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Social Security, Retirement Incentives, and Retirement Behavior: An International Perspective

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The largest entitlement program in the United States today is the Social Security program (SS). Social Security benefits payments in 1997 amounted to over $316 billion, which is almost 18% of the federal budget and about 4% of U.S. GDP for that year; this represents a doubling as share of GDP in the past 30 years. Social Security in the U.S. is also a system in fiscal imbalance. The convergence of three trends in the early 21st century will cause problems with the long run solvency of the program. Two of these trends are the aging of the "baby boom" cohort and the drop in the fertility rate of U.S. families. As a result, the ratio of persons over age 65 to those aged 20-64 has risen from 0.14 in 1950 to 0.21 today, and is projected to rise to 0.36 by 2030 and to 0.41 by 2070. The final trend is the reduction in the rate of growth in real wages in the U.S., which has lowered the base of earnings on which SS benefits commitments can be financed. As a result, current estimates imply that if the structure of the program remains unchanged, payroll taxes to finance this program, currently at 12.4% of payroll, would have to rise to over 18% (Steurle and Bakija, 1994).

This type of fiscal imbalance is reflected not only in the Social Security system in the U.S., but in systems around the industrialized world.

Indeed, the projected actuarial deficits in SS systems in other nations dwarf those of the U.S. Figure 1 shows the ratio of the number of persons age 65 and over to the number age 20-64 for a sample of 11 countries. In six of the countries, this ratio will exceed 0.5 by 2050; in Japan, it will exceed 0.6.

Figure 1 here

These demographic trends have placed enormous pressure on the financial viability of the social security systems in these countries. The financial pressure is compounded by another trend. In virtually every country employees are leaving the labor force at younger and younger ages. In some countries, the labor force participation rates of 60 to 64 year old men have fallen by 75% over the past three decades.

What accounts for the striking decline in labor force participation? One explanation is that social security provisions themselves provide enormous incentive to leave the labor force early, thus by their very structure exacerbating the financial problems that they face. The purpose of this paper is to summarize the financial incentives for retirement faced by older workers in the U.S. and around the world, and the correspondence between these financial incentives and the actual retirement decisions that are made. The work that is summarized here is part of an ongoing National

Bureau of Economic Research project on International Social Security Comparisons. This project is organized by Jonathan Gruber and David Wise, and the results of the first round of analysis are presented in Gruber and Wise (1998). The participating countries are:

- Belgium (Pestieau and Stijns, 1998)
- Canada (Gruber, 1998)
- France (Blanchet and Pele, 1998)
- Germany (Börsch-Supan and Schnabel, 1998)
- Italy (Brugiavini, 1998)
- Japan (Oshio and Yashiro, 1998)
- Netherlands (Kapteyn and de Vos, 1998)
- Spain (Boldrin, Jimenez, and Peracchi, 1998)
- Sweden (Palme and Svensson, 1998)
- United Kingdom (Blundell and Johnson, 1998)
- United States (Diamond and Gruber, 1998).

This paper begins with a review of the trends in labor force participation, in the U.S. and around the world, highlighting the remarkable reduction in the participation of older workers in the labor force. It then documents the current patterns of labor force participation by older workers in the U.S. and in these other countries. We then use data from

several individual countries to illustrate the relationship between social security provisions and withdrawal from the labor force. We first discuss the relationship between the age of benefits entitlement and retirement patterns across several nations. We then summarize across the full sample of nations the retirement incentives inherent in their different systems. Finally, we compare these incentives to actual patterns of retirement across this sample of nations, finding a striking correlation between countries that tax work heavily at older ages and countries that have little labor supplied at those ages.

A. Labor Force Participation

1. The Decline Since 1960

The decline in the labor force participation of older persons is one of the most dramatic features of labor force change over the past several decades. This decline for the United States is illustrated in Figures 2 and 3, which graph the labor force participation rates of men and women in different age groups since 1960. We focus on four age groups: 45-54; 55-59; 60-64; and 65 plus. For men, there is a decline in the labor force participation of all of these groups. The decline for the youngest group is slight, while the decline for 60-64 year olds is much more precipitous; for

the latter group, labor force participation has fallen from above 80% in 1960 to 52% in 1994. There is also a large percentage decline, albeit from a smaller base, for the oldest group, where participation rates were halved, from 35% to 17%.

