NBER WORKING PAPER SERIES

SOCIAL SECURITY PROGRAMS AND RETIREMENT AROUND THE WORLD

Jonathan Gruber
David Wise

Working Paper 6134

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 1997

Financial support from the National Institute on Aging through grant number 5 P20 AG12810 and from the National Bureau of Economic Research is gratefully acknowledged. This paper is part of NBER's research programs in Aging and Public Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

Social Security Programs and Retirement
Around the World
Jonathan Gruber and David Wise
NBER Working Paper No. 6134
August 1997
Aging and Public Economics

ABSTRACT

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 some countries, the labor force participation rates of 60 to 64 year old men have fallen by 75% over the past three decades. 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, the provisions of the social security systems themselves typically contribute to the labor force withdrawal.

This paper is a summary of the findings of the evidence in eleven industrialized countries. We distill the key conclusions that can be drawn from the collective findings of the individual papers.

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.

Jonathan Gruber
U.S. Treasury Department
Room 3454
1500 Pennsylvania Avenue
Washington, DC 20220
and NBER
jonathan.gruber@ms01.do.treas.sprint.com

David Wise
Kennedy School of Government
Harvard University
79 JFK Street
Cambridge, MA 02138
and NBER
dwise@nber.org

In almost every industrialized country the population is aging rapidly and individuals are living longer. 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. It is this aspect of social security plan provisions that is emphasized in this volume. By considering the relationship between plan provisions on the one hand and labor force participation rates on the other we hope to draw attention to the important role that social security can have on the labor force decisions of older persons.

This volume contains analyses based on evidence in eleven industrialized countries. We attempt to distill in this summary key conclusions that can be drawn from the collective findings of the individual papers. The project relies on the analysis of a large group of economists who have analyzed social security provisions and labor force participation in their own countries. The authors of the individual country papers are:

Pierre Pestieau and Jean-Philippe Stijns	Belgium
Jonathan Gruber	Canada
Didier Blanchet and Louis-Paul Pelé	France
Axel Börsch-Supan and Reinhold Schnabel	Germany
Agar Brugiavini	Italy
Takashi Oshio and Naohiro Yashiro	Japan
Arie Kapteyn and Klaas de Vos	Netherlands
Michele Boldrin, Sergi Jimenez, and Franco Peracchi	Spain

Mårten Palme and Ingemar Svensson	Sweden
Richard Blundell and Paul Johnson	United Kingdom
Peter Diamond and Jonathan Gruber	United States

The central feature of the project is an attempt to present comparable descriptive data and analytic calculations for each of these eleven countries. Each of the country studies follows the same format. The studies begin with a description of the historical evolution of labor force participation and then present data on the current age-specific activities and income sources of men and women. Each then describes the institutional features of the country's social security system, highlighting any interactions with other public and private programs that might also influence retirement behavior. Finally, the core of each paper is a detailed analysis of the retirement incentives inherent in the provisions of that country's retirement income system. By making the same analytic calculations and by presenting the same simulations in each of the countries, the individual studies provide a means of comparing the retirement incentives among the nations.

We begin this introduction by describing the dramatic fall in labor force participation rates over the past three decades, which provides the primary motivation for this project. We then describe the decline in labor force participation with age that is reflected in current labor force patterns. We draw attention in particular to the foregone productive capacity implicit in the low participation rates of older persons. We then use data from several individual countries to illustrate the relationship between social security provisions and withdrawal from the labor force. These illustrative country data are also used to explain the key methods used in each of the country papers. We also point out important features of public and private policies that differ among the countries, which must be kept in mind when making comparisons between countries. Finally we present a summary of key

findings for all of the countries, emphasizing the relationship between social security provisions and retirement patterns.

A. Labor Force Participation

1. The Decline Since 1960

The decline in the labor force participation of older persons is perhaps the most dramatic feature of labor force change over the past several decades. The decline has been striking in all but one of the countries studied here. 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 1, which for ease of exposition is presented 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. Although United States analysts have often emphasized the "dramatic" fall in that country, 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 and these trends can be seen in the individual country papers. Each of the country papers also presents labor force participation data for women, but for ease of exposition we have not presented those data in this summary.

2. The Decline with Age and "Unused Productive Capacity"

The current relationship between labor force participation and age for men is shown for each of the countries in Figure 2. 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 69 virtually no men in Belgium are working; in Japan almost 50% are still in the labor force. Indeed, most men in Belgium are no longer in the labor force at age 65, and only about 25% are working at age 60. In Japan, on the other hand, 60% are working at 65 and 75% at age 60.

There are many implications of the withdrawal of older men from the workforce. Some have to do with the political influence of older versus younger voters. Some have to do with the psychological well-being of older persons as they age. We emphasize here the foregone productive capacity of older employees who leave the workforce. Figure 3a helps to explain this idea and provides a simple way of comparing the extent of labor withdrawal of older men across countries. This figure shows the labor force participation of men aged 50 to 69 in three countries: Japan, Spain, and Belgium. For Japan, consider the height above the LFP curve, which is the proportion of men not working at a given age (1-LFP). Loosely speaking, we can refer to this measure as the "unused productive capacity" at that age. If the unused capacity is added up over all ages, we find the area above the LFP curve. When divided by the total area of the figure (1 x 19), it is a rough measure of the unused capacity over the age range 50 to 69, as a percent of the total labor capacity in that age range. In Japan, the value of the unused capacity measure is 22%. It is clear from the figure that many more older men are out of the labor force in Belgium, where the unused capacity measure is 61%. In Spain, the unused capacity measure is 48%.

We emphasize that 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, unused capacity may be higher in countries in which a larger proportion of jobs are physically demanding.[1] Nevertheless, these enormous differences across fairly similar industrialized countries are striking.

The labor participation profiles for the other countries are shown in the second and third panels of Figure 3. For comparison, the profiles for Japan and Belgium are shown in each panel. The unused productive capacity measures for all of the countries are shown in Figure 4. For the entire age range from 50 to 69 the unused capacity measures range from a high of 61% in Belgium to a low of 23% in Japan. In the 55 to 65 age range, unused capacity ranges from 67% in Belgium to 22% in Japan. We will consider below how this relative measure is related to the provisions of the social security programs in the countries.

B. The Incentive Effects of Plan Provisions

The key feature of each of the chapters in this volume 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

---

[1]In addition, our measure of unused capacity is crude. A more refined measure would account not only for participation, but the nature of that participation, i.e. hours of work. And it would account for the fact that moving from high pay (marginal product) jobs to lower pay (marginal product) jobs increases unused capacity. For example, the higher LFP of older men in Japan may be due to less rigorous work in the secondary sector, so that we understate unused capacity for that country. Moreover, some of what is called unused productive capacity may include non-market work, such as off-the-books handiwork or volunteer labor; this would lower measured unused capacity. An appropriate measurement of unused capacity across countries is an important priority for future work.

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 present discounted value of these benefits is the person's Social Security Wealth at that age (SSW_a). 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 provision. The most important determinant of accrual 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. Second, 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. Third, 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 studies have incorporated them into the "social security" incentive calculations.

C. Country-Specific Examples

To illustrate the relationship between social security plan provisions and retirement behavior, we draw on the data for three countries: Germany, France, and the United States. The analysis of incentive effects presented in this volume pertains primarily to current country social security systems, or to the systems as they existed until recently. Data for these three countries, however, 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. These three examples also help to draw

attention to the features of other social programs -- disability and unemployment in particular -- that often interact with the social security program in a country. 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 German Case

The German experience provides a rather clean example because a large fraction of employees are covered by the social security system but few are covered by employer-provided pension plans, and such plans that do exist typically provide small benefits. On the other hand, "retirement" in Germany is to some extent encouraged by liberal disability and unemployment programs, in addition to the social security plan provisions.

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 5.[2]

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. Figure 6 shows the proportion men employed at a given age who retire at that age -- the "hazard," or "departure," rate. 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. By age 65, however, fewer than 29% of men are still in the labor force. In addition, even before age 60, liberal interpretation of disability and unemployment plan provisions effectively serves to provide early retirement benefits, which is discussed further below.

But retirement eligibility may not by itself induce retirement. In Germany, a high price is paid for not retiring if eligible. Consider, for example, the prospects faced by a man with median earnings whose wife is three years younger than he is, and -- like 40% of older German workers -- he would be eligible for disability benefits were he to leave the labor force. Suppose he could retire at age 60 but was considering postponing retirement until

[2]The mean retirement age is the average age of persons retiring in a given year.

age 65. The receipt of benefits for five fewer years would not be offset by larger benefits. Indeed, the present value of benefits if taken at 65 would be much less than the present value of benefits if taken at 60; that is, the social security accrual rate is negative. If retirement were postponed by five years, the present value of the benefits would fall by almost 18%. Delaying retirement from 60 to 61 would reduce benefits by over 4%. This large negative accrual rate implies a substantial tax on additional work. The 4% reduction in benefits from delaying retirement to age 61 is equivalent to a tax of roughly 35% of the net wage earnings from working an additional year. This represents an enormous disincentive to continued work.

The tax rates on earnings for each additional year in the labor force from 55 to 70 are shown in Figure 7. It is clear that the cost of postponing retirement is very large; a large fraction of what would be gained in wage earnings if the person worked between 60 and 65, for example, is lost by way of reduced pension benefits. Thus a large fraction of employees retire as soon as they are eligible.

The net affect on labor force participation is illustrated by Figure 8, which describes the labor force status of men by age.[3] Retirement under the social security plan begins at age 60 and labor force participation declines rapidly thereafter; by age 65 virtually all men are retired under the social security retirement system.

This figure also provides an illustration of the interaction of the social security system and other programs. The labor force participation of men starts to fall well before the social security early retirement age. Indeed, at age 59 -- just before the social security

[3]Note that the labor force participation figures here do not correspond exactly to the hazard rates shown earlier. The labor force status estimates are based on a nationally representative micro-data survey, while the hazard rate estimates are from administrative data on pension receipt.

early retirement age -- only about 50% of employees are still in the labor force. The fall coincides with the increase in the proportion of men who are receiving unemployment benefits and the proportion receiving disability benefits. These programs in effect provide retirement benefits before the social security early retirement age. At age 60, most of those who had been receiving unemployment, and many of those receiving disability benefits, switch to receiving social security benefits instead. At age 65, all of those who had been receiving disability benefits switch to social security.

2. 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 9, which show the distribution of social security retirement ages of several cohorts -- those attaining age 60 in 1972, 1978, 1982, and 1986 respectively. (These figures must be distinguished from those like Figure 6 for Germany, which shows hazard or departure rates; Figure 9 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. Such allowances were also provided for younger workers in some industry sectors. In addition, early retirement before age 65 was available under some pension plans. In 1983, age 60 became the normal social security retirement age (and guaranteed income was provided for persons age 57 and older who lost their jobs). Shortly after that, the modal retirement age did indeed become 60, as shown in the panel for the cohort reaching age 60 in 1986.

As in Germany, the current labor force departure rates in France also correspond closely to social security provisions. And, like the German provisions, the French social security provisions also impose a large tax on continued employment past the early retirement eligibility age, as shown in Figure 10. The implicit tax on continued labor force participation earnings at age 60 is close to 70%. The negative tax rates (large subsidy) prior to age 58 reflect the sharp increases in social security entitlement for continuing in the labor force during these years; workers receive much lower social security benefits unless they work until that age. But the incentive to stay in the labor force provided by this accrual is largely canceled by the guaranteed income for persons who become unemployed at age 57 and older. The age-specific rates of departure from the labor force in France are shown in Figure 11. 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.

3. The US Case

As in Germany and France, 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 12, which shows the hazard rates out of the labor force for men in 1960, 1970, and 1980.[4] 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.

In 1961, early eligibility for retirement benefits for men at age 62 was introduced.[5] 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.[6] Thus, as in Germany and France, the United States data suggest a very strong influence of social security incentives on retirement.

And, as in France and Germany, there also is a strong contemporaneous correspondence in the United States between social security early and normal retirement ages and departure from the labor force, as shown in Figure 13. But there is a noticeable difference between the United States departure rates and those in France and Germany; the departure rates in the United States are much lower. Whereas in France and Germany

---

[4]Taken from Burtless and Moffitt (1984).

[5]It had been introduced for women in 1956.

[6]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.

the departure rates at the social security early retirement age are approximately 60%, in the United states the departure rate is only about 25%.

The difference corresponds to large differences in the tax on continued wage earnings. The tax in the United States is shown in Figure 14. At 62, the tax rate in the United States is essentially zero, whereas in France the tax at the early retirement age (60) is close to 70%. In Germany, the tax rates just at and after the early retirement age are about 40%.

