table 3 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 current provisions is 61.91. The base simulation yields a mean retirement age very close to the sample mean. The actuarially fair reduction in benefits is estimated to increase the retirement age by about 3 years, for both men and women. Figure 20 shows the change in the distribution of retirement ages for men; there is a clear shift to older ages throughout the distribution.

Table 3. German Illustration: Effect of Actuarial Reduction in Benefits on Retirement Age: OV Model

Model	Men	Women
Sample frequencies	61.91	61.73
Base simulation	62.05	62.01
Actuarially fair simulation	65.18	64.57

The fiscal implications of this change are shown in Table 4. As described above, 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 due to

change in retirement ages. Benefits received at any age less than 65 are reduced by the actuarial reduction. If there were no change in retirement ages, the average benefit per worker would be reduced by 37,056 Euros. But the behavioral response to the reform increases the average retirement age, as shown in Table 3 and Figure 20. This increases the average benefit by 19,632 Euros. The total (net) effect on benefits is a reduction of 17,423 Euros.

In addition to the change in benefits, the reform has further fiscal implications. Contributions to the social security system are increased if employees continue to work. This behavioral effect is +16,766 Euros.

In addition, if employees work longer, they pay more in other taxes. The total increase in taxes is 49,049 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 taxes is -83,238 Euros. This net reduction in the total government benefit payments minus revenues is equivalent to 42.85 percent of base benefits under the current system. The fiscal effect of the reform as a percent of GDP is shown in Figure 21, which 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.

Table 4. German Illustration: Fiscal Implications of Actuarial Fair Reform: Change in PDV, Euros per Worker (OV model, dummies shifted)

	Mechanical Effect	Behavioral Effect	Total Effect
Benefits	-37056	19632	-17423
Contribution	0	16766	16766
All taxes	-1558	50608	49049
Net change	-35497	-47741	-83238
% Change	-18.27%	-24.58%	-42.85%

Cross-Country Comparisons

Calculations like those illustrated for Canada and Germany were made by each of the country teams for each of the three illustrative reforms. As the illustrations highlight, the effect of each of the reforms depends on the provisions of the current system in each country. An increase in eligibility ages is expected to reduce expenditures and increase tax revenues in all countries. But even in this case, the added tax revenue from increased labor force participation can be at least partly offset by lower taxes resulting from lower future social security benefits as in Canada. The actuarial reform, which has large effects in Germany, should have little effect in countries like the United States and Canada where the system is already actuarially fair.

Results across all countries are shown in the next five figures. Like the results for the first two phases of the project, these results are taken from the individual country papers. For these comparisons, we use the estimates based on the option value specification and simulation method "S3"—sometimes referred to as OV-S3 or as option value-age dummies shifted. The figures show the total fiscal effect of the reforms. To reduce complexity, the figures do not divide the total effect into the mechanical and the behavioral components that can be seen in the country papers. The behavior effects of the three-year increment in eligibility ages and of the common reform on labor force participation are shown in Figures 13 and 14 respectively.

Figure 22 shows the total fiscal effect of the three-year increment in eligibility ages. For example, in Germany, the reduction in government benefit payments minus the increase in tax revenues—resulting from a three-year increment in all eligibility ages—would be equivalent to about 36 percent of the current cost of the program. Across all countries, the average decrease in government benefit payments minus tax

revenues is equivalent to 27 percent of current program cost. The anomalous positive total fiscal effect in Denmark is due to the replacement of 3 years of Old Age Pension benefits with benefits from a more generous early retirement program.

Figure 23 shows the decrease in government benefit payments minus tax revenues—resulting from the three-year increment—as a percent of Gross Domestic Product. The average decrease over all countries is equivalent to 0.97 percent of GDP and is greater than 0.50 percent or greater in all but two of the countries—again reported as a reduction in government benefit payments minus tax revenues.

Figure 24 shows the fiscal effect of the actuarial adjustment, as a percent of base cost. As expected, there is large variation across countries. As noted above, In the United States and Canada 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, the actuarial increase in benefits after the age-60 early retirement age would prolong participation in the labor force and would increase benefits for many retirees. The early retirement age in France is 60 and the normal retirement age depends on the number of "validated" participation quarters. (The normal retirement age is the minimum of 65 and the age at which a person attains 150 validated quarters). But under the current system there is no actuarial adjustment of benefits if they are taken after the age of first eligibility and the reduction in benefits if they are taken before the normal retirement is greater than actuarial. For persons with more than 150 validated quarters, the actuarial upward adjustment of benefits after age 60 would increase their pension benefits. The reduction in benefits if they are taken with

less than 150 quarters is less under the actuarial reform. So both the behavioral and the mechanical effects of the actuarial reform increase the cost of benefits.

On average across all countries the decrease in government expenditure minus revenue is equivalent to about 26 percent of the base cost—reported as a reduction in government benefit payments minus tax revenues. Because of particular features of the current system in the United Kingdom, the actuarial reform has not been simulated for that country.

Figure 25 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 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. Also in the United Kingdom, 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.

Figure 26 shows the fiscal effects of each of the reforms on the same figure, ordered by the effect of the common reform. This figure helps to emphasize the sometimes intricate relationship between current plan provisions and the effects of the illustrative reforms. In the United States and Canada, for example, the three-year increment reduces (net) program costs. The actuarial reform has essentially no effect in Canada where the system is already actuarial, and little effect in the United States where the system is close to actuarial. But in both of these countries the common reform provides higher benefits than provided by the current systems, and in the United

States benefits are available 2 years earlier than the current early retirement age. Thus the common reform substantially increases program costs in these countries.

As another example: In France, the three-year increment would reduce net program costs. The actuarial adjustment alone would increase benefit payments as described above. But the common reform provides much lower benefits than the current system in France. In addition the common reform sets the normal retirement age at 65 and benefits are reduced actuarially between 65 and the age 60 early retirement age. Thus, on balance, the common reform implies a substantial reduction in net program cost in France.

Although not detailed in this introduction, the results for each of the countries are determined by the precise relationships between the current plan provisions and the illustrative reform.

CONCLUSIONS: LOOKING BACK AND GOING FORWARD

Our introduction to Phase I of the project emphasized the striking relationship across countries between social security program incentives to retire and the proportion of older persons out of the labor force (Figures 7 and 8 above). The weight of the evidence, we judged, was that the relationship was largely causal.

The results of the country analyses reported in Phase II of the project— based on within-country analysis of micro data—confirmed the strong causal effect of social security program retirement incentives on labor force participation and showed the large magnitude of these effects. The results left no doubt that social security incentives have a strong effect on retirement decisions. Across 12 countries the results consistently showed that program incentives accord strongly with retirement decisions. The magnitude of the estimated effects varies from country to country, but in all countries

the effects were found to be large. 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 different 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 made clear that changes in the provisions of social security programs would have very large effects on the labor force participation of older employees.

In this phase of the project we built on the estimates obtained in the second phase to analyze the fiscal implications of program provisions. In particular, we estimated the financial implications of three illustrative program reforms. The results make clear that reforms like those considered in this volume can have very large fiscal implications for the cost of social security benefits as well as for government revenues engendered by changes in the labor force participation of older workers.

On average across the 12 countries, we judge that a three-year increase in program eligibility ages would reduce government benefits payments minus tax revenues by 27 percent of current program cost. The average reduction is approximately 0.72 percent of country GDP. While the estimates vary by method of estimation—as reported in each of the country papers—we believe that these averages reflect the most likely long-run effect of the illustrative reforms. Actuarial reform alone would have a very large effect in some countries—reducing net government cost by over 40 percent in 5 countries—depending on the extent of actuarial adjustment to benefits under the current program provisions.

In the second phase of the project, we used estimates of the of the labor force participation effects of the common reform to judge the plausibility of the estimates. In

this third phase we estimated the fiscal implication of the common reform. Again we find that the results accord strongly with intuition based on the provisions of the current plans. In accord with intuition, the common reform yields both increases and reductions in government revenue equivalent to a large fraction of current program costs. We believe that this adds credence to the methods used for estimation of the fiscal effects of the illustrative reforms.

In short, the fiscal effects of reform can be very large. 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 by the participants in this project yield reductions in government benefit payments minus tax revenues equivalent to 20 to 50 percent of current program cost.

Finally, having emphasized the potential for changes in plan provisions to increase the labor force participation of older workers and to relieve the financial pressure on social security systems, we consider how such changes in social security systems may already be having an effect in some countries. Figures 27a and 27b are the same as Figures 2a and 2b but they have been updated to include labor force participation rates of men from about 1995 to about 2003. In many of the countries there seems to be a clear reversal in the decline in labor force participation. In some countries the reversal can be traced to changes in social security provisions, while in others it seems to be associated with economy-wide trends in labor market conditions.

Consider Denmark first. Except for updating the series, the only other change is the addition of data for Denmark, which was added to the project after the first phase. In 1999, the Post Employment Wage (PEW) program was changed to provide

incentives to stay in the labor force until 62. (When the PEW program was introduced in 1979 it induced an almost immediate drop of 17 percentage points in the labor force participation rate of men 60 to 64.)

In Sweden, the explanation for the increase in the labor force participation of men 60 to 64 lies primarily in changes in the eligibility requirement for the disability program. The provision that unemployed workers older than aged 60 were eligible for a disability pension was abolished in 1991 and the provision that these unemployed workers were eligible because of a combination of medical and labor market reasons was abolished in 1997. The most important change was likely the 1995 provision that enabled the social security administration to reconsider the right to a disability pension. Consistent with these changes, from 1993 to 2002 the percent of men aged 60 to 64 with a disability pension was reduced from 30 to 23 percent. In addition, the Swedish economy has recovered from the 1990s recession during the 1990s that limited labor force demand.