Figures 2 and 3 here

For women, the pattern is quite different: any trend towards earlier retirement is dominated by increased labor force participation across cohorts. Even for those age 60-64, participation is rising; for the oldest group, participation declines slightly.

This dramatic decline in labor force participation for older men in the U.S. is well known, and has been the subject of much commentary, particularly in terms of the role that Social Security might have played in this trend. What is less well known, however, is that the decline is much more striking in other industrialized nations. The labor force participation rates of men aged 60 to 64 for the years 1960 to 1996 are shown for each of the eleven countries in Figure 4, which for ease of presentation is shown in two panels. 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% in each of the countries and above 80% in several countries. By the mid 1990s, the rate had fallen to below

20% in Belgium, Italy, France, and the Netherlands. It had fallen to about 35% in Germany and 40% in Spain.

Figure 4 here

The U.S. decline from 82% to 53% was modest in comparison to the much more precipitous decline in these European countries. The decline to 57% 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% to 75%. Labor force participation rates of 45-59 year old men, as well as those 60 and older, have also declined substantially.

The individual country analyses summarized here also present parallel information for women. While labor force participation is increasing for women around the industrialized world, most other countries differ from the U.S. in that for older women (60-64) labor force participation is still falling, albeit less precipitously than male participation.

2. The Decline with Age and "Non-Work"

Of particular interest for the analysis in this paper is the current relationship between labor force participation and age. The age pattern of non-participation for men and women for the U.S. case is depicted in

Figure 5. At age 45, the participation of men is significantly higher than that of women, although almost 80% of 45 year old women are working in 1994/5. There is then a gradual parallel decline for men and women until age 55, at which the age pace steepens; this is particularly true for men, so that the participation gap closes substantially by age 62. By age 75, participation has dropped quite low, with fewer than 20% of men and 10% of women participating in the labor force.

Figure 5 here

Figure 6 considers in more detail the allocation of time among men as they age, by dividing activities at each age into employment, unemployment, disability, and retirement. The top line, showing the share of men employed, mirrors the age trend in Figure 5. There is very little age trend in either unemployment or disability, although both categories do shrink over time. The dominating trend here is increased retirement with age.

Figure 6 here

This same relationship between labor force participation and age for men is shown for each of the countries in the sample in Figure 7. The countries are ordered by labor force participation at age 65. At age 50 approximately 90% of men are in the labor force in all of the countries. The

decline after age 50 varies greatly among countries. By age 65 virtually no men in Belgium are working; in Japan about 60% are still in the labor force. Indeed, only about 25% of men in Belgium are working at age 60. In Japan, on the other hand, 75% at working at age 60.

Figure 7 here

One simple means of comparing the extent of labor withdrawal of older men across countries is to compare the average proportion of men not participating in the labor market. That is, consider the proportion of men not working at a given age (1-LFP, where LFP is the labor force participation rate); this is about 0.95 for Belgium and about 0.40 for Japan at age 65, for example. Loosely speaking, we can refer to this as "non-work" at that age. If non-work is added up over all ages, and divided by the number of ages, we measure total non-work for a given age range as a percent of total work capacity in that age range.

The non-work measures for all of the countries are shown in Figure 8. The non-work ranges from 67% in Belgium to 22% in Japan. The U.S. is towards the bottom of the range, with a non-work measure of 37%. Of course, these are only relative measures; there is no reason to assume that all men who are not working should, or could, work. In particular, this measure might differ across countries because of differences in health

status. Or, non-work may be higher in countries in which a larger proportion of jobs are physically demanding. Nevertheless, these enormous differences across fairly similar industrialized countries are striking. We will consider below how this relative measure is related to the provisions of the social security programs in the countries.

Figure 8 here

B. The Incentive Effects of Plan Provisions

The key feature of each of the country analyses summarized here is their highly detailed computation of plan retirement incentives. In this section, we provide a very brief overview of the provisions of social security plans that can create large retirement incentives. We then present evidence on how these incentives appear to be reflected in retirement behavior.

Two features of social security plans 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. The "normal" retirement age is also important, but as the data will show, is typically much less important than the early retirement age. It may once have been that the normal retirement age was when most people were expected to

retire; now in most countries, few people work until the “normal” retirement age.