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 Germany or France. At age 62, social security replaces about 41% of previous earnings on average, whereas at age 60 the replacement rate is 62% in Germany and 91% in France. Aside from other features of the programs, higher replacement rates increase the retirement incentives in Germany and France. 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 Germany or France.[7] 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 Germany, but can occur in France.

After the normal retirement age (65), however, tax rates become much higher in the United States, approaching 50% by age 70. This is primarily because the actuarial

[7]Reforms in 1992 introduced such an adjustment in Germany.

adjustment after age 65 is much less than the "fair" rate -- that would be required to equate the expected present value of benefits if their initial receipt is delayed.

Finally, Figure 13 shows an increase in departure rates around age 55, well before the social security early retirement age. The departure rate at 61 is about 10%. A similar but much more pronounced pattern is evident in Figures 6 and 11 for Germany and France. In those countries the increase is associated with the receipt of unemployment and or disability benefits. In the United States, on the other hand, the increase is apparently associated with employer-provided pension plan early retirement ages, which are common at 55 and are typically between 55 and 60. The estimated hazard rates in Figure 13 are imprecise, however, and thus don't show a precise increase at age 55.[8]

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. In addition, the jump in departure rates, at the early retirement age in particular, appears to be a much greater in countries where the tax on continued work is large (Germany and France) than in countries where it is smaller (the United States). We now turn to an overview of the conclusions that seem warranted based on the combined results in all of the eleven countries.

---

[8]This jump in the hazard is more apparent in longitudinal data as shown in Welch and Peracchi [1996].

4. All Countries

In distilling the evidence from all of the countries studied in this volume, 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. Although the between country comparisons suggest a rather strong relationship between these provisions and retirement -- in particular the unused capacity measure -- we don't attempt through the comparisons made here to assign quantitative magnitudes to the effects. We will try to summarize the results for all of the countries, however, in a way that makes clear that economic incentives to retire are indeed associated with early departure from the labor force. More precise quantitative estimates of the effects of specific provisions will have to await more formal analysis.[9]

a. Early Retirement Provisions and Departure Rates

Perhaps the easiest way to see the relationship between departure rates and early retirement provisions is to consider graphs of hazard rates for each of the countries, like those shown above for Germany, France, and the United States. These are shown in the first of the two panels that are presented for each country individually in Figure 15. The

[9]Some analyses are reviewed on a country-by-country basis in appendices to the individual country papers.

first panel for each country also shows the labor force participation rates by age for each country. It is evident that there is typically a strong correspondence between retirement plan provisions and labor force departure rates. In virtually every country, there is a sharp jump in the departure rate at the social security early retirement age, when employees are first eligible for benefits.[10] In every country there also is a jump in departure at the normal retirement age as well. We emphasize the early retirement age, however, because in most countries only a small fraction of men remain in the labor force until the normal retirement age. Thus the large departure rates at the normal retirement age apply to only a small fraction of employees.

Although the social security early retirement age is the most critical of plan provisions, as emphasized above, in many countries unemployment and disability programs effectively provide early retirement at younger ages. The effects of these programs are reflected in the departure rates before the social security early retirement ages. To understand the implications of departure rates, it is useful to have in mind a few illustrations of their cumulative effect: if 5% of those still employed leave each year, after five years 24% will have left. If 10% leave each year, 41% will have left over five years; if 20% leave each year, 67% will have left over five years. The effects of unemployment and disability programs seem especially evident in Belgium, France, the Netherlands, and Germany, where labor force departure rates approach or exceed 20% before the social security early retirement age. (These programs are also labeled on the first panels of Figure 15.) In contrast, in Sweden -- with no early retirement and normal retirement at 65 -- departure rates before age 60 are typically well below 5%. Departure rates before the

[10]In the Netherlands the jump is not in fact at the "social security" retirement age, but at the common employer plan early retirement age. In the Netherlands, employer plans are virtually universal and are mandated by law.

social security early retirement age are also much smaller in the United States and Canada as well, although in these countries employer-provided pension plans -- with typical early retirement ages between 55 and 60 -- provide incentive for some employees to retire at earlier ages.

To understand further the importance of unemployment and disability programs, the proportion of men reporting that they are unemployment or disabled is shown in the lower panel for each country in Figure 15. These panels also show the proportion of men who are employed and the proportion who are retired. In Belgium, for example, 22% of men are receiving unemployment or disability benefits at age 59. In France 21% are receiving these benefits at that age, in the Netherlands 27%, in the United Kingdom 33%, in Germany 37%. Even in Sweden, where departure rates are relatively low before age sixty, 24% are receiving unemployment or disability benefits at age 59. In the United States and Japan on the other hand only about 12% are receiving unemployment or disability benefits at age 59.

The relationship between these programs and social security is made clear in these figures as well. For example, in France almost all those who are unemployed at age 60 begin to receive social security benefits at that age and thereafter are officially classified as retired. In the Netherlands, the United Kingdom, Germany, and Sweden the large fraction of persons receiving disability benefits before age 65 then start to receive social security benefits and are classified as retired.

In short, the conclusion is clear: as was apparent in the more detailed data for Germany, France, and the United States, the collective evidence for all countries combined shows that statutory social security eligibility ages contribute importantly to early departure

from the labor force. In addition, unemployment and disability programs serve as early retirement programs in many countries.

b. Implicit Tax Rates and Incentives to Retire

The three illustrative country descriptions also suggested that the jump in the departure rate at the social security early retirement age is magnified by greater implicit tax penalties on wage earnings after social security eligibility. In particular, in France and Germany, with large taxes on continued work, the departure rate was much greater than in the United States, with a much smaller implicit tax on work. We explore this relationship further here, drawing on the broader evidence from all of the countries in the study. Labor force participation and retirement incentives for all eleven countries are summarized in Table 1. The countries are ordered by the unused productive capacity of men between the ages of 55 and 65, which is explained above and shown in Figure 4. The panels of Figure 15 above follow the same order.

We emphasize first that once employees are eligible for social security benefits, a heavy tax burden is often imposed on persons who continue to work. The third to last column of the table shows the implicit tax rate on labor earnings at the early retirement age for each country. It is clear that in many countries these tax rates are extremely high, in particular in those countries at the top of the table -- those with the greatest unused labor capacity. Thus it is evident that the implicit tax on earnings can provide a strong incentive to leave the labor force.

Table 1. Unused labor capacity, key plan features, and retirement rate at early retirement age, by country.

Country	Unused Labor Capacity 55 to 65	Men Out of LF Age 59	Early retire-ment age	Replace-ment rate at ER age %	Accrual in next year %	Implicit tax on earnings in next year %	"Tax Force" ER age to 69	Hazard rate at early retire-ment age %
Belgium	67	58	"60"	77	-5.6	82	8.87	33
France	60	53	60	91	-7.0	80	7.25	65
Italy	59	53	"55"	75	-5.8	81	9.20	10
Netherlands	58	47	"60"	91	-12.8	141	8.32	70
U. K.	55	38	60	48	-10.0	75	3.77	22
Germany	48	34	60	62	-4.1	35	3.45	55
Spain	47	36	60	63	4.2	-23	2.49	20
Canada	45	37	60	20	-1	8	2.37	32
US	37	26	62	41	0.2	-1	1.57	25
Sweden	35	26	60	54	-4.1	28	2.18	5.00
Japan	22	13	60	54	-3.9	47	1.65	12

Note: In some countries, the effective early retirement age is ambiguous. The ages in quotation marks are intended to signal cases where the ambiguity is perhaps the greatest, but the availability of unemployment and disability benefits create ambiguities in other cases as well. The calculations presented in this table and in Figure 17 below are taken from the individual country papers and pertain to these cases:

Belgium: The social security early retirement age is 60, but employees who are laid off are eligible for large benefits at younger ages. Thus the accrual, implicit tax, and tax force measures treat unemployment benefits as early retirement benefits available at 55.

France: Counting social security benefits, available at age 60, but not accounting for guaranteed income benefits for those losing there jobs at age 57 or older.

Italy: Social security benefits for private sector employees, not counting disability availability.

Netherlands: In addition to public social security benefits, the calculations account for virtually universal employer private pension benefits. The employer plan is assumed to provide for early retirement at age 60. There is no social security early retirement in the Netherlands, but employer early retirement benefits are commonly available at age 60.

U.K.: Based on social security benefits only, but counting "incapacity" benefits at 60 as early retirement benefits.

Germany: Counting social security benefits and assuming a person is eligible for "early" disability benefits.

Spain: Based on RGSS (the main social security program).

Canada: Counting social security benefits only.

United States: Counting social security benefits only.

Sweden: Counting social security benefits only. The hazard rate at the early retirement age is the average of the rates between 59 and 61.

Japan: Assuming the "diminishing earnings" profile described in the Japan paper. The employment option is to work in the primary firm until age 60 and then a secondary firm, where the worker would be eligible for the 25% wage subsidy if his earnings were low enough.

The 4th column of the table shows replacement rates at the early retirement age, which are also very large in many countries, especially those with the greatest unused labor capacity.

Casual perusal of this table suggests a strong relationship between unused labor capacity 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 unused capacity: Belgium, France, Italy, the Netherlands, and the United Kingdom; (2) a medium unused capacity group: Germany, Spain, and Canada; (3) and those with low unused capacity: 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 unused labor capacity -- 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 unused capacity.

There is no completely satisfactory way to summarize the country-specific incentives for early retirement. One crude measure is based on continued labor earnings once a person is eligible for social security benefits. We sum of the implied tax rates on continued work beginning with the early retirement age -- when a person is first eligible for social security benefits -- and running through age 69. We call this the "tax force" to retire. This measure is reported in the second to last column of Table 1. The measure is shown in Figure 16, in which the countries follow the same order as in Table 1. This figure suggests once again that there is a strong relationship between social security penalties on work and

retirement. The average tax force to retire is 7.5 in the first group of countries in Table 1 and 1.8 in the third group.

The relationship is formalized in Figures 17a, 17b and 17c, which present scatter plots of the tax force to retire and unused labor capacity between ages 55 and 65. Figures 17a and 17b are based on the sum of tax rates from the early retirement age through age 69. Japan is included in 17a but excluded from 17b. Figure 17c is based on the sum of tax rates from age 55 to age 69 in all countries. In either case, the relationship is clear; there is a strong correspondence between the tax force to retire and unused labor capacity. 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. About 81% of the variation in unused capacity can be explained by the early retirement to age 69 tax force to retire when Japan is included, and 86% can be explained when Japan is excluded. When the age 55 to age 69 tax force measure is used, 82% of the variation is explained, including Japan.[11] Thus, these data suggest a strong relationship between social security incentives to quit work and the labor force departure of older workers.

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

---

[11] Japan appears to be an outlier when the first tax force measure is used, although not when second tax force measure is used. That Japan appears to be an outlier in one version may reflect a weakness of our summary measure of unused capacity. A rather high share of Japan's labor force is self-employed and not covered by the social security system, and the very high participation rate at older ages in Japan is largely in the secondary sector and is often part-time.

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.

The data in the second column of Table 1 can be interpreted in the light of both of these issues. These data show the proportion of men who have left the labor force by age 59. This is before the official social security early retirement age in all countries, with the exception of Italy where the early retirement age younger in some instances. The non-participation rate at 59 varies from a high of 58% in Belgium to a low of 13% in Japan. A large part of the difference across countries can apparently be ascribed to differences in disability and unemployment insurance provisions. One might think of the labor force participation at this age as the level at which the force of the official social security provisions is first felt. As emphasized above, however, in many instances these other

programs effectively provide early retirement at younger ages than the official social security early retirement age. It is perhaps not surprising that these levels are also strongly related to the unused capacity measures.

Why were these provisions adopted? One possibility, consistent with the first issue above, is that they were part of an effort to facilitate early withdrawal of older employees from the labor force. And, like the social security provisions themselves, they worked. Again, this does not by itself question the causal relationship between the provisions and retirement; to the extent that it is true it suggests a reason for adopting the provisions. But these pseudo early retirement programs could also have been adopted to accommodate pre-existing labor force departure rates and this possibility must temper a causal interpretation of the relationship between program provisions and retirement. Again, however, the data for the three illustrative countries provide strong evidence of a causal link between provisions and retirement. The extent of any reverse causality, however, cannot be determined by these descriptive statistics and can only be addressed with more detailed analysis.

C. 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 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.

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 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.

References

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

Burtless, Gary. 1984. "The Effect of Social Security Benefits on the Labor Supply of the Aged." In H. Aaron and G. Burtless (eds.), *Retirement and Economic Behavior.* Washington: Brookings Institution: 135-175.

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.