In Germany, the reversal of the downward trend in the labor force participation of men 60 to 64 that began in 1997 coincides with the introduction of partial actuarial reduction in benefits taken before the early retirement age. In the United States the downward trend was reversed about 1995. While the reason for the reversal is unclear, it seems likely that the decline in employer-provided defined benefit pension plans—with strong incentives to retire early—and the rapid spread of personal retirement plans—with no retirement incentive effects—has been part of the explanation.

In the United Kingdom, there has been a general increase in labor force participation rates at all ages, but there was no apparent change in social security plan provisions that might have lead to an increase for men 60 to 64. In Canada, there were no changes in social security provisions that could account for the increase in the labor

force participation of men 60 to 64. There was, however, a general improvement in labor market conditions after the mid 90s, with a fall in the overall unemployment rate from 10.4 percent in 1995 to 7.6 percent in 2003. In Spain, the reforms during the 1997 to 2002 period did not change substantially the retirement incentives faced by older workers. There was, however, a large increase in the labor force— from about 12.5 million in 1995 to over 17 million in 2004—apparently due to an increase in the demand for labor. And during this period, labor force participation increased from 50.8 to 55.7 percent.

We do not yet have a succinct explanation for the increase in the labor force participation in the Netherlands. Early retirement provisions in the Netherlands are the result of collective bargaining by sector, or even by firm, and hence it is hard to easily identify and summarize changes in plan provisions.

Thus far in the project, we have considered the early retirement incentives inherent in many social security programs, the reduction in the labor force participation of older workers induced by these penalties on work, and the consequent financial implications of the induced early retirement. Going forward, we will direct our attention to several new issues, including: the relationship between social security system provisions and the well-being of the elderly and the young, the relationship between social security system provisions and the employment of the young, and how the relationship between health status and retirement varies with social security (including disability) program provisions.

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Figure 1. Population 65+ to population 20 to 64