The extent to which people continue to work after the early retirement age is closely related to the second important feature of plan provisions, the pattern of benefit accrual. Suppose that at a given age a person has acquired entitlement to future benefits upon retirement. The sum of this future stream of benefits, expressed in terms of today’s dollars, is that person’s Social Security Wealth at that age (SSW_a).[1] The key consideration for retirement decisions is how this wealth will evolve with continued work. If a person is 59, for example, what is the change in SSW if he retires at age 60 instead of age 59? The difference between SSW if retirement is at age a and SSW if retirement is at age a+1, $SSW_{a+1} - SSW_a$, is called *SSW accrual*.

We compare the SSW accrual to net wage earnings over the year. 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 a key calculation that is made in the same way for each of the countries considered here. 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.

The magnitude of the SSW accrual, and the corresponding tax or subsidy, differ greatly from country to country, and is determined by several provisions. The most important is of course the magnitude of the benefits to which the worker, and his family, is entitled; any taxes or subsidies are multiples of the generosity of the benefits structure. These benefit effects can even be multiplied if, as in the U.S. case, there are tax subsidization of benefits relative to earnings. The second is the adjustment to benefits if a person works for another year. An additional year of work means a delay in receiving benefits which will be received for one fewer years. In some countries, there is an “actuarial” adjustment, such that benefits are increased to offset the fact that they are received for fewer years. But in other countries there is no such adjustment. The greater the adjustment, the greater the inducement to continue working. If the adjustment is not large enough to offset the fewer years of benefit receipt,

however, there is an incentive to leave the labor force. Third, a person who continues to work must pay social security taxes on earnings, lowering net social security accrual. These tax payments make retirement more attractive. Fourth, the additional year of earnings is often used in the re-computation of social security benefits, which are typically based on some measure of lifetime average earnings. Since earnings are often higher later in life than earlier, this may raise net accrual, making retirement less attractive. This effect may be especially important for the younger old who are not fully "vested" in their social security systems until they have paid in for some minimal number of years. Finally, a delay in receiving benefits raises the odds that the worker might die without being able to collect any benefits. This lowers net social security accrual and may be an important consideration for the oldest workers.

In addition to social security plan provisions, other government and private programs may also affect the relationship between social security plan provisions and observed retirement patterns. One is the availability of employer-provided pension plans. For example, half of employees in the United States are covered by employer-provided plans, and about half of these are “defined benefit” plans that have substantial retirement incentive effects, as emphasized by Stock and Wise (1990a, 1990b) and Lumsdaine,

Stock, and Wise (1991, 1992, 1994). For most European countries, employer-provided plans are much less prevalent; the most important exceptions are the United Kingdom and the Netherlands. The other programs that may have an important effect on retirement are unemployment and disability insurance. In many European countries these programs essentially provide early retirement benefits before the official social security early retirement age. While these other programs affect the comparisons that are made here, the basic relationship between social security plan provisions and retirement is typically quite clear. In some cases where these plans are especially important, the country analyses have incorporated them into the "social security" incentive calculations.

The remainder of this paper discusses the role of these two important features of SS systems: the age of benefits entitlement and the implicit tax on work through the structure of SS benefits.

C. Age of Benefits Entitlement: Country-Specific Examples

To illustrate the relationship between social security plan provisions and retirement behavior, we begin with evidence from the United States, and then turn to two other countries who have seen substantial changes in the structure of their social security systems: Germany and France. Data

from these three countries allow a simple within country comparison of change in plan provisions over time and the corresponding change in the labor force participation of older people. The experience of these countries also highlights a feature of retirement that is common to all countries, the concentration of retirement at social security early and normal retirement ages. In the final section we discuss overall evidence based on all of the eleven countries and draw general conclusions based on between-country comparisons.

1. The US Case

Key Institutional Features

For understanding the retirement implications of the structure of SS in the United States, and the corresponding implications of systems in other countries, it is useful to quickly review the institutional structure of our SS system. The "Normal Retirement Age" (NRA) for receipt of SS benefits is 65, although since 1956 for women and 1961 for men, persons have been able to claim their SS benefits at age 62 if they are interested. The system is financed by a payroll tax of 5.3 percentage points on both the employer and employee, up to a taxable maximum earnings per year of $68,400.

The amount that a worker receives upon claiming his SS benefits is a function of his average indexed monthly earnings (AIME), which is the real monthly earnings averaged over the highest 35 years of earnings. A key feature of this process is that additional higher earnings years can replace earlier lower earnings years since only 35 years are used in the calculation. This function is progressive; a dollar of contributions yields a higher benefit for a low income than for a higher income worker.