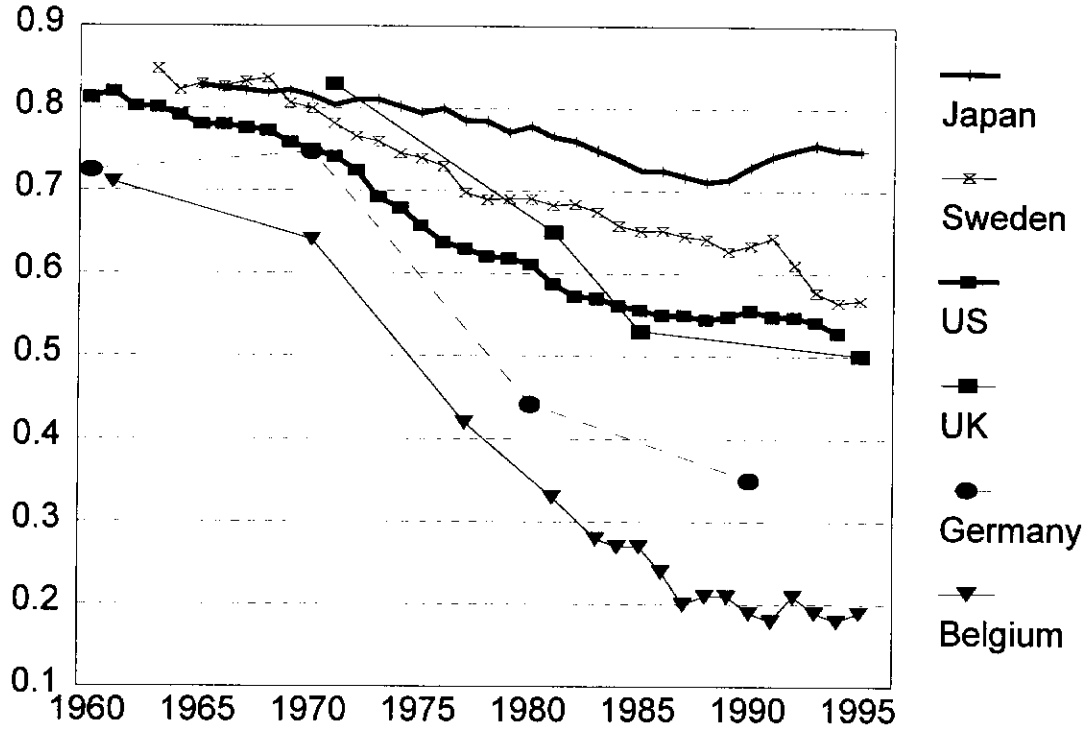
_____. 1994. "Pension Plan Provisions and Retirement: Men and Women, Medicare, and Models." In D. Wise (ed.), *Studies in the Economics of Aging.* Chicago: University of Chicago Press.

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

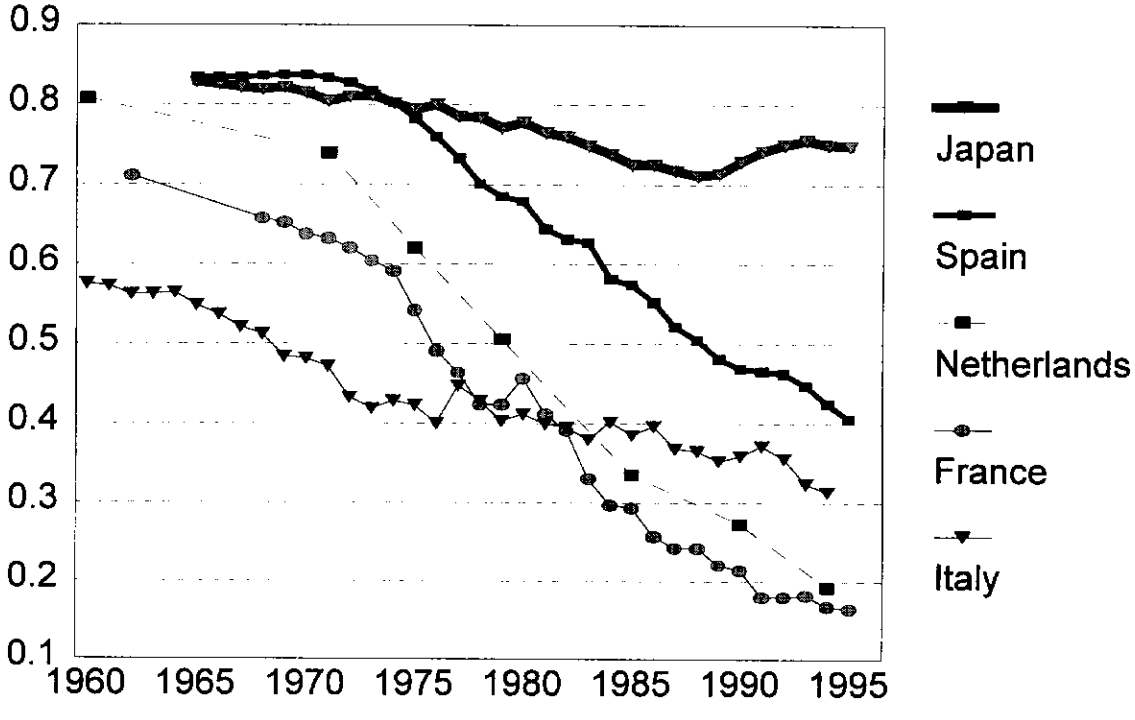
_____. 1990b. "The Pension Inducement to Retire: An Option Value Analysis." In D. Wise (ed.), *Issues in the Economics of Aging.* Chicago: University of Chicago Press.

Welch, Finis and Peracchi, Franco. 1994. "Trends in Labor Force Transitions of Older Men and Women." *Journal of Labor Economics* 12(2): 210-242.