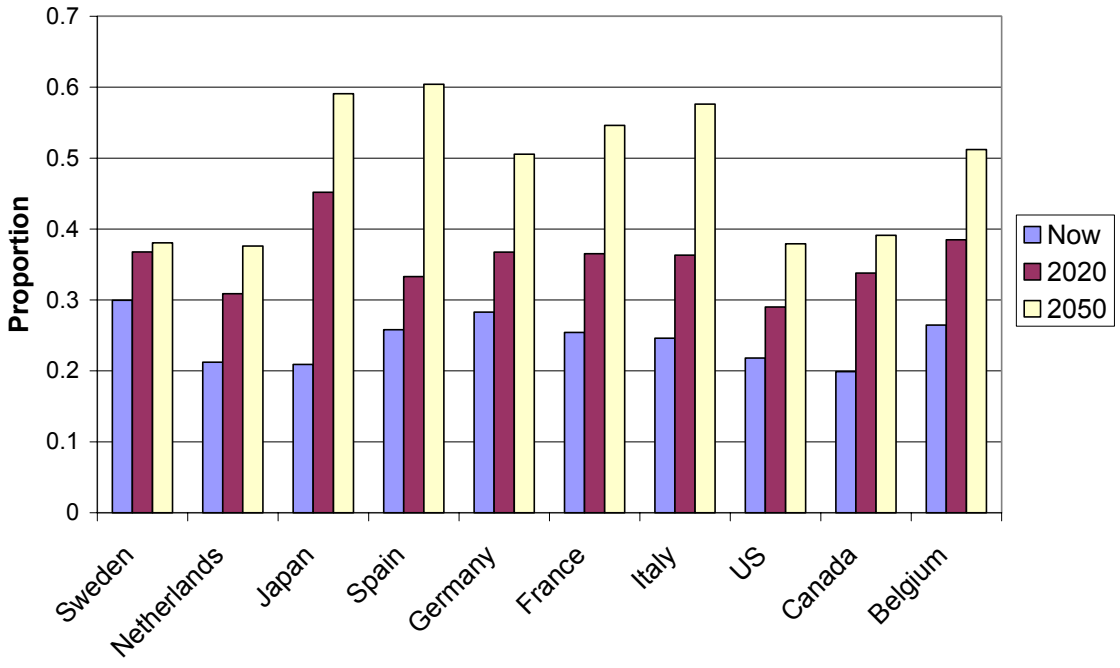

Figure 2a. LFP trends for men 60 to 64

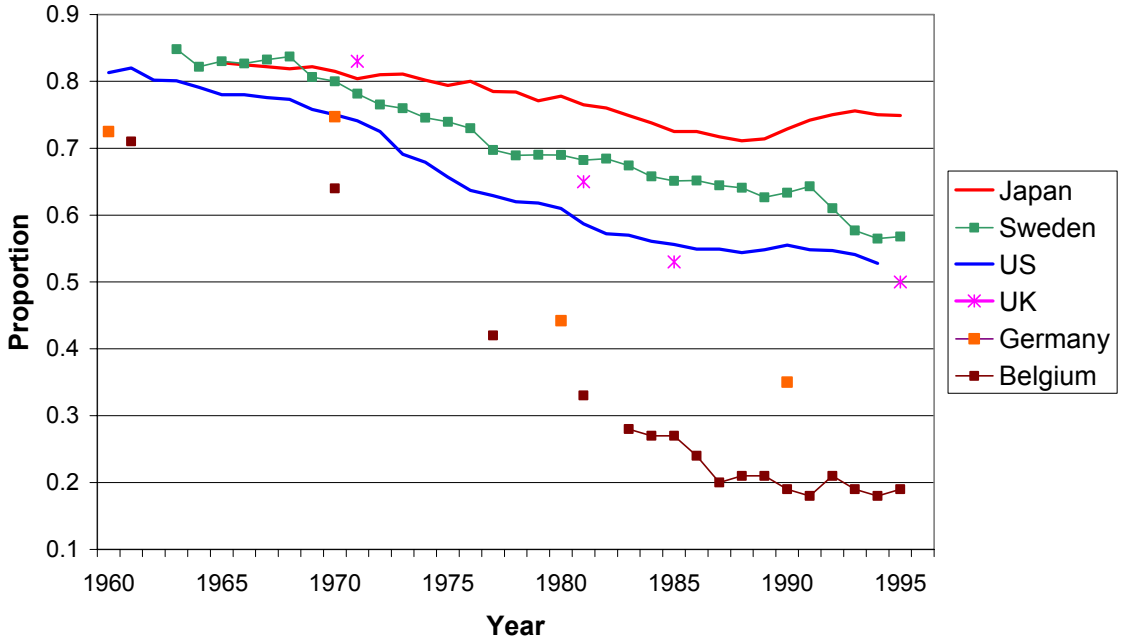

Figure 2b. LFP trends for men 60 to 64

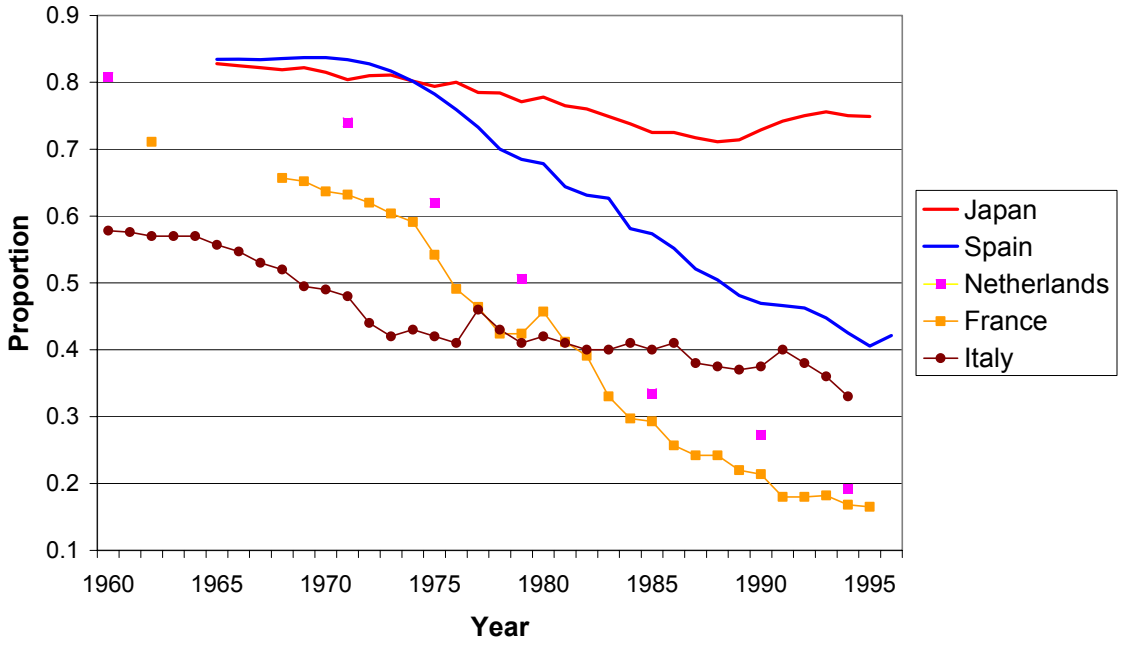

Figure 3. Unused productive capacity: men age 55 to 65

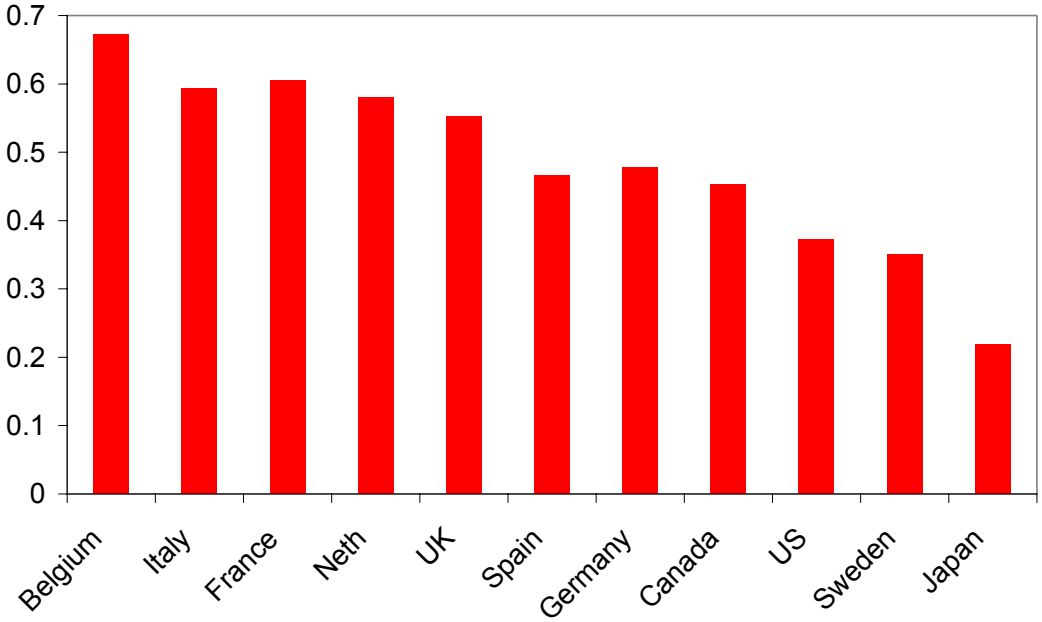

Figure 4. Proportion of men collecting disability benefits, by age

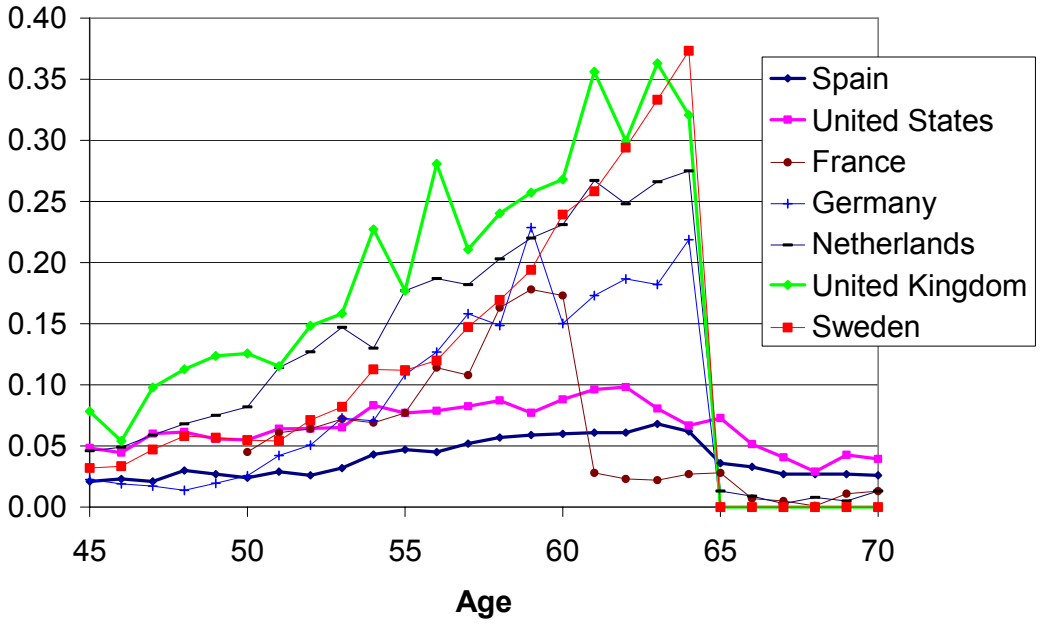

Figure 5. Germany: Pathways to retirement for men, 1960 to 1995

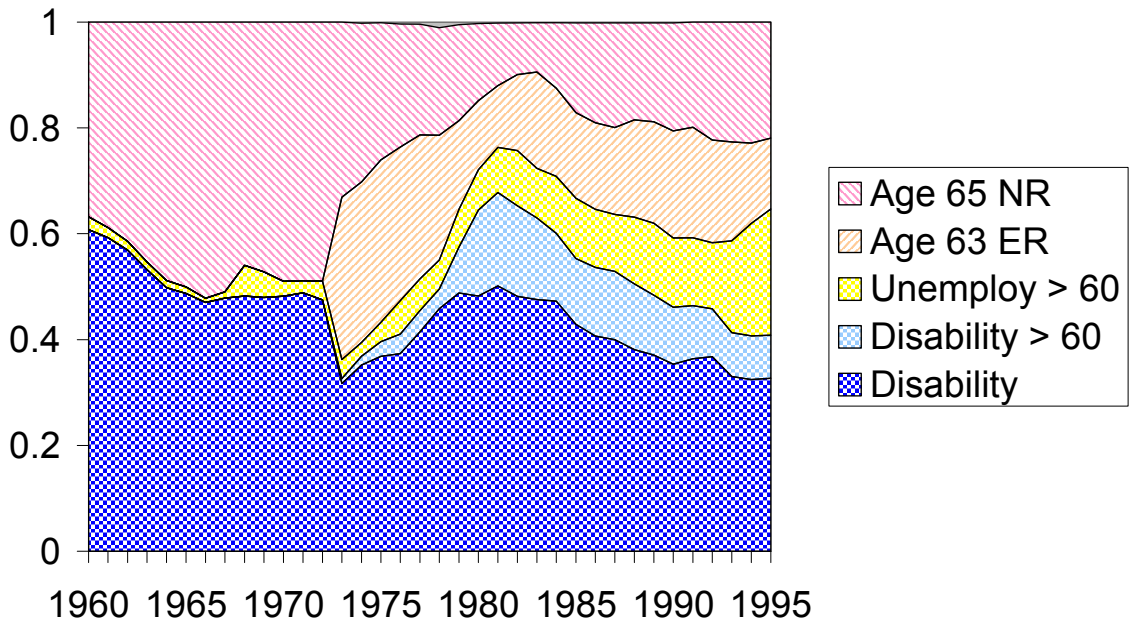