Adjustments to the benefit level are made based on the age at which benefits are first claimed. For workers claiming before the Normal Retirement Age (currently 65, but legislated to slowly increase to 67), benefits are decreased by 5/9 of one percent per month, so that for those claiming on their 62nd birthday their benefits are 80% of what they would be if they waited until the normal retirement age. The reduction is called the Actuarial Reduction Factor. Individuals can also delay the receipt of benefits beyond age 65, and receive a Delayed Retirement Credit (DRC). For workers reaching age 65 in 1996, an additional 5% is paid for each year of delayed receipt of benefits. Under current legislation this amount will steadily increase until it reaches 8% per year in 2009. There are also important additional benefits provisions based on family structure: spouses of SS beneficiaries receive an additional benefit which is 50% of the

primary earners benefit, if their SS entitlement based on their own earnings is lower than this level; dependent children are also eligible for 50% of the earners benefit; and surviving spouses receive 100% of that benefit.

Correspondence with Retirement Decisions

The clear correspondence between the structural features of SS and individual retirement decisions in the U.S. can be seen clearly by examining the "departure rate" or "hazard rate" out of the labor force: the proportion of men who are employed at a given age who retire at that age. Figure 9 shows the hazard rate for labor force leaving for men in the U.S. The striking fact about this figure is the dramatic increase in labor force leaving at age 62, which is precisely the age of eligibility for early retirement under Social Security, and at age 65, which is the normal retirement age. That is, of those working at age 60, fewer than 10% retire when they turn 61; but of those working at 61, 25% retire when they turn 62. These "spikes" are very suggestive of a role for SS in explaining the retirement behavior of men. There is also a small spike around age 55, which may reflect the early retirement provisions at that age under many pension plans. There is also another spike around age 68; the cause here is not clear, although the small denominator of the participation hazard after age 65 makes it hard to interpret this finding.[2]

Figure 9 here

Moreover, changes in the age of eligibility for social security benefits in the U.S. had a large effect on retirement behavior. This pattern is illustrated in Figure 10, which shows the hazard rates out of the labor force for men in 1960, 1970, and 1980.[3] In 1960, the normal retirement age was 65, and there was no opportunity for early retirement under social security. In that year, the hazard rate was low until age 65, when the departure rate jumped precipitously, reflecting the availability of social security benefits.

Figure 10 here

In 1961, early eligibility for retirement benefits for men at age 62 was introduced.[4] The effect of the introduction of early retirement on labor force departure rates is striking. Starting in 1970, and visible most clearly in 1980, there was a dramatic increase in the departure rate at age 62, and a corresponding decrease at age 65. As a result, since 1980 the highest rate of labor force leaving has been at age 62.[5] Thus, the United States data suggest a very strong influence of social security incentives on retirement: not only are current retirement ages correspondent with the ages of benefits entitlement under the SS system, there was a distinct shift towards retirement at age 62 in the wake of the introduction of that early retirement age.

2. The German Case

The German experience provides another striking example of the role of SS institutions in driving retirement decisions. Before 1972, the social security retirement age in Germany was 65, except for disability, and there was no social security early retirement age. But legislation in 1972 provided for early retirement at age 60 for women and at age 63 for men (given the accumulation of required social security work years). In addition, liberal use of disability and unemployment benefits effectively expanded the early retirement option. In a large fraction of cases, social security early retirement benefits were made available with no reduction in benefits; benefits if taken at the early retirement age were the same as if they were taken at the normal retirement age. This greatly increased the net tax on work, since delaying retirement simply reduced the number of years that one could receive benefits, without increasing the annual benefit.

In fact, there was a dramatic response to this increase in retirement incentives. Over the next few years the mean retirement age of white collar workers was reduced by 5.5 years as shown in Figure 11.[6]

Figure 11 here

The correspondence between plan provisions and retirement can also be demonstrated by considering the relationship between retirement

and social security provisions at a point in time. The detailed provisions of the 1972 legislation are mirrored in the retirement rates by age, as illustrated by the hazard rates in Figure 12.