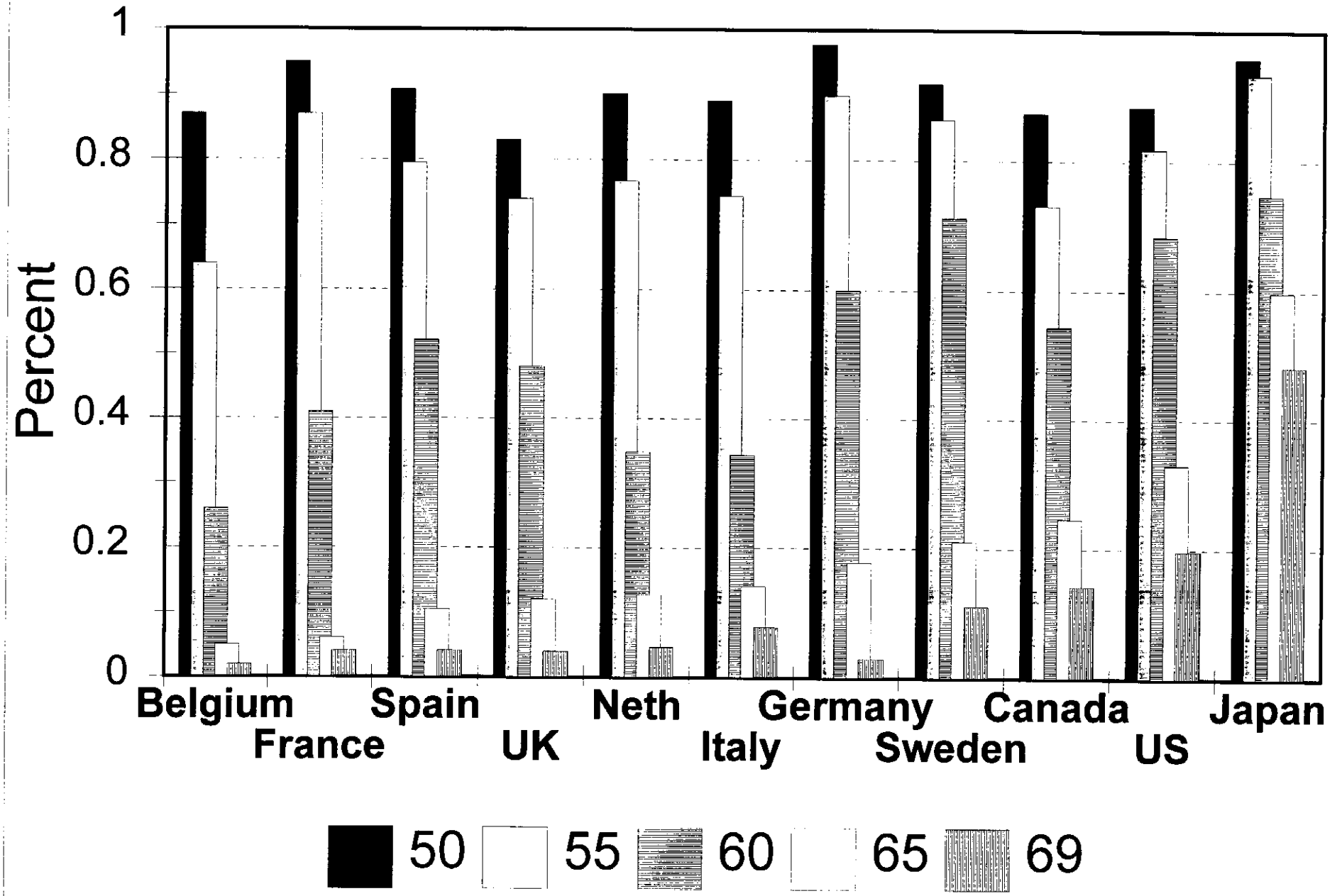
F1a. LFP Trends for Men 60 to 64

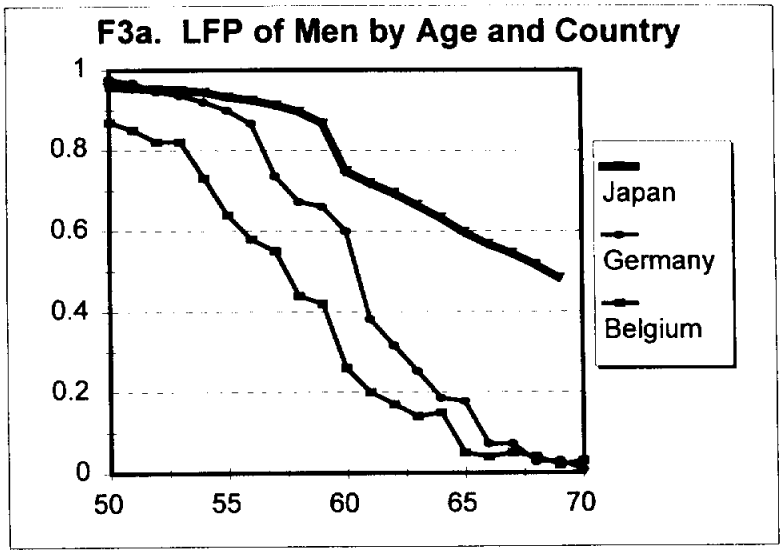


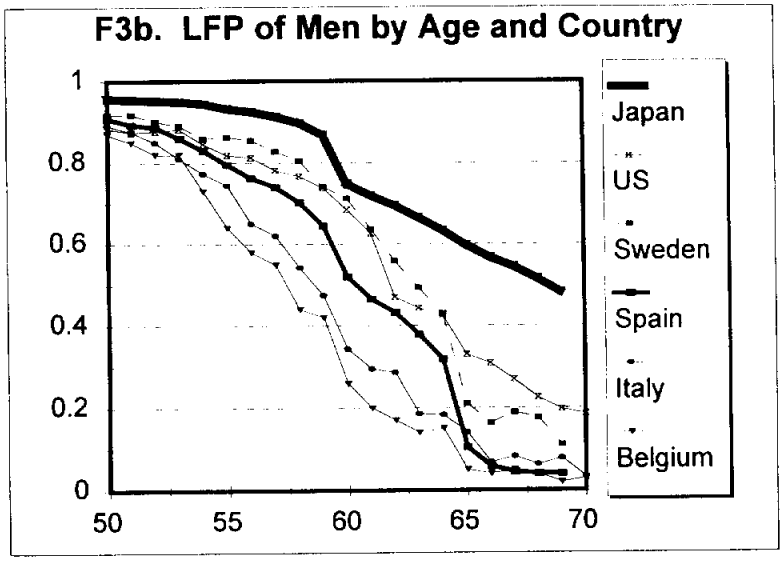
F1b. LFP Trends for Men 60 to 64

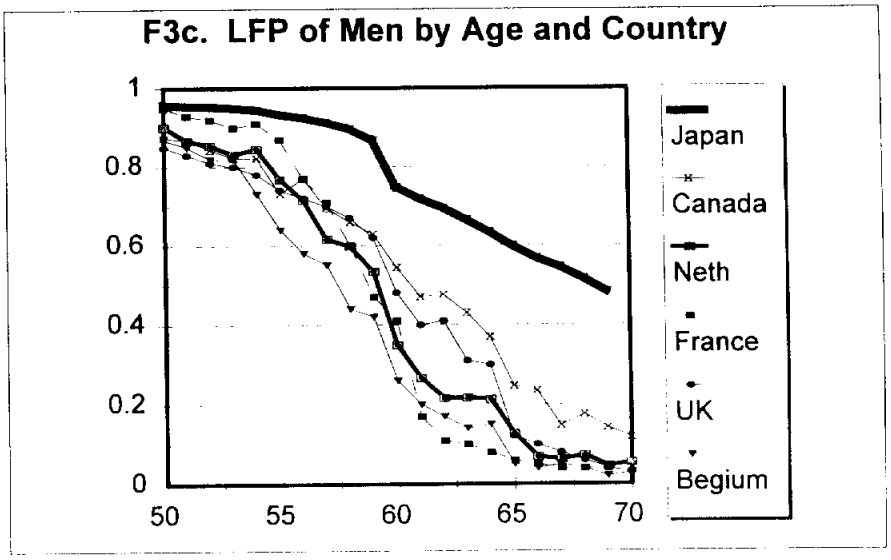


F2. LFP by Country and Age

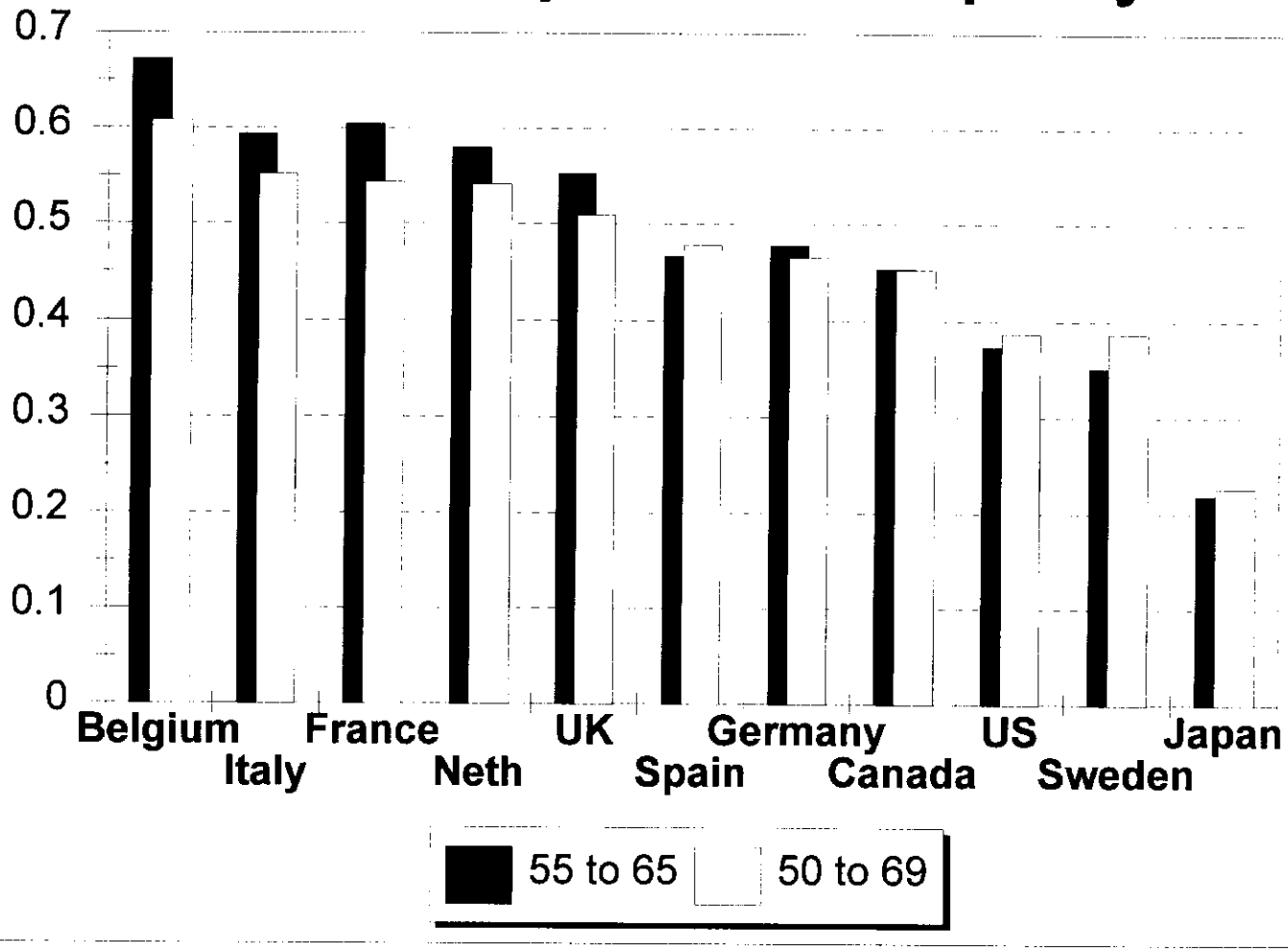



F3a. LFP of Men by Age and Country
1
0.8
0.6
0.4
0.2
0
50
55
60
65
70
Japan
Germany
Belgium

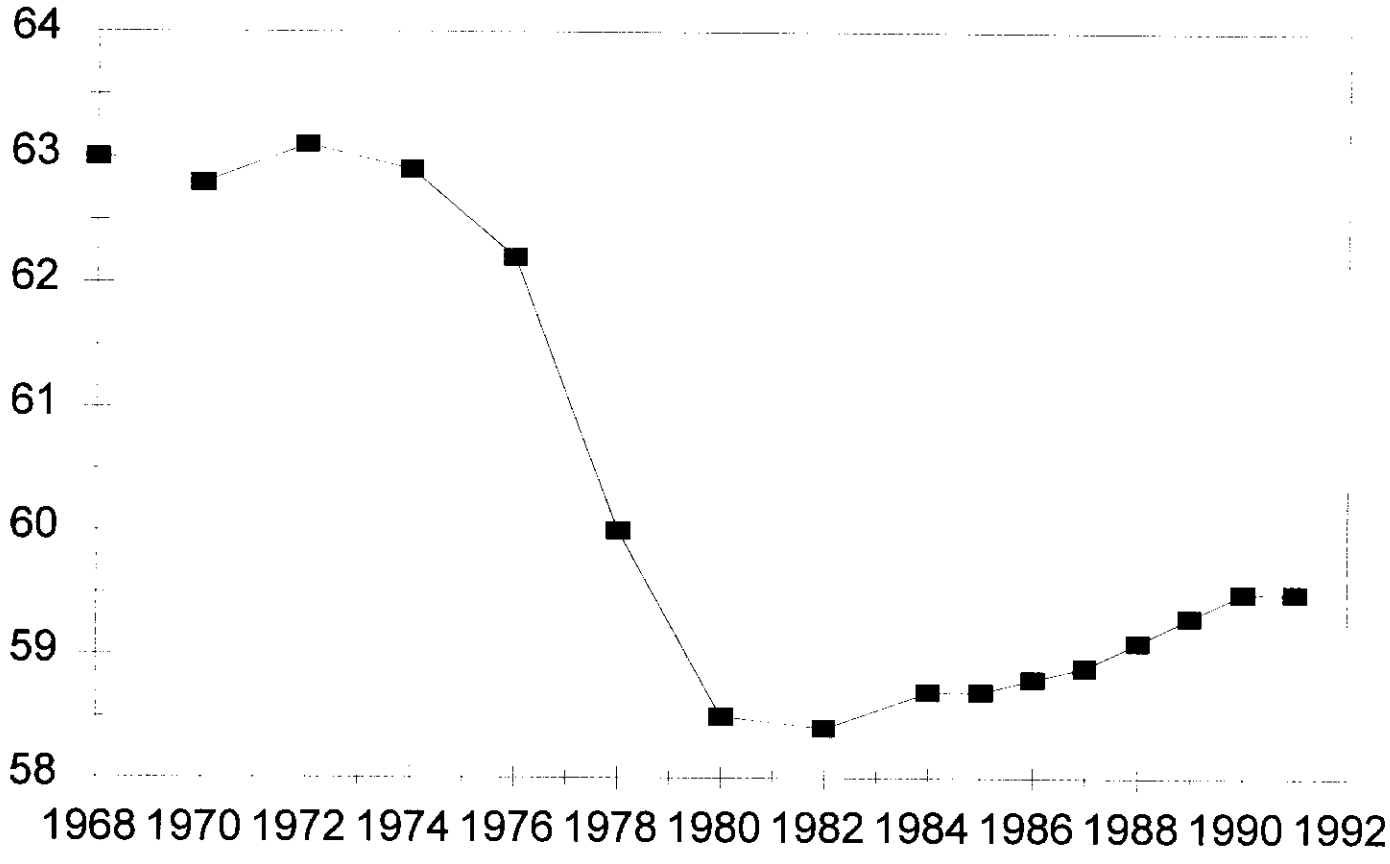

F3b. LFP of Men by Age and Country
1
0.8
0.6
0.4
0.2
0
50
55
60
65
70
Japan
US
Sweden
Spain
Italy
Belgium


F3c. LFP of Men by Age and Country
1
0.8
0.6
0.4
0.2
0
50
55
60
65
70
Japan
Canada
Neth
France
UK
Begium