Figure 6. Sum of Tax Rates on Work From Early Retirement Age to 69

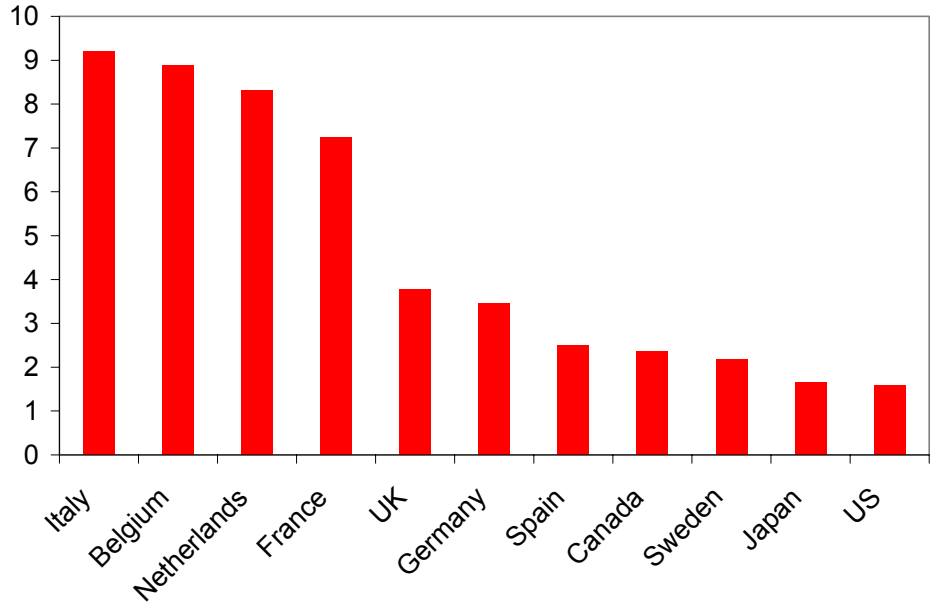

Figure 7. Unused Capacity v Tax Force to Retire

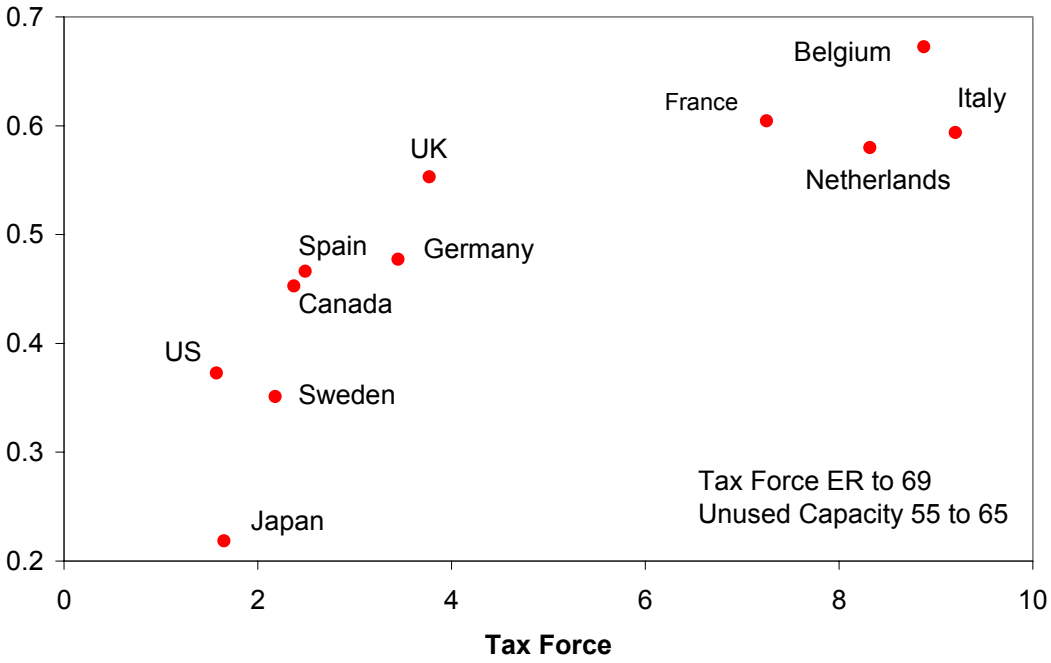

Figure 8. Unused Capacity v Tax Force to Retire

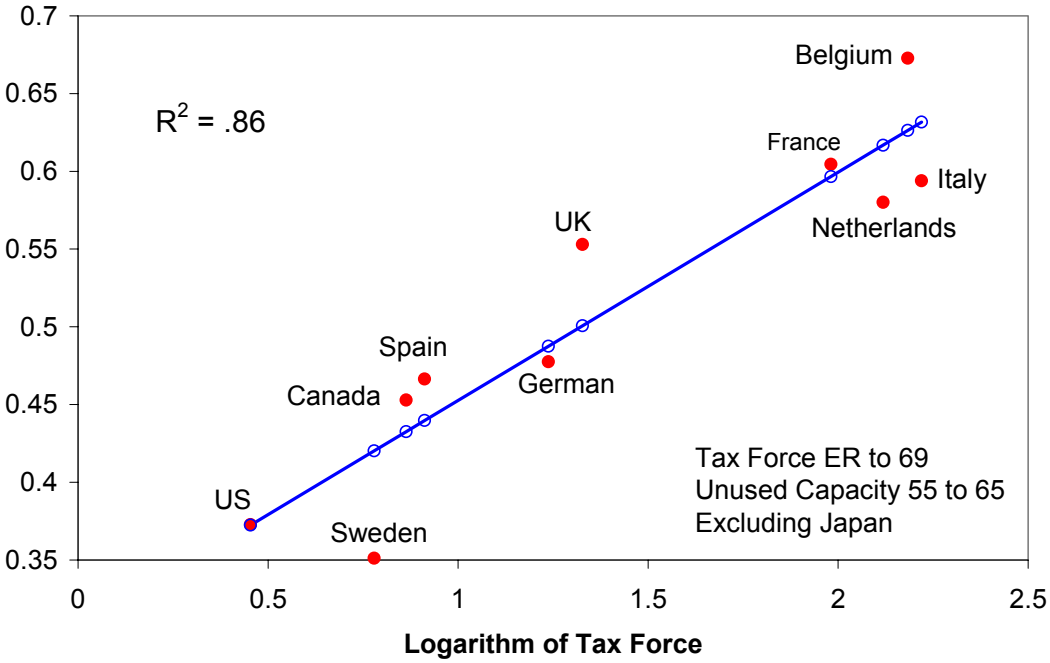

Figure 9. Germany: base versus actuarial adjustment

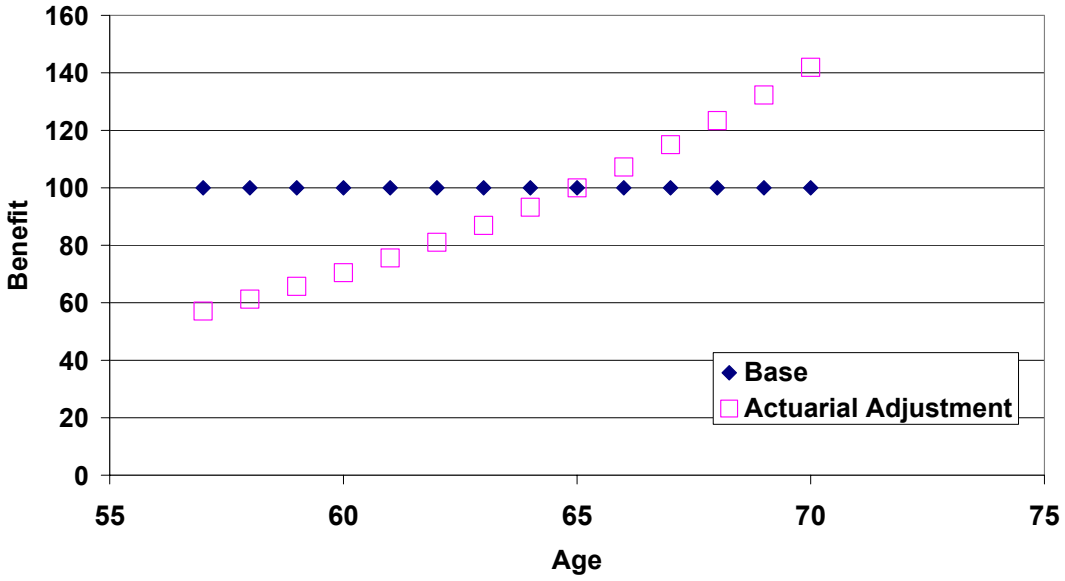

Figure 10. US: base versus actuarial adjustment

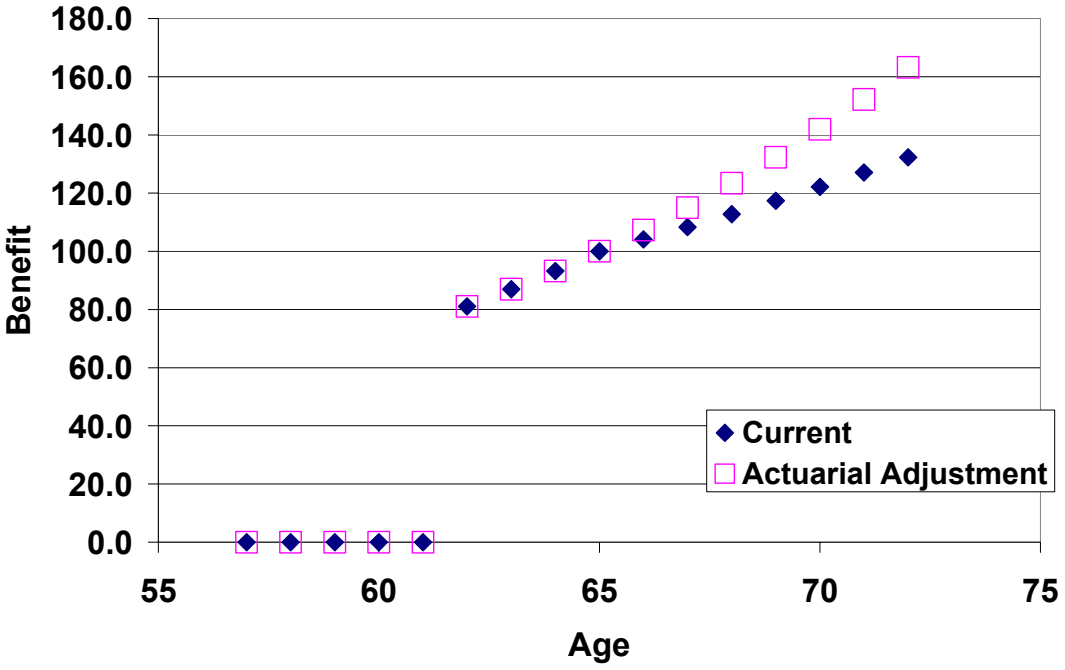

Figure 11. Germany: base, 3-year increment, actuarial adjustment, common reform