Figure 12 here

The ages of key plan provisions are also noted on the figure so that the correspondence between provisions and retirement is easily seen. Men who are “disabled” or “unemployed” at age 60, and have a certain number of years of employment under the social security system, are eligible for early retirement at that age. There is a corresponding large jump in the retirement rate at that age. Men who have been employed for 35 years are eligible for early retirement at age 63 and there is a corresponding jump in the retirement rate at that age. The normal retirement age is 65 and there is a corresponding spike at that age as well.

3. The French Case

The experience in France provides another illustration of the effect of changes in plan provisions. Prior to 1972, the French normal social security retirement age was 65 and early retirement provisions were uncommon. In the early 1970s “early retirement provisions” were introduced by way of guaranteed income for persons age 60 and over who

lost their jobs. In 1983, age 60 became the normal retirement age. In addition, guaranteed income was provided for persons age 57 and older who lost their jobs.

The effect of this series of reforms is easily seen in the panels of Figure 13, which show the distribution of social security retirement ages for those workers attaining age 60 in 1972, before any of these changes, and in 1986, after they were all in place (These figures must be distinguished from those like Figure 12 for Germany, which shows hazard or departure rates; Figure 13 shows the distribution of retirement ages.) In the early 1970s the modal retirement age was 65, as shown for the cohort that reached age 60 in 1972 (and age 65 in 1977). But as early as 1963, special allowances were provided for some workers who became unemployed at age 60 or older, perhaps reflected in the small spike at age 60. Beginning in 1972, a “resource maintenance” program provided grants equal 60 to 70 percent of last earnings to persons who became unemployed between ages 60 and 64. The effect of these programs seems to be reflected in the increasing proportion of workers retiring at age 60, as shown in the second and third (1978 and 1982) panels of Figure 9. In 1983, age 60 became the normal social security retirement age.

Shortly after that, the modal retirement age did indeed become 60, as shown in the panel for the cohort reaching age 60 in 1986.

Figure 13 here

As in Germany, the current labor force departure rates in France also correspond closely to social security provisions. The age-specific rates of departure from the labor force in France are shown in Figure 14. Approximately 60% of employee who remain in the labor force until the social security early retirement age -- 60 -- retire then. But even before that age, departure rates are substantial, apparently reflecting the guaranteed income provisions for employees who become “unemployed,” even if they are not eligible for social security benefits. Thus, as in Germany, there is a large incentive to take retirement benefits once they are available.

Figure 14 here

To summarize: These three country illustrations make clear the very close correspondence between retirement ages and the statutory social security eligibility for early and normal retirement benefits. In all three cases, there are large jumps in labor force departure rates at the early retirement age, in particular, and at the normal retirement age as well. The correspondence is demonstrated most convincingly by within-country

changes in retirement behavior over time, which follow on changes in statutory provisions.

D. Tax Incentives to Retire: Evidence Across All Countries

In distilling the evidence from all of the countries studied in the NBER project, three features of the data stand out. First, as in the three country illustrations, there is a strong correspondence between early and normal retirement ages and departure from the labor force. Second, the social security provisions in most countries place a heavy tax burden on work past the age of early retirement eligibility and thus provide a strong incentive to withdraw from the labor force early. Third, the tax -- and thus the incentive to leave the labor force -- varies substantially among countries. So does retirement behavior. Thus by considering comparisons across the countries we are able to draw general conclusions about the relationship between the tax penalty on work and retirement behavior.

In order to facilitate these comparisons, a central feature of the project was a detailed computation of the retirement incentives inherent in the provisions of that country's retirement-income system. This included, in some cases, not only SS programs but other quasi-early retirement options such as disability insurance. By making the same analytic calculations, the

individual studies provide a means of comparing the retirement incentives among the nations. In each case, the study considered the incentives facing a male worker born in 1930, and thus turning 65 in 1995, who earned the median earnings in each year for his cohort. He is assumed to have a wife who is three years younger and who did not work.

Results for the U.S.

To illustrate the nature of these calculations, it is useful to start with the U.S. case, and then to move to a summary of the international findings; these U.S. results are presented in Diamond and Gruber (1998). Table 1 shows the basic results for the U.S. case. Each row represents the age of the worker in the last year that they work; that is, the first row represents the effect of working during the 61st year and retiring on the 62nd birthday. The first column shows the net replacement rate. At the first point of possible claiming, the replacement rate is 40%; that is, if the individual retires on his 62nd birthday, this SS benefits will replace 40% of his foregone wages. This rises over time due to actuarial adjustment, which rewards workers for delayed claiming by increasing benefits. The major change occurs for retirement on the 65th birthday, when the wife turns 62, since at that point the spouse becomes entitled to dependent benefits. For

the worker who works through his 69th year and collects on his 70th birthday, SS replaces almost 90% of his after-tax earnings.