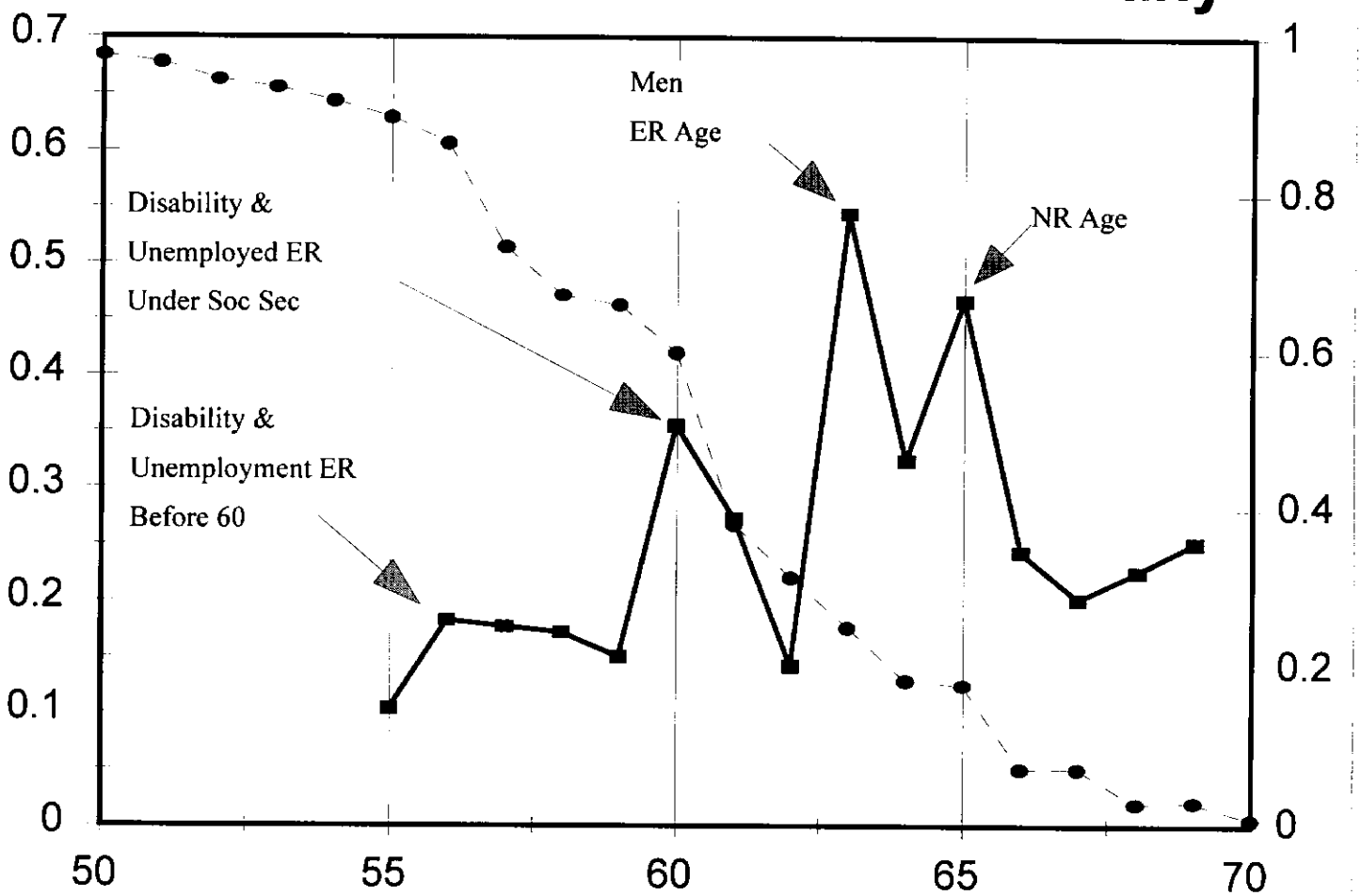
F4. Unused productive capacity



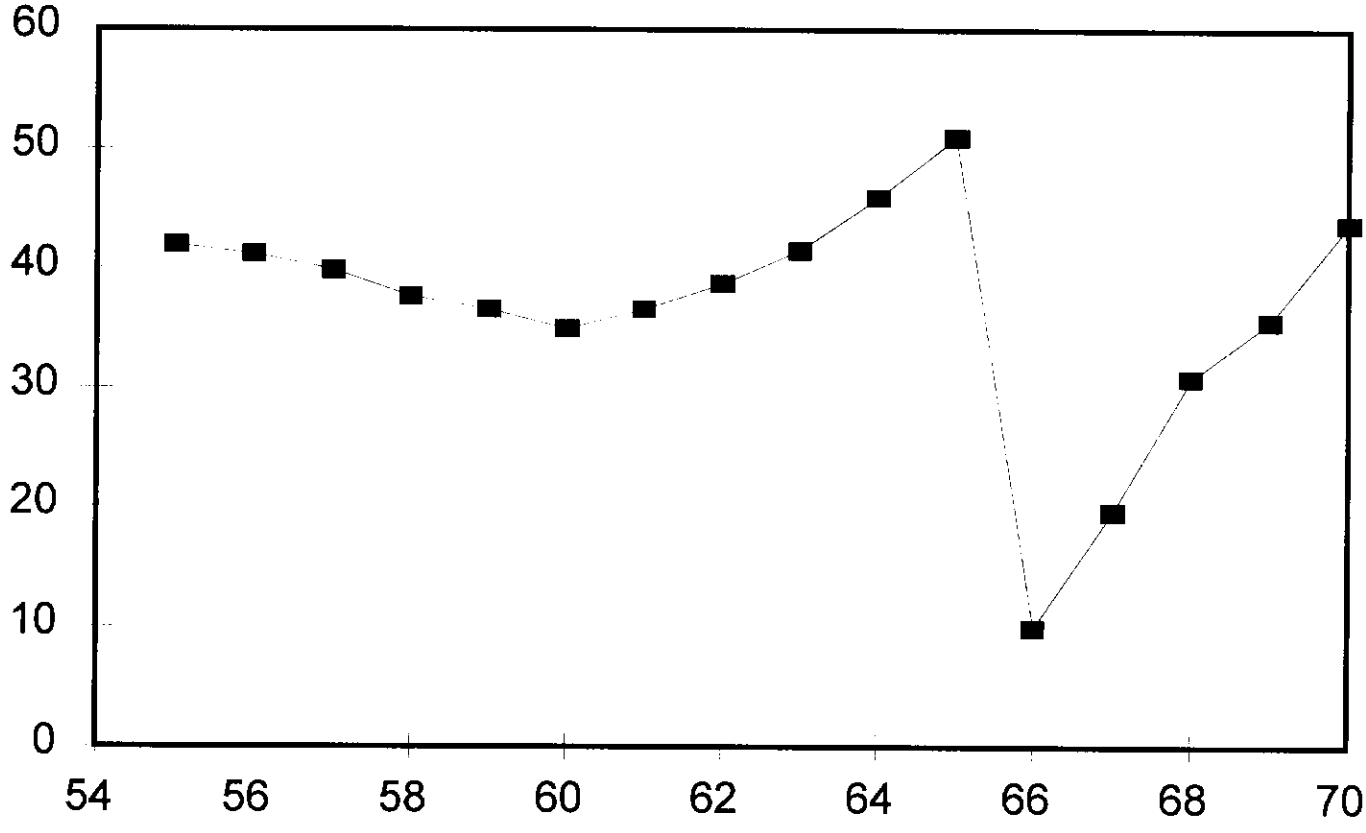
F5. Mean Retirement Age in Germany



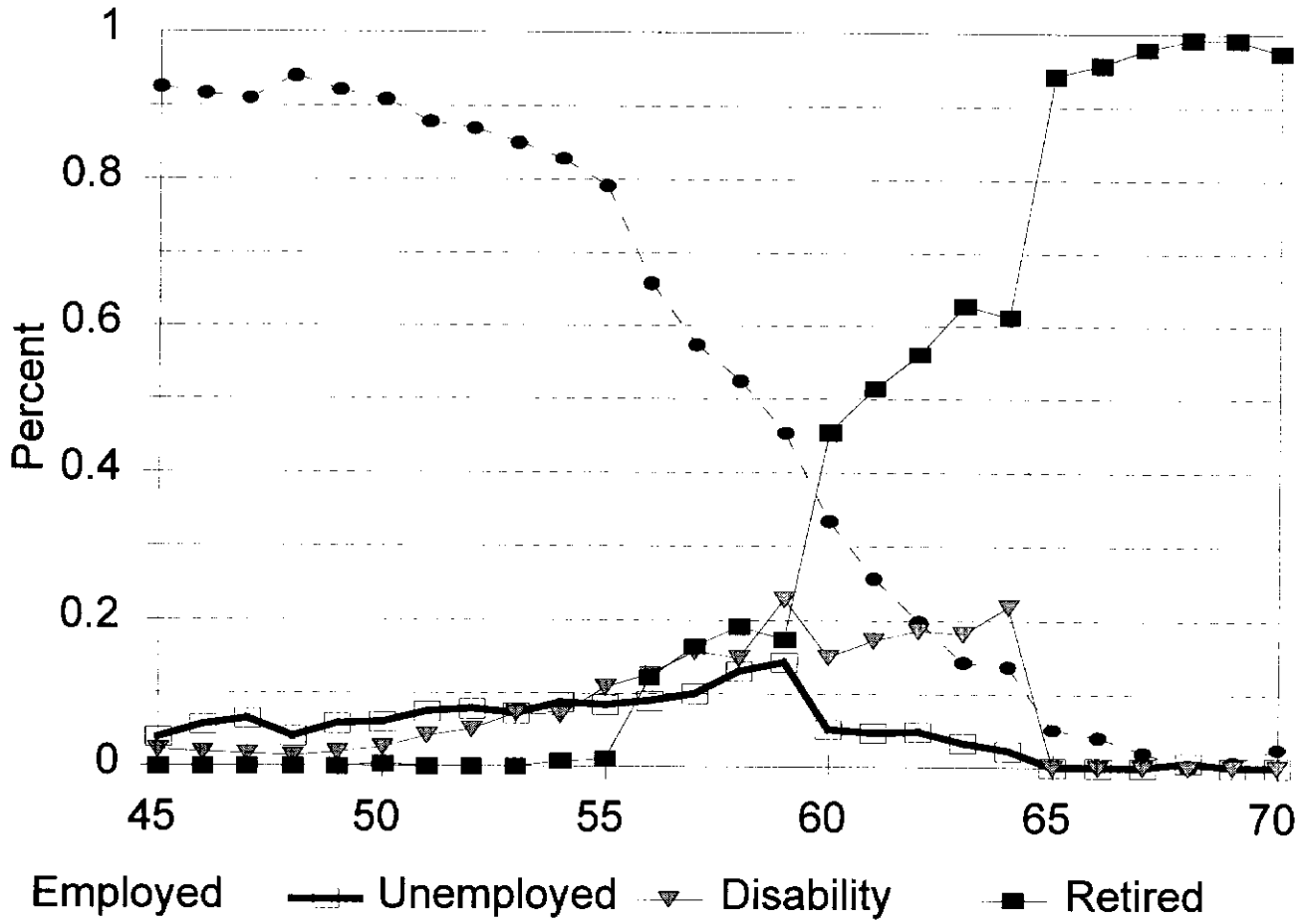
F6. Hazard & LFP Rates for Germany

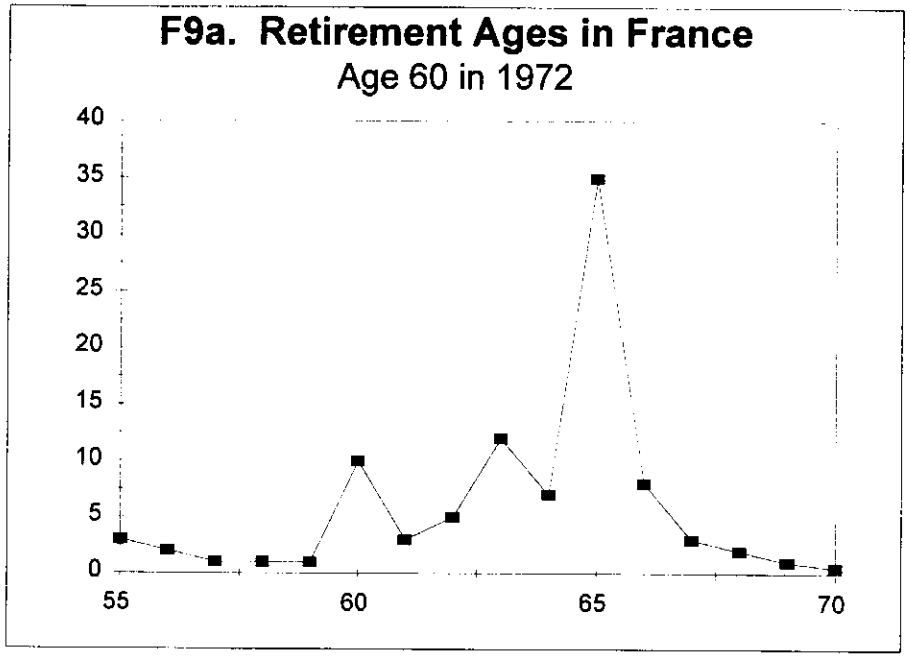


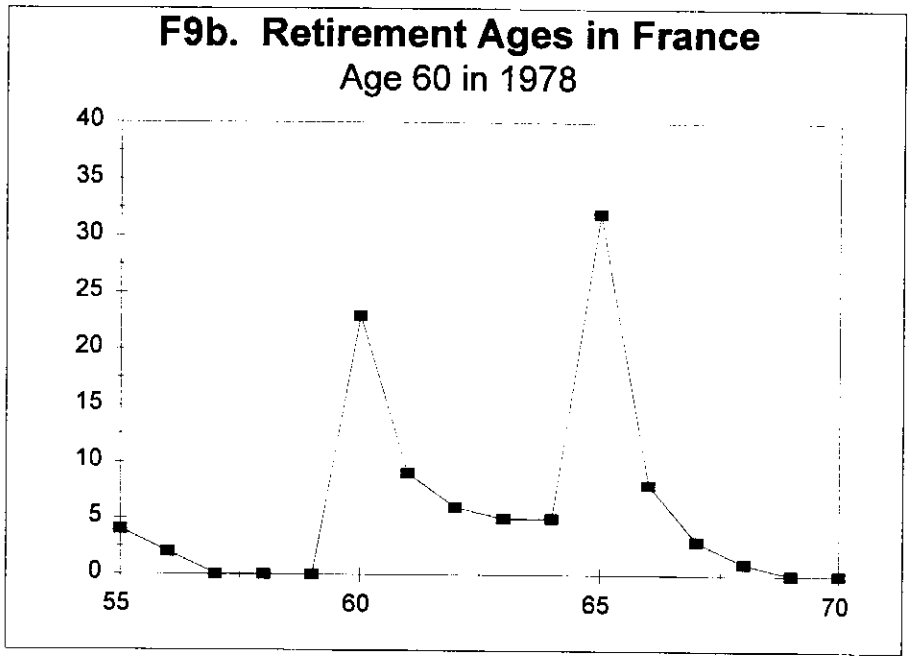
F7. Tax Rates on Work in Germany

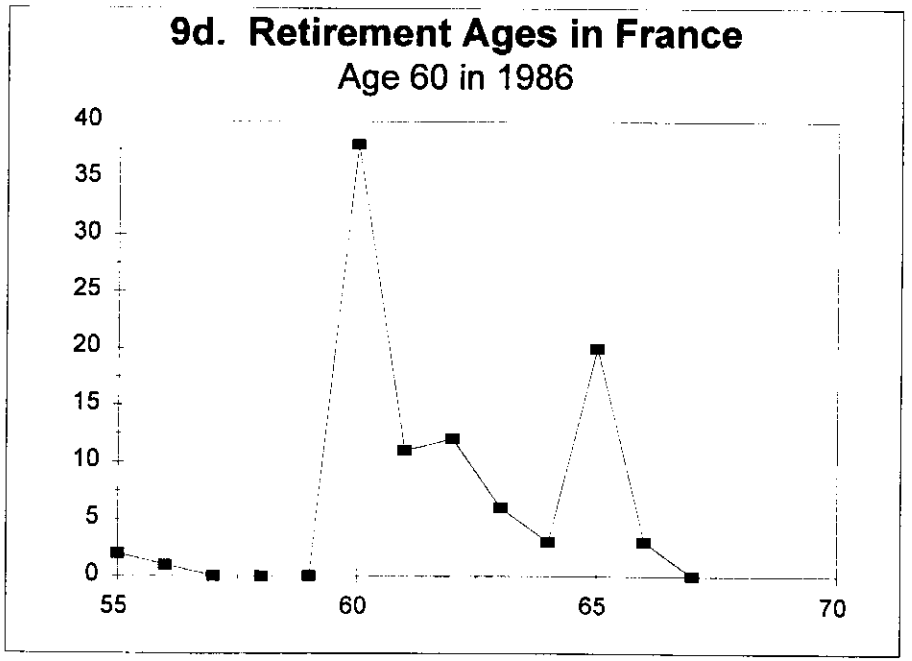


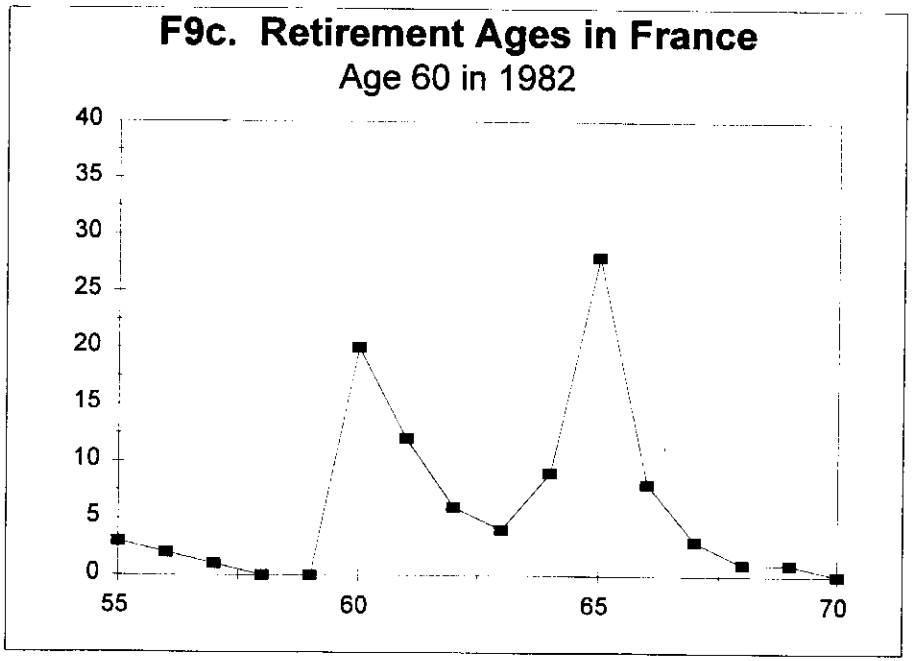