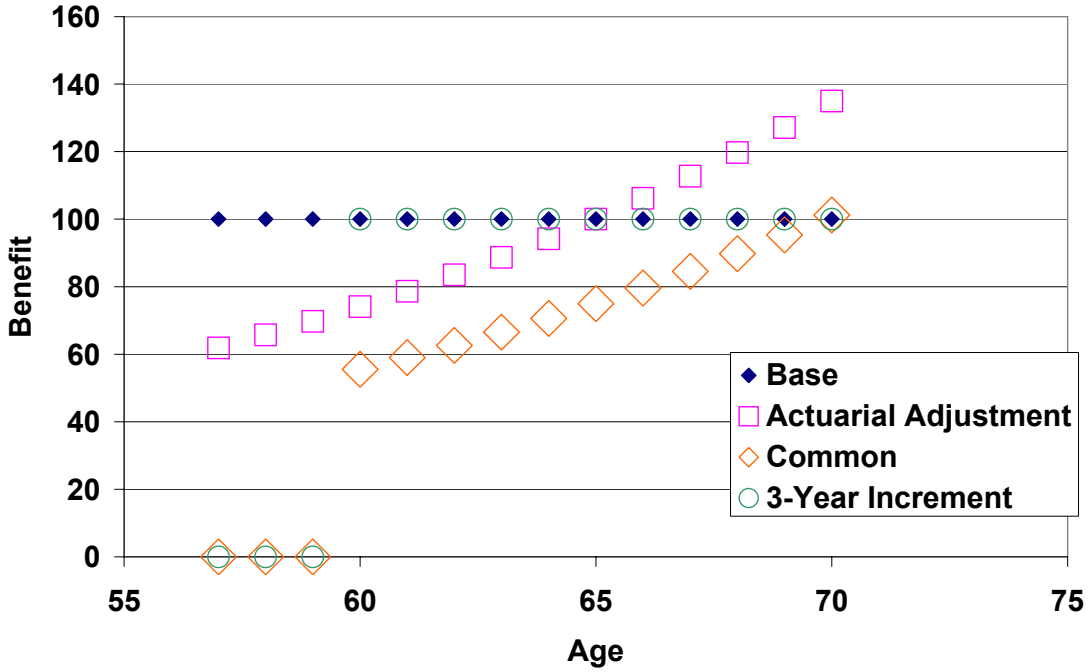

Figure 12. US: base versus common reform

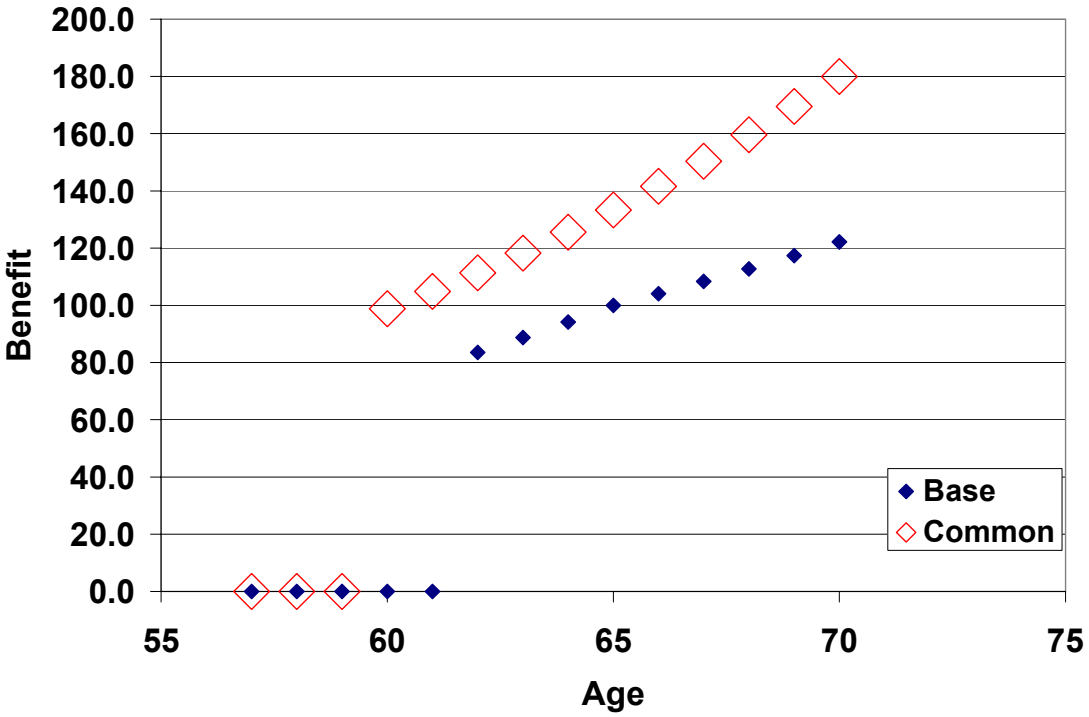

Figure 13. OLF Change 25% Age + 4 Yrs Base versus 3-Year Delay: OV-S3

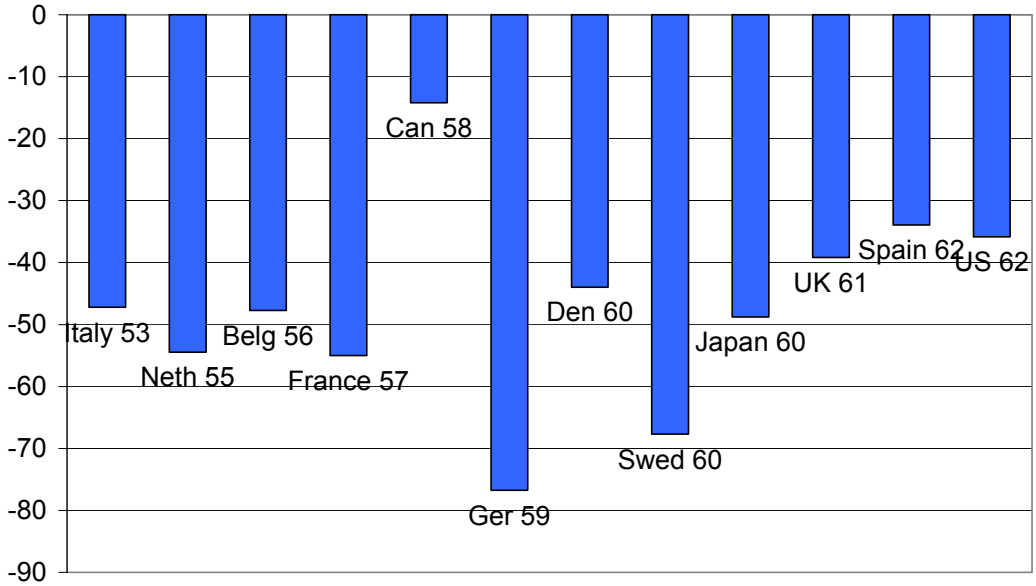

Figure 14. OLF Change 25% Age + 4 Yrs Base versus Common Reform: OV-S3

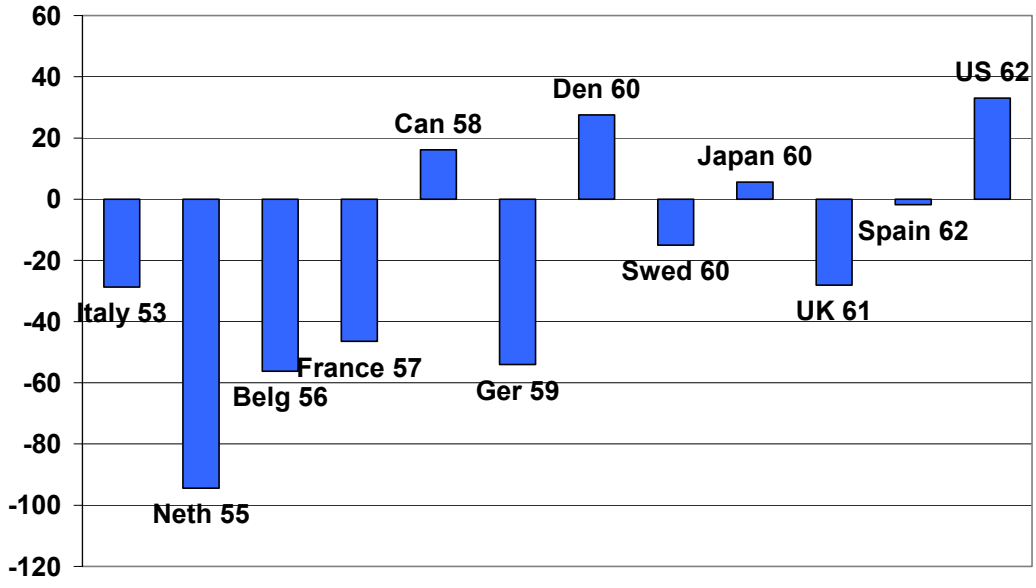

Figure 15. Canada: SSW by age of labor force exit

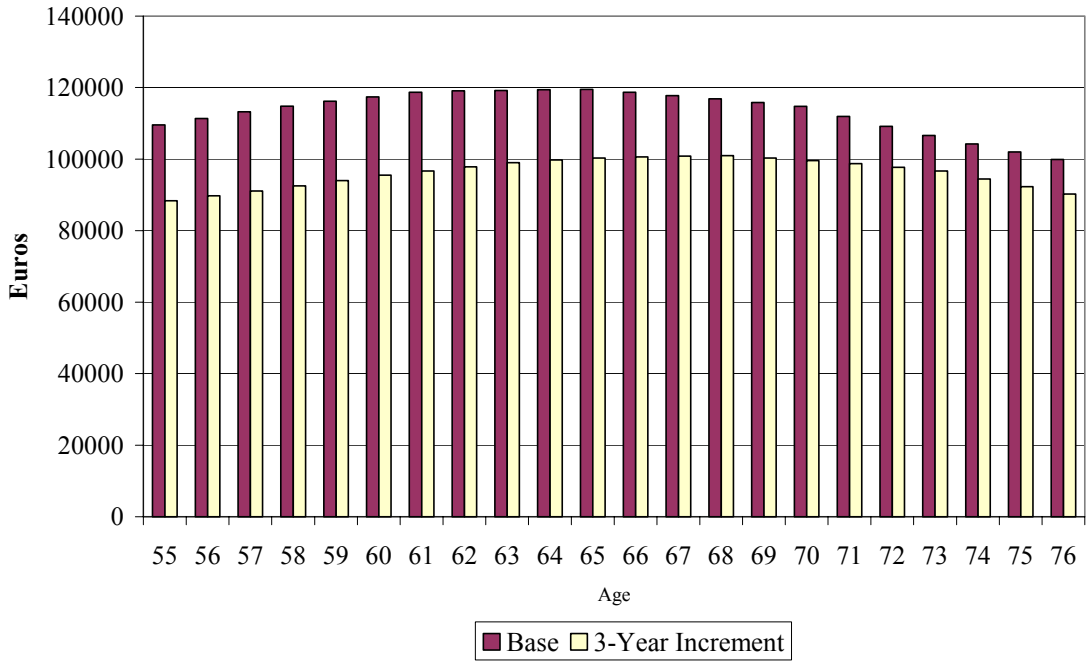

Figure 16. Canada: Total taxes by age of labor force exit