Table 1 here

The next three columns show the evolution of SSW over time. For the worker retiring at the early retirement age, he will have accumulated $104,275 in SSW. If he works an additional year, he SSW will increase by about 0.4%, as shown by the accrual rate in the fourth column. That is, the system in the U.S. is roughly "actuarially fair" with respect to retirement at age 62; the fact that benefit receipt is delayed for a year and that the worker has to pay another year of SS taxes is compensated by the actuarial adjustment to benefits, and the fact that this next high earnings year can replace a lower earning year earlier in his career. As a result, as the final column shows, there is actually a subsidy to work at age 62 under the SS system: the median worker who chooses to work an additional year at age 62 sees a net wage bonus of 2.7%.

From age 62-64, there are implicit taxes on work through the SS system, but these are small. However, at age 65, the implicit tax on work jumps up dramatically. For this worker, working during his 65th year means forgoing over $2450 in SSW, which amounts to almost 19% of what he would earn during that year. This is because the actuarial adjustment

for working beyond age 65 is unfair, given the foregone year of SS benefits. This tax rate rises further with age, so that for the decision to work during the 70th year, the foregone SSW amounts to almost half of what he would earn during that year.[7]

Table 2 here

The results in Table 1 illustrate the retirement incentives under SS for one type of worker, a married male with a non-working spouse. Table 2 summarizes the incentives under SS for other types of workers, showing both the replacement rate for retiring at a given age and the tax/subsidy rate for another year of work. We first consider single male workers. For this group, the replacement rate is much lower than for their married counterparts, since they do not benefit from the dependents benefit that accrues to the married male with a non-working spouse. The tax rates on additional work are also higher at most ages for single workers, for the same reason: both the actuarial adjustment to benefits and the benefit recomputation from additional years of high earnings are worth more to married workers, since they get a 50% bonus on each extra benefit dollar.

We then consider low versus high earnings workers. In particular, we show the results for workers at the 10^{th} and 90^{th} percentiles of the earnings distribution. Low earnings workers have a much higher

replacement rate, and higher earnings workers a correspondingly lower rate. Before age 65, there are small tax rates on work for higher earning workers, and larger subsidies for low earners; this is because the actuarial adjustment and benefit recomputation is worth much more to a low earner as a share of earnings. After age 65, however, when actuarial adjustments become "unfair", the tax rates rise much more for low earning workers, since at their high replacement rates there is a greater penalty for unfair actuarial adjustments. This effect foreshadows somewhat what we see below for other nations.

International Comparison

Labor force participation and retirement incentives for all eleven countries in our study are summarized in Table 3. The countries are ordered by the amount of "'non-work" of men between the ages of 55 and 65, which is explained above and shown in Figure 8.

Table 3 here

The second column of the Table shows the early retirement age under SS systems in each country. In several countries (where age is in quotations), there is no clearly defined early retirement age. For example, in Italy, one can retire upon the accumulation of 35 years of work

experience, which we write as age 55 in the table, since our “sample” worker begins working at age 20.

The third column shows the “replacement rate” of the SS system at that early retirement age. There is substantial variation in the replacement rates. In the U.S., the replacement rate for this sample worker is about 40% of previous earnings. In France and the Netherlands, however, the replacement rate is 91%, and in the majority of countries it is over 60%.

The next two columns show the accrual rate of Social Security Wealth, and the associated implicit tax on earnings, for a worker who works for one year beyond the early retirement age. That is, this summarizes the incentives facing a worker as he decides whether to retire at the age of first benefits entitlement. As noted above, in the U.S., this accrual rate is positive, and the tax is negative, at the early retirement age, although the tax on work becomes substantial after age 65.

For the other countries, the story is generally quite different: delaying retirement past the age of early benefit entitlement leads to enormous reductions in SSW and associated very large tax rates on continued work. For example, in France, retiring at age 61 instead of age 60 implies a 7% reduction in the total value of one’s SSW, which is 80% of earnings over that next year. That is, by working one more year, the

worker forgoes in SSW four-fifths of what he will earn from work! Indeed, in the Netherlands, the tax rate is actually much greater than 100%; the median worker who continues in the labor force beyond the age of early benefits entitlement loses much more in SSW than he will earn from his job.