F8. Status of Men by Age in Germany



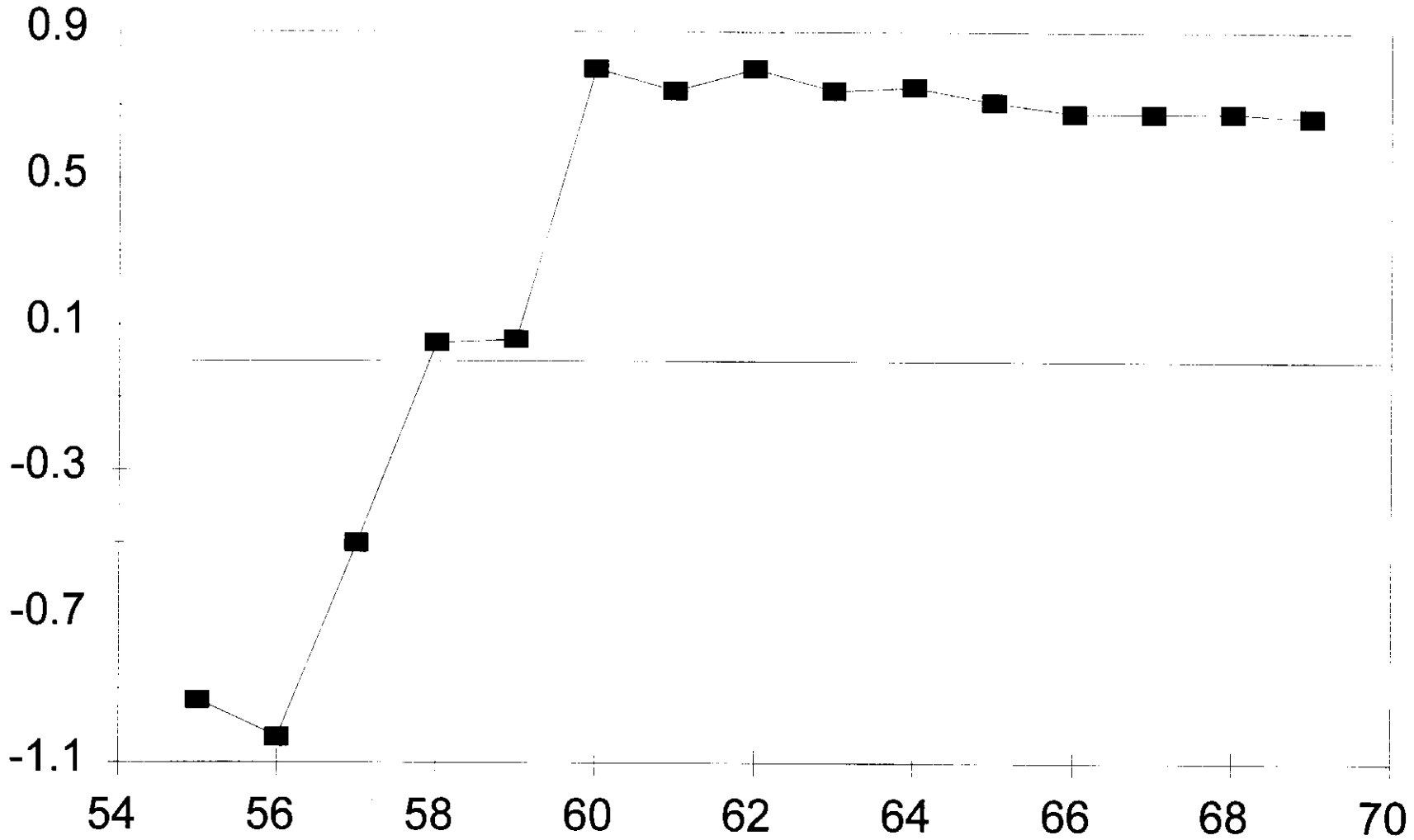

F9a. Retirement Ages in France
Age 60 in 1972
40
35
30
25
20
15
10
5
0
55
60
65
70

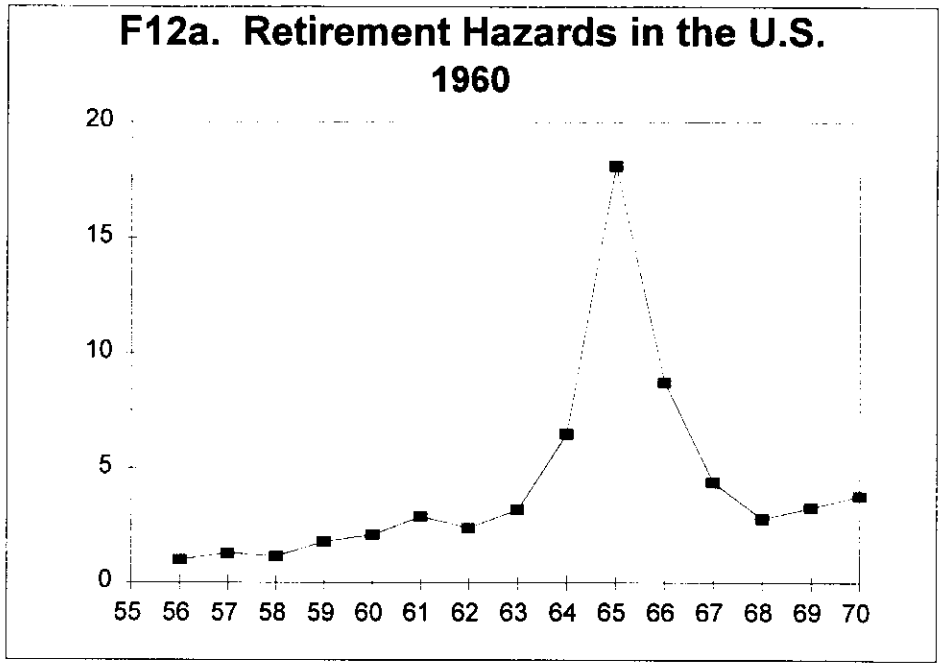

F9b. Retirement Ages in France
Age 60 in 1978
40
35
30
25
20
15
10
5
0
55
60
65
70

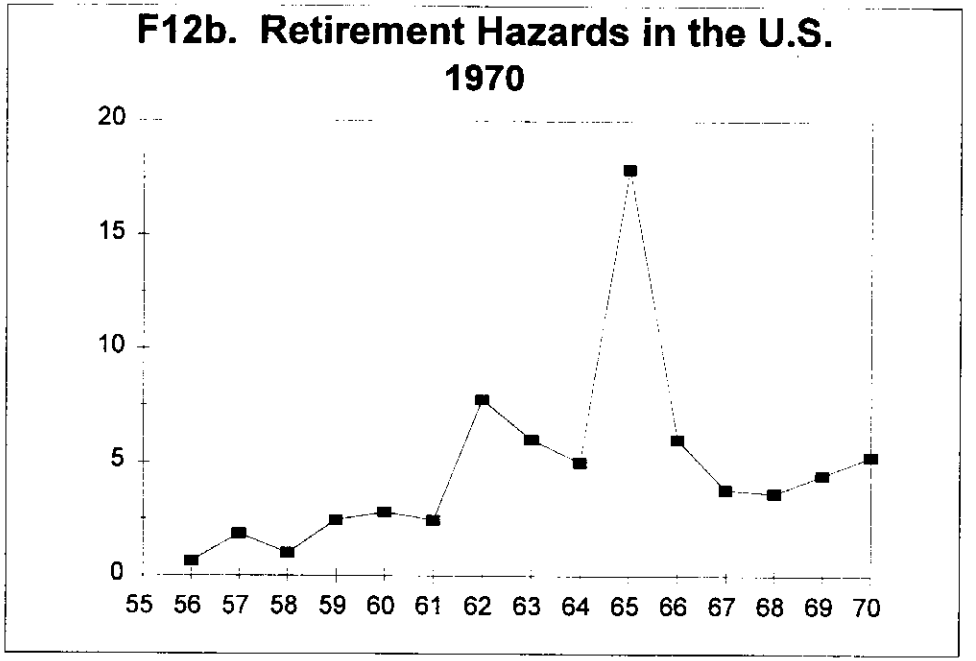

9d. Retirement Ages in France
Age 60 in 1986
40
35
30
25
20
15
10
5
0
55
60
65
70