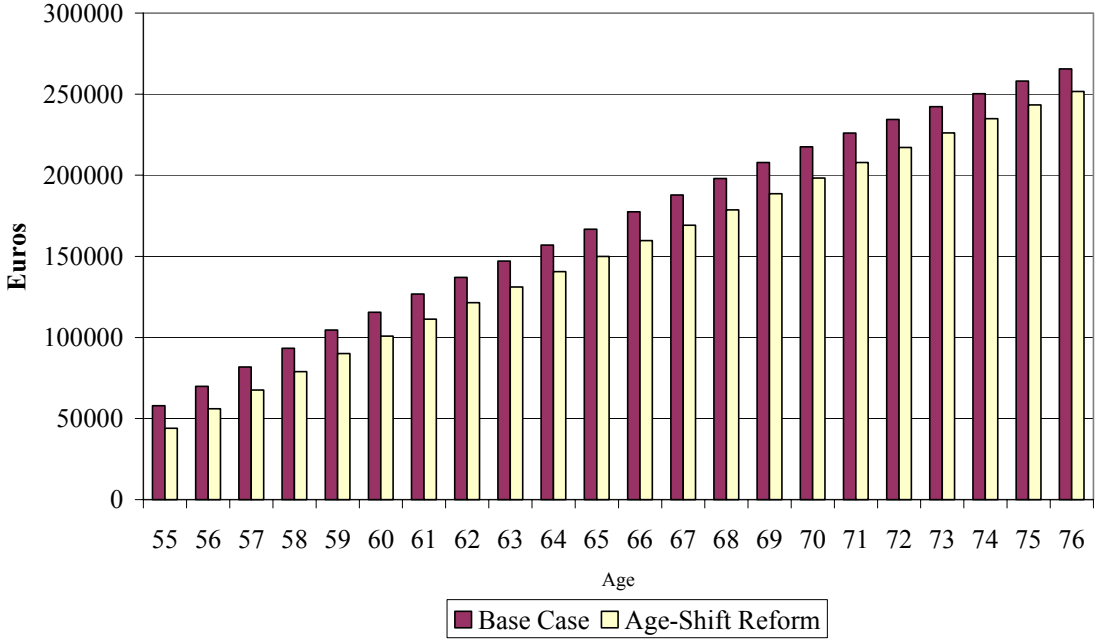

Figure 17. Canada: Distribution of labor force exit ages, OV S1 model

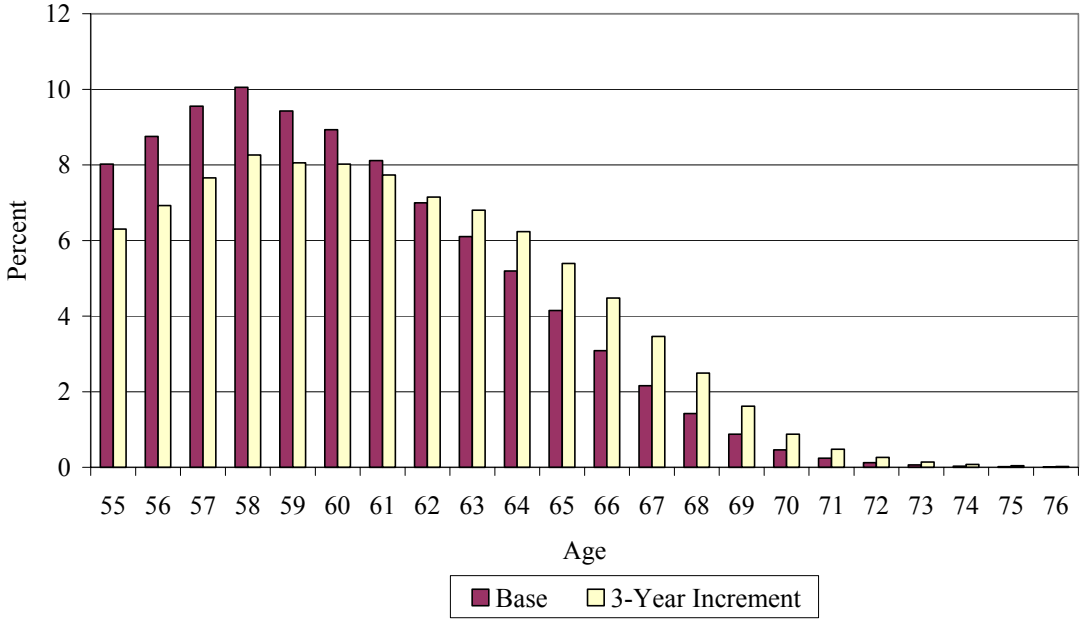

Figure 18. Canada: Total effect of three-year increment by age of retirement, OV S1 model

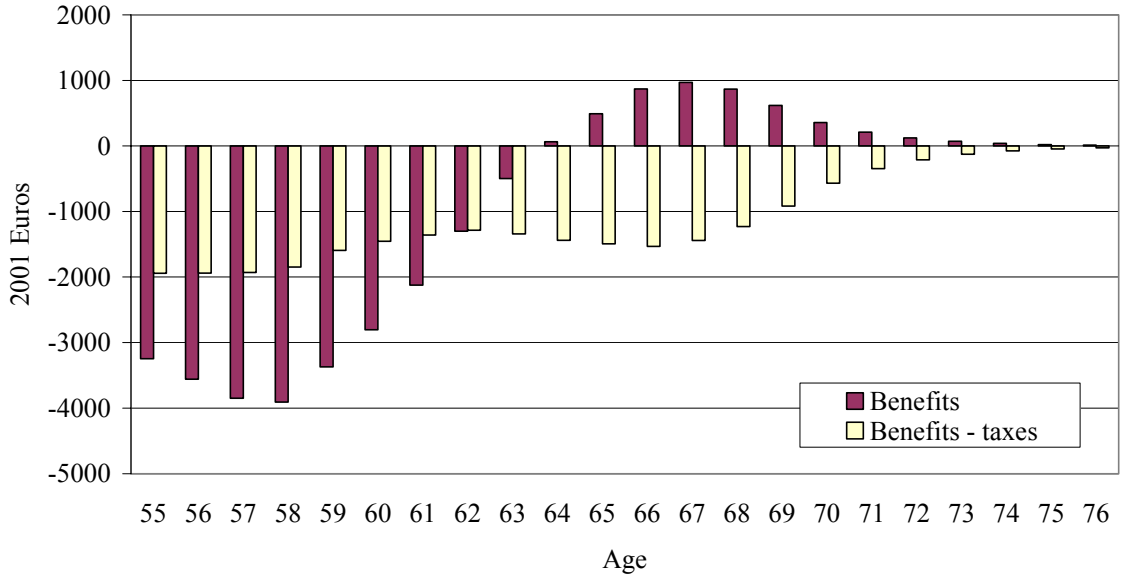

Figure 19. Canada: Fiscal implication of three-year increment as percent of GDP, by estimation method

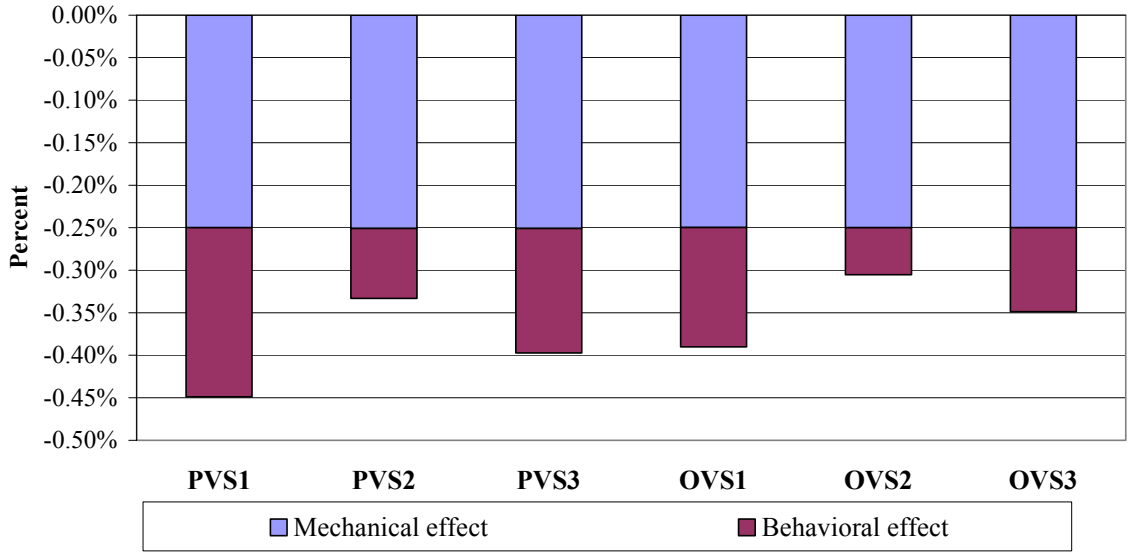

Figure 20. Germany: Distribution of retirement ages for base and actuarial reform, OV-S1 method