These enormous tax rates on continued work in many other countries are striking, particularly in contrast with the low tax rates in the U.S. There are four reasons why the tax rate at the early retirement age is so much lower in the United States: First, the "replacement rate" is much lower in the United States, and thus wage earnings exceed social security benefits by much more than in other countries such as France or the Netherlands. Aside from other features of the programs, higher replacement rates increase the retirement incentives in these other countries; the benefit foregone is much lower in the United States. Second, between age 62 and 65 the United States system provides an actuarial adjustment to benefits if their receipt is delayed, which offsets to a large extent the fewer years of benefit receipt. There is no actuarial adjustment in countries such as France. Third, payroll tax rates to finance the program are much lower in the United States, which lowers the tax on additional work. Finally, the U.S. system allows higher earnings later in life to replace low earnings in earlier years; this is not true in many other countries.

Casual perusal of this table suggests a strong relationship between non-work and the tax rate on continued work. To see the relationship more clearly, it is useful to divide the countries into three groups: (1) those with high non-work: Belgium, France, Italy, the Netherlands, and the United Kingdom; (2) a medium non-work group: Germany, Spain, and Canada; (3) and those with low non-work: the United States, Sweden, and (in particular) Japan. The average replacement rate at early retirement in the first group is 76.6% of median earnings and the average tax on continued labor earnings in that year is 91.8%. In the third group -- with the least non-work -- the average replacement rate at the early retirement age is 50%, and the tax rate on continued earnings is 24.7%. These comparisons point to a rather strong correlation between social security incentives and non-work

There is no completely satisfactory way to summarize the country-specific incentives for early retirement. One crude measure is based on implied tax rates on continued labor earnings once a person is eligible for social security benefits. We sum the implied tax rates (expressed as fractions) on continued work from age 55 through age 69. We call this the “tax force” to retire. We begin with age 55 because, even though age 60 is the official “early retirement age” for most SS systems in our study, in

practice these systems often offer important retirement incentives at earlier ages as well through related provisions that should be reflected in the comparisons.

The relationship is formalized in Figures 15, which present scatter plots of the tax force to retire and the amount of non-work between ages 55 and 65. The relationship is clear; there is a strong correspondence between the tax force to retire and non-work. The relationship is non-linear however. Thus in the lower panels of each figure, unused capacity is plotted against the logarithm of the tax force. The solid line in these panels shows the "fit" of the data by a regression of unused capacity on the logarithm of the tax force. This tax force measure can explain about 82% of the variation in non-work across our sample of countries. Thus, these data suggest a strong relationship between social security incentives to quit work and the labor force departure of older workers.

Figure 15 here

The correspondence between the two should be understood in a broader context, however. There are two distinct issues: First, while it seems apparent that social security provisions do affect labor force participation, it also seems apparent from the country papers that in at least some instances the provisions were adopted to encourage older

workers to leave the labor force. For example, anecdotal evidence suggests that in some countries it was thought that withdrawal of older employees from the workforce would provide more job opportunities for young workers. This possibility does not by itself bring into question a causal interpretation of the relationship between plan provisions and retirement. To the extent that it is true, it simply says that in some instances the provisions were adopted for a particular reason. And, the data show that they worked.

The second issue, however, must temper a causal interpretation of the results. It could be argued that to some extent at least, the social security provisions were adopted to accommodate existing labor force participation patterns, rather than the patterns being determined by the provisions. For example, early retirement benefits could be provided to support persons who are unable to find work and thus already out of the labor force. While this is surely possible, the weight of the evidence suggests otherwise. The German, French, and United States illustrations provide strong evidence that changes in plan provisions induced subsequent changes in retirement rates, and not the other way around. In addition, Axel Börsch-Supan has noted, the decrease in the retirement age in Germany was not associated with high unemployment; more likely, it

reflected socio-political forces that were otherwise independent of retirement decisions.

E. CONCLUSIONS

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.