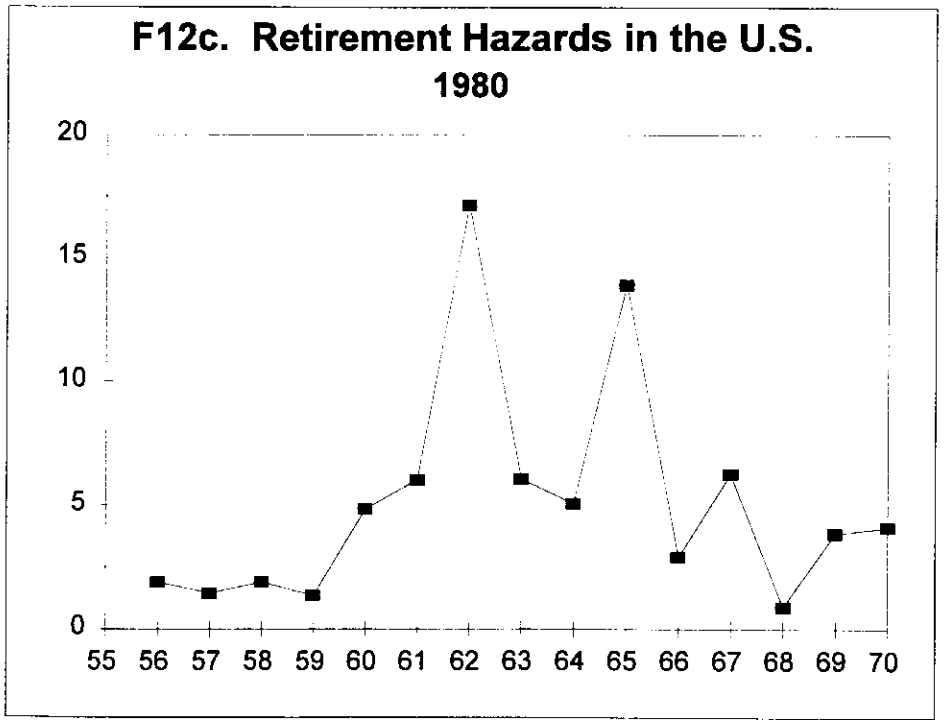

F9c. Retirement Ages in France
Age 60 in 1982
40
35
30
25
20
15
10
5
0
55
60
65
70

F10. Tax Rates on Work in France



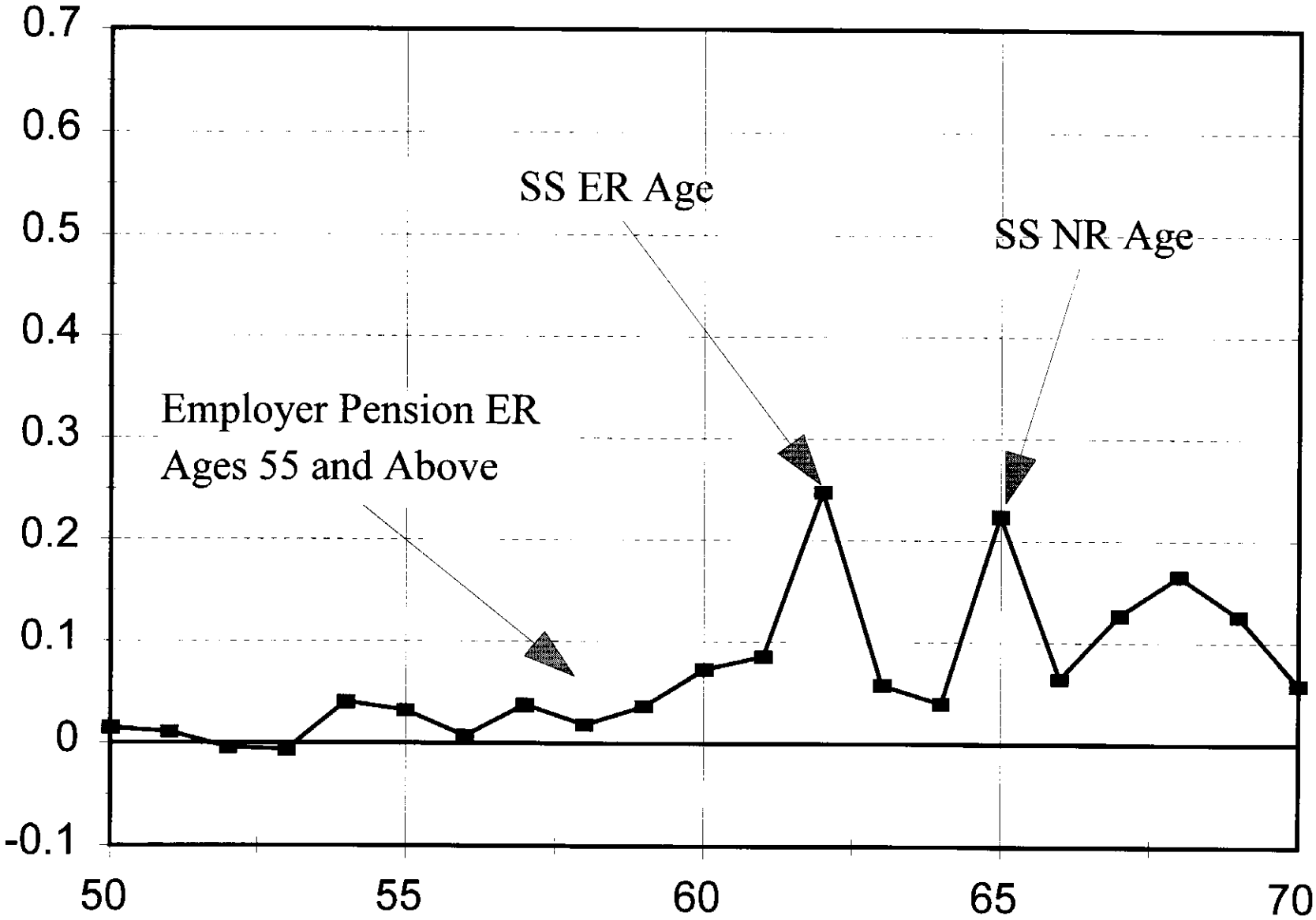




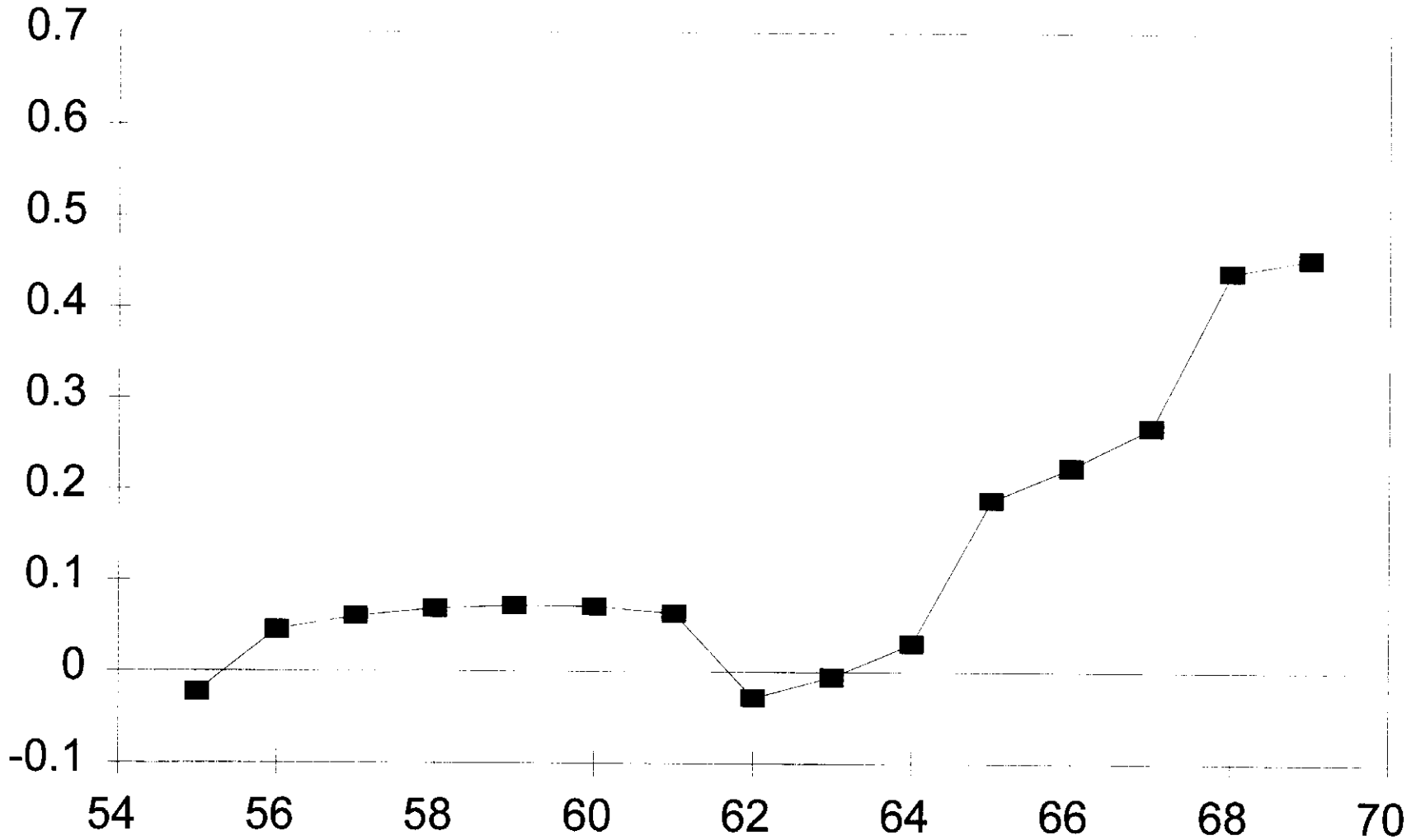


Source: Burtless and Moffit [1984].

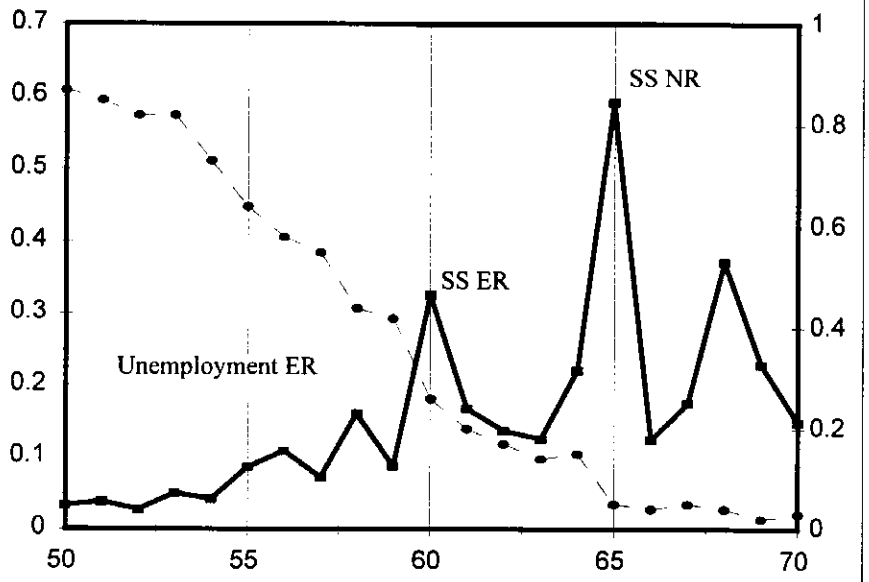
F13. Hazard Rates for the US



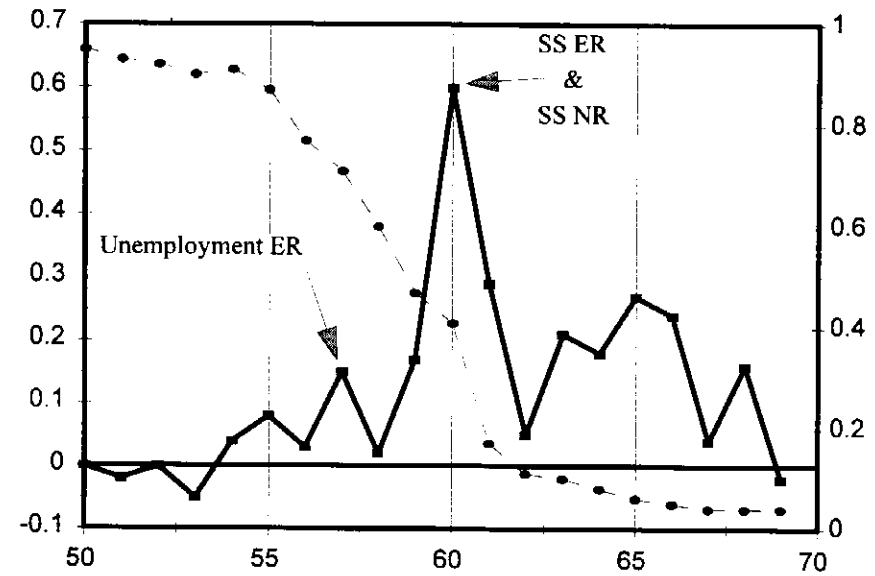
F14. Tax Rates on Work in the U.S.



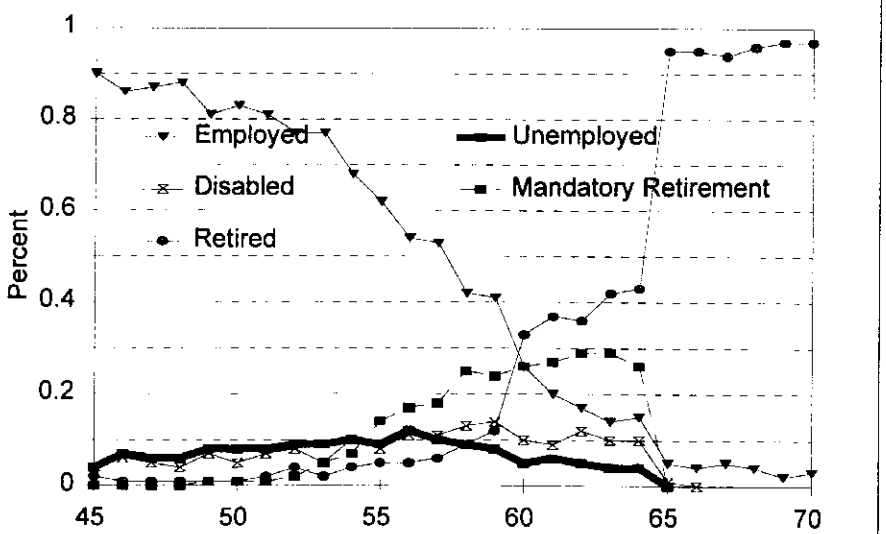
F15a. Hazard & LFP Rates for Belgium



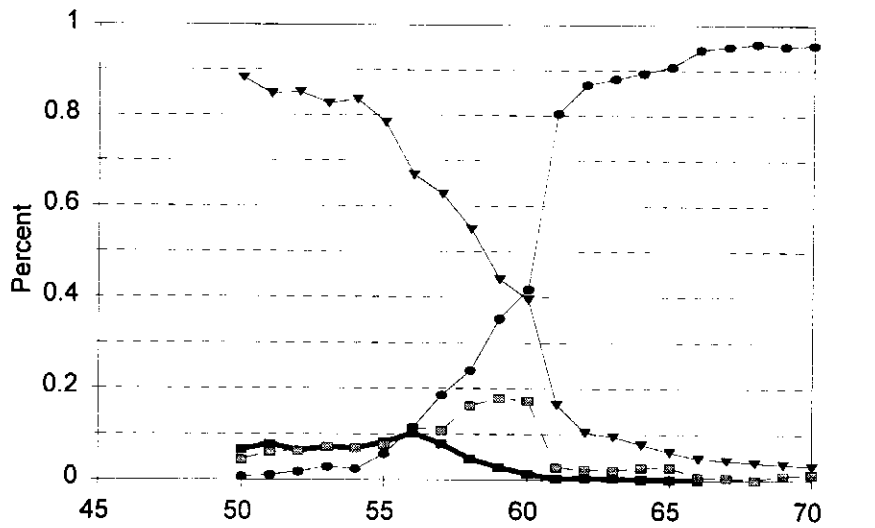
F15b. Hazard & LFP Rates for France



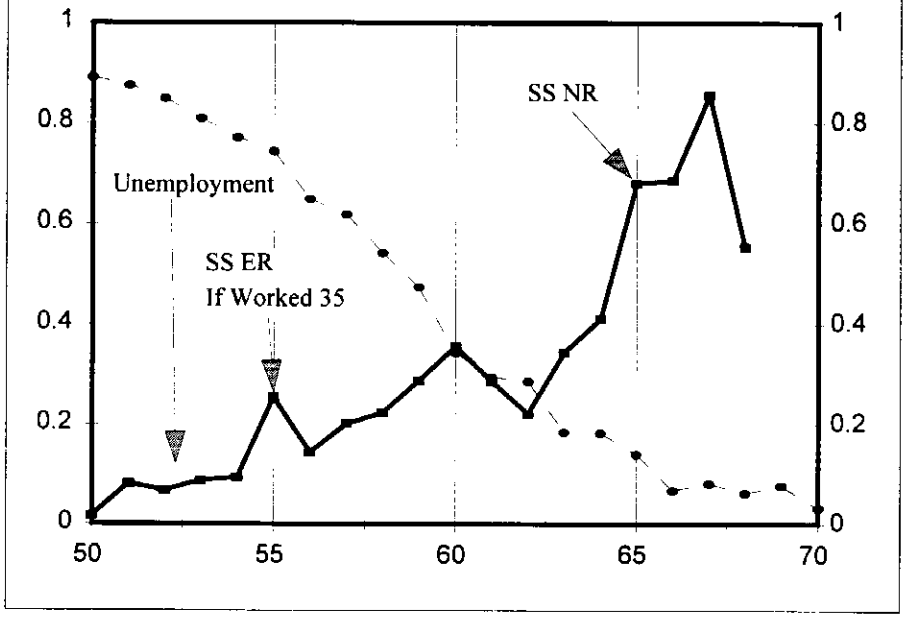
F15a. Status of Men by Age in Belgium



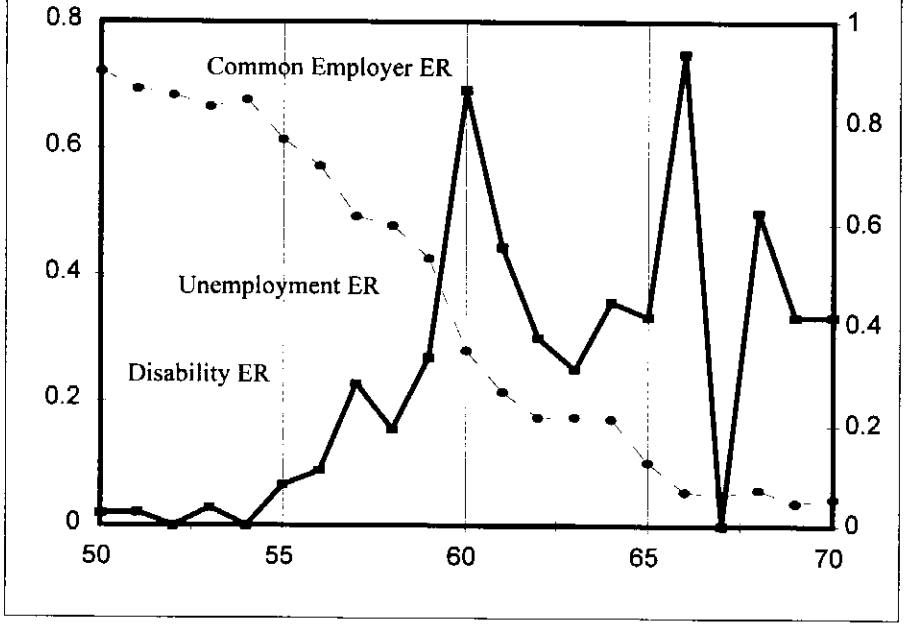
F15b. Status of Men by Age in France



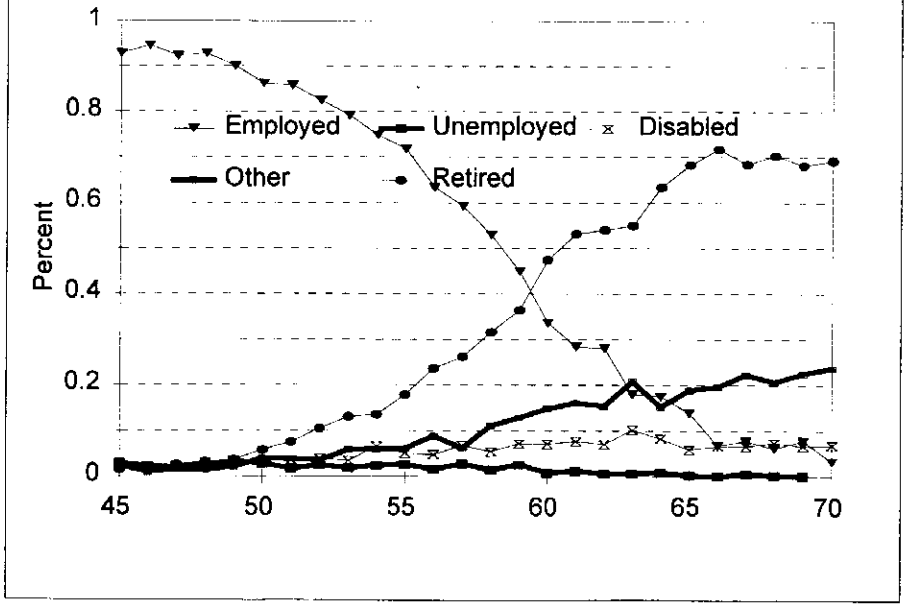
F15c. Hazard & LFP Rates for Italy



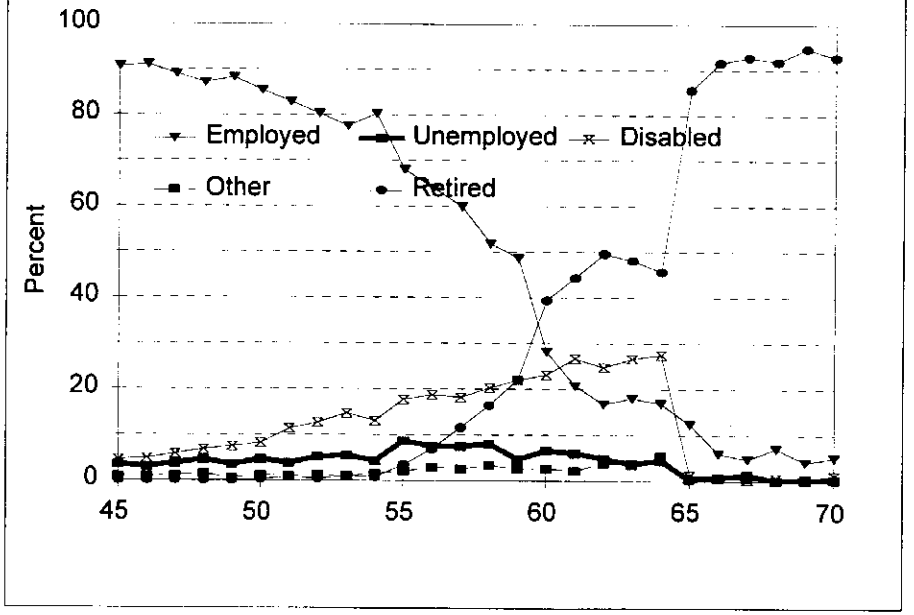
F15d. Hazard & LFP Rates, Netherlands



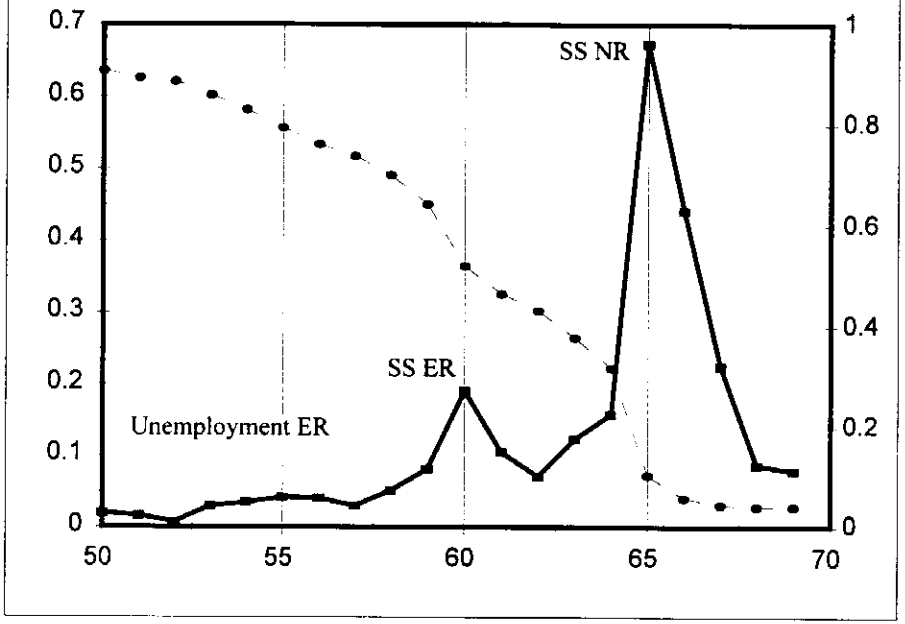
F15c. Status of Men by Age in Italy