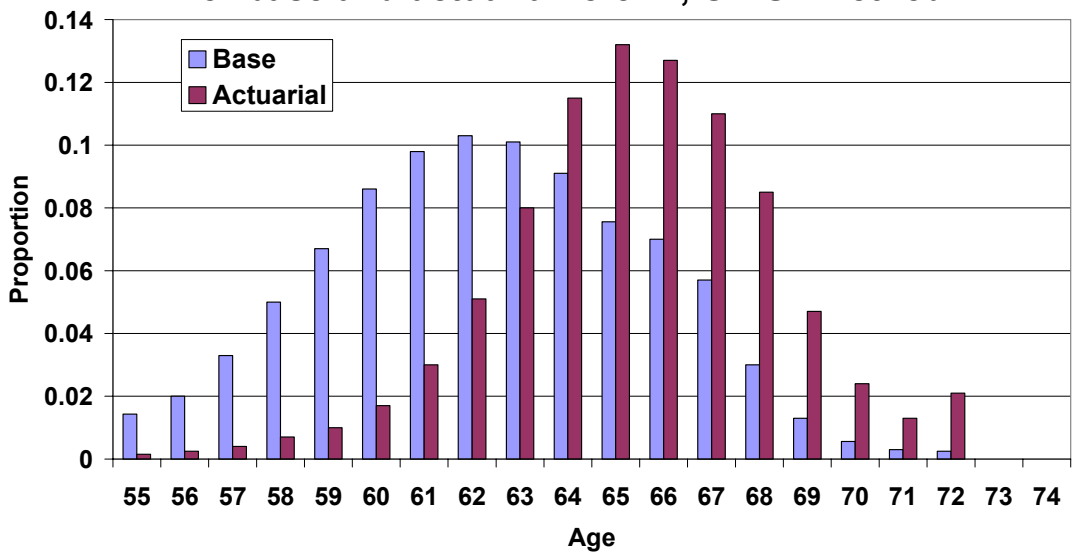

Figure 21. Germany: Fiscal implications of actuarial reform as % of 2001 GDP, by estimation method

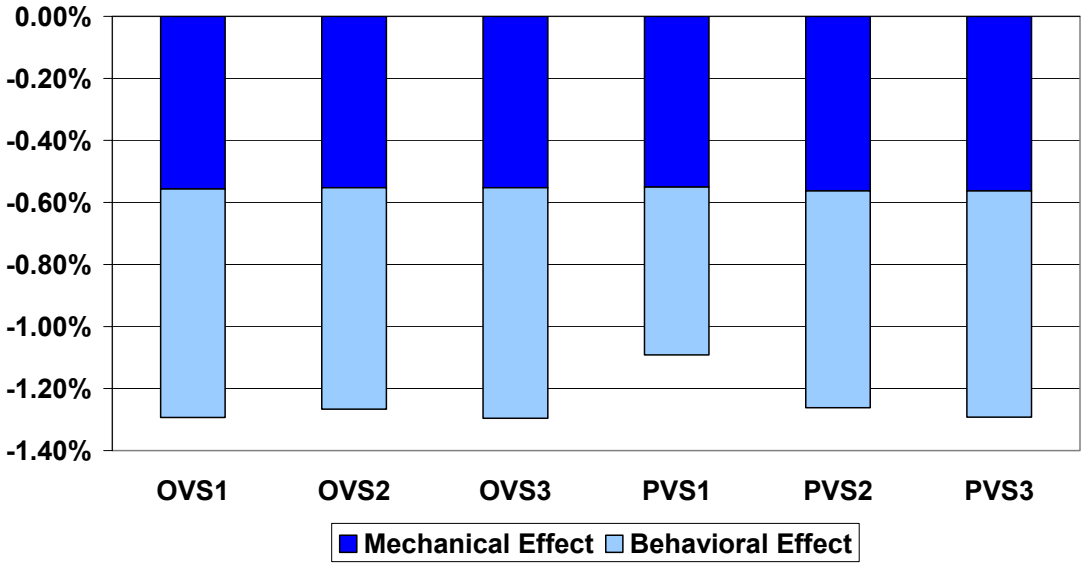

Figure 22. Total fiscal effect of 3-yr increment, as % of base cost

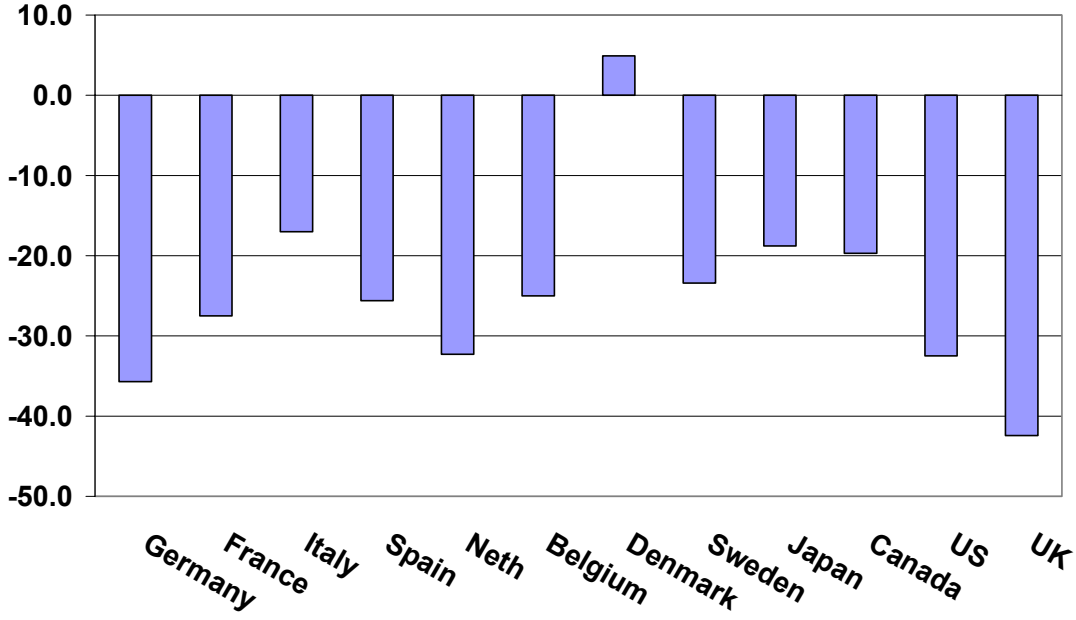

Figure 23. Total fiscal effect of 3-yr increment, as % of GDP

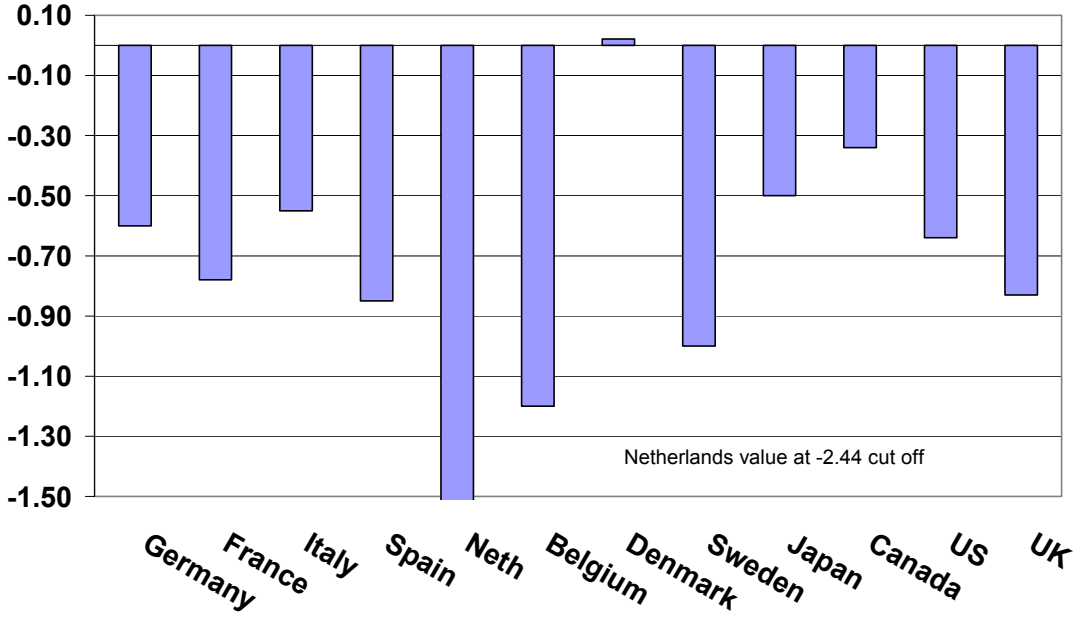

Figure 24. Total fiscal effect of actuarial reform, as % of base cost

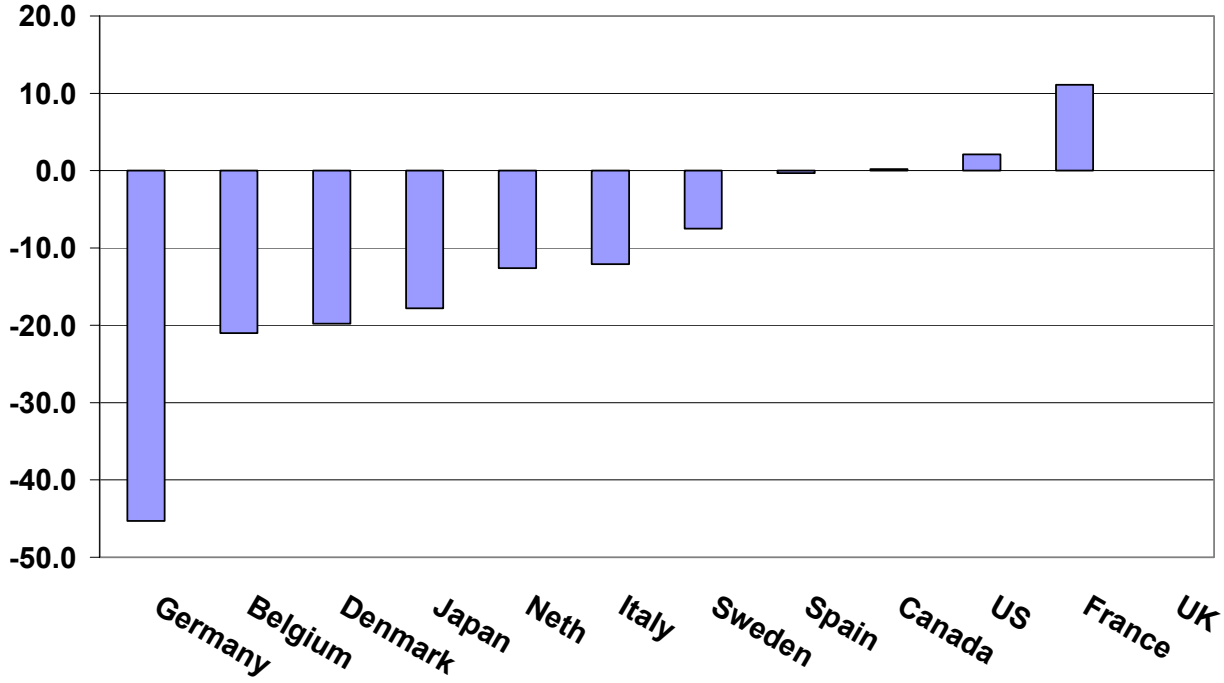

Figure 25. Total fiscal effect of common reform, as % of base cost

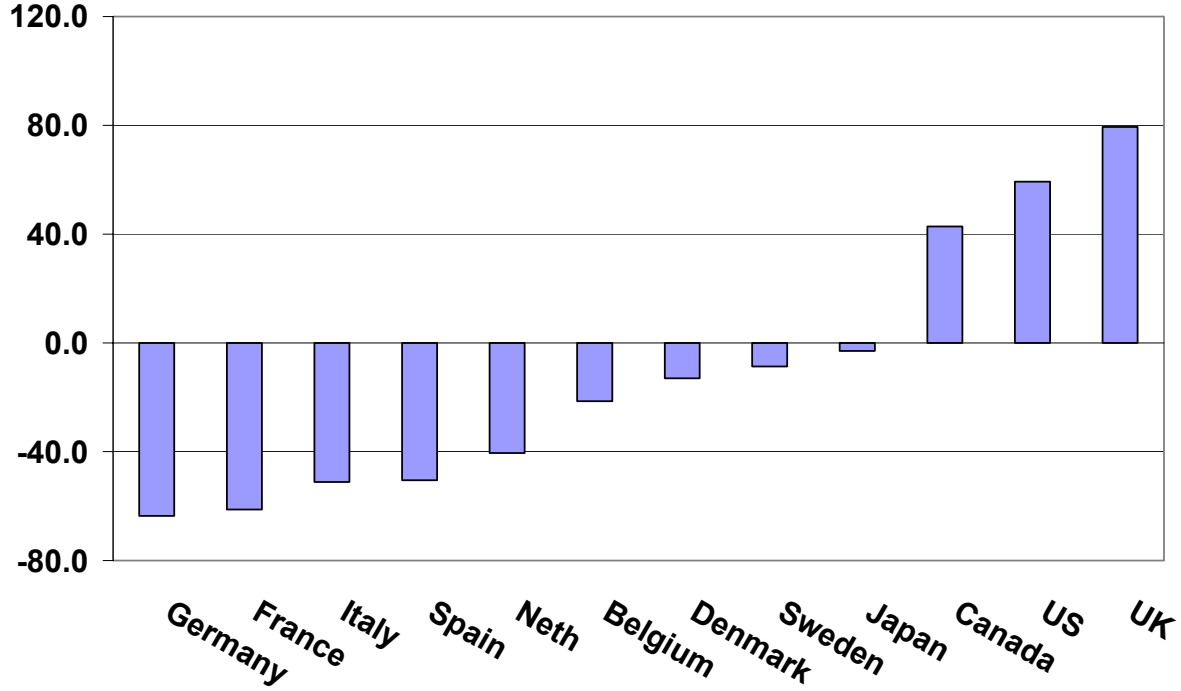

Figure 26. Total fiscal effect of 3-year increment, actuarial, and common reforms, as % of base cost

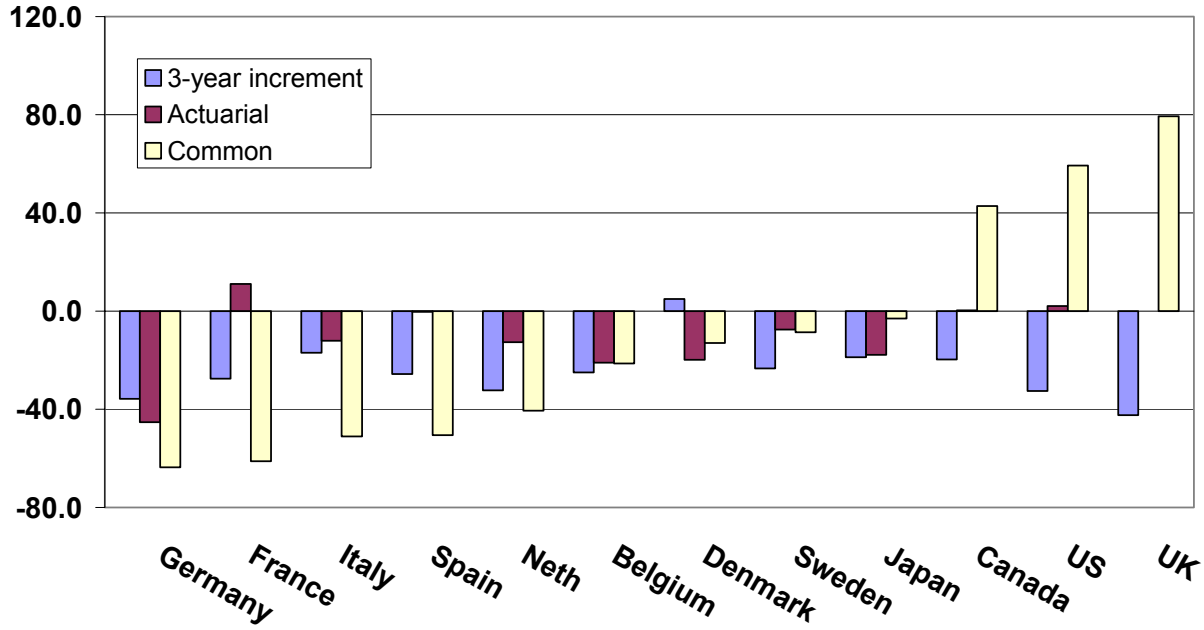

Figure 27a. LFP trends for men 60 to 64, updated

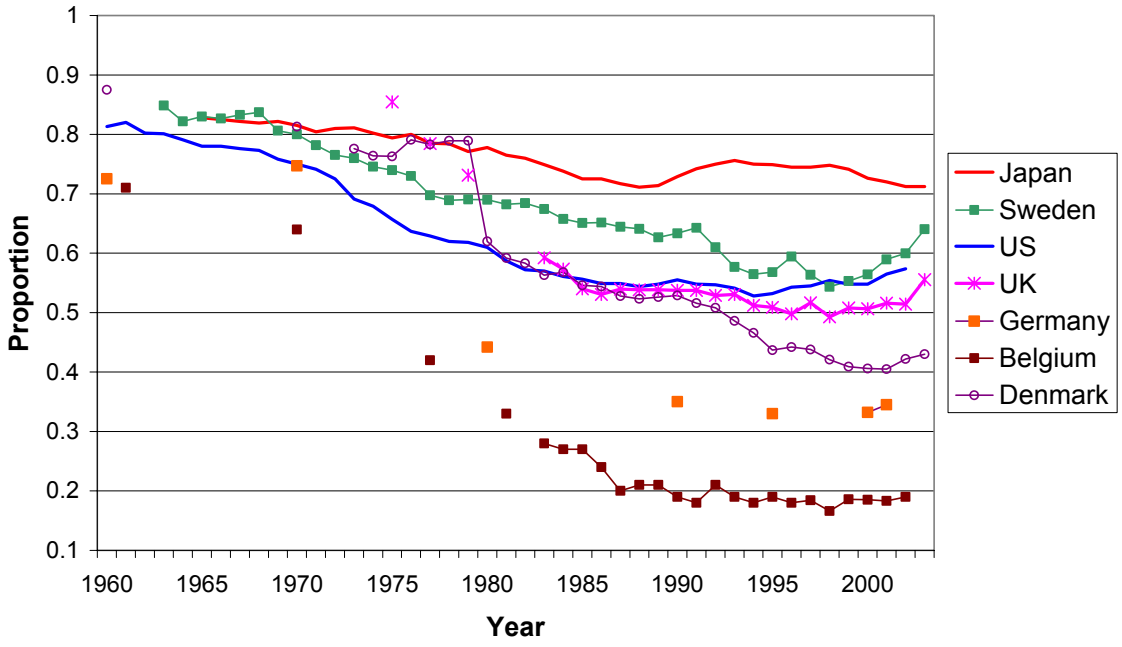

Figure 27b. LFP trends for men 60 to 64, updated