Endnotes

1. Technically, the future stream of benefits is discounted to today's dollars by both the rate of interest and the likelihood that the individual will live to each future age.
2. That is, the spike at age 65 represents a 9.5 percentage point change in labor force participation, while the spike at age 68 represents only a 4.5 percentage point change; the latter appears almost as large as the former because the denominator is so much smaller.
3. Taken from Burtless and Moffitt (1986).
4. It had been introduced for women in 1956.
5. This evolution was fairly slow. A similar pattern is seen in Canada, as documented by Baker and Benjamin (1996): early retirement at age 60 was introduced in 1987, but not until the early 1990s was it reflected in a limited way in retirement behavior.
6. The mean retirement age is the average age of persons retiring in a given year.
7. The much higher tax rates after age 65 will be diminishing over time, as the Delayed Retirement Credit (DRC)provided to workers who work past that age is gradually increased from 5 to 8% over the next decade. The jump in the implicit tax on work in the 68th year is due to dependent benefits: if the worker delays claiming past age

68, that implies (given our assumed age difference) that dependent benefits are delayed past age 65, so that the unfair DRC penalizes the dependent as well. There is an explicit jump for work in the 68th year, due to spousal claiming behavior - penalty on her for waiting until after age 65 to claim.

References

Baker, Michael and Dwayne Benjamin. 1996. "Early Retirement Provisions and the Labour Force Behavior of Older Men: Evidence From Canada." Mimeo, Department of Economics, University of Toronto.

Blanchet, Didier and Louis-Paul Péle. "Social Security and Retirement in France." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Blundell, Richard and Paul Johnson. "Social Security and Retirement in the United Kingdom." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Boldrin, Michele, Sergi Jimenez, and Franco Peracchi. "Social Security and Retirement in Spain." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Börsch-Supan, Axel and Reinhold Schnabel. "Social Security and Retirement in Germany." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Brugiavini, Agar. "Social Security and Retirement in Italy." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Burtless, Gary, and Robert Moffitt (1986). "Social Security, Earnings Tests, and Age at Retirement," Public Finance Quarterly, 14, 3-27.

Diamond, Peter and Jonathan Gruber. Social Security and Retirement in the United States." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Gruber, Jonathan. "Social Security and Retirement in Canada." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Gruber, Jonathan and David Wise. "Social Security and Retirement Around the World." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Kapteyn, Arie and Klaas de Vos. "Social Security and Retirement in the Netherlands." In J. Gruber and D. Wise (eds.), *Social Security and*

Retirement Around the World. Chicago: University of Chicago Press, forthcoming.

Kohli, M., M. Rein, A. M. Guillemard, and H. van Gunsteren (eds.). Time for Retirement: Comparative Studies of Early Exit from the Labor Force. Cambridge University Press, 1991.

Lumsdaine, Robin L., James H. Stock, and David A. Wise. 1991. Fenêtres et Retraites. *Annales d'Économie et de Statistique* 20/21: 219-242.

_____. 1992. "Three Models of Retirement: Computational Complexity versus Predictive Validity." In D. Wise (ed.), *Topics in the Economics of Aging*. Chicago: University of Chicago Press.

_____. 1994. "Pension Plan Provisions and Retirement: Men and Women, Medicare, and Models." In D. Wise (ed.), *Studies in the Economics of Aging*. Chicago: University of Chicago Press.

OECD. "The Transition from Work to Retirement." Social Policy Studies Series #16, OECD, 1995a.

OECD. "The Labor Market and Older Workers." Social Policy Studies Series #17, OECD, 1995b.

Oshio, Takashi and Naohiro Yashiro. " Social Security and Retirement in Japan." In J. Gruber and D. Wise (eds.), *Social Security and*

Retirement Around the World. Chicago: University of Chicago Press, forthcoming.

Palme, Mårten and Ingemar Svensson. "Social Security and Retirement in Sweden." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Pestieau, Pierre and Jean-Philippe Stijns, "Social Security and Retirement in Belgium." In J. Gruber and D. Wise (eds.), *Social Security and Retirement Around the World*. Chicago: University of Chicago Press, forthcoming.

Stock, James H. and David A. Wise. 1990a. "Pensions, the Option Value of Work, and Retirement." *Econometrica* 58, 5: 1151-1180.

_____. 1990b. "The Pension Inducement to Retire: An Option Value Analysis." In D. Wise (ed.), *Issues in the Economics of Aging*. Chicago: University of Chicago Press.

Welch, Finis and F. Peracchi [1994]. "Trends in Labor Force Transitions of Older Men and Women." *Journal of Labor Economics*: v12(2), 210-242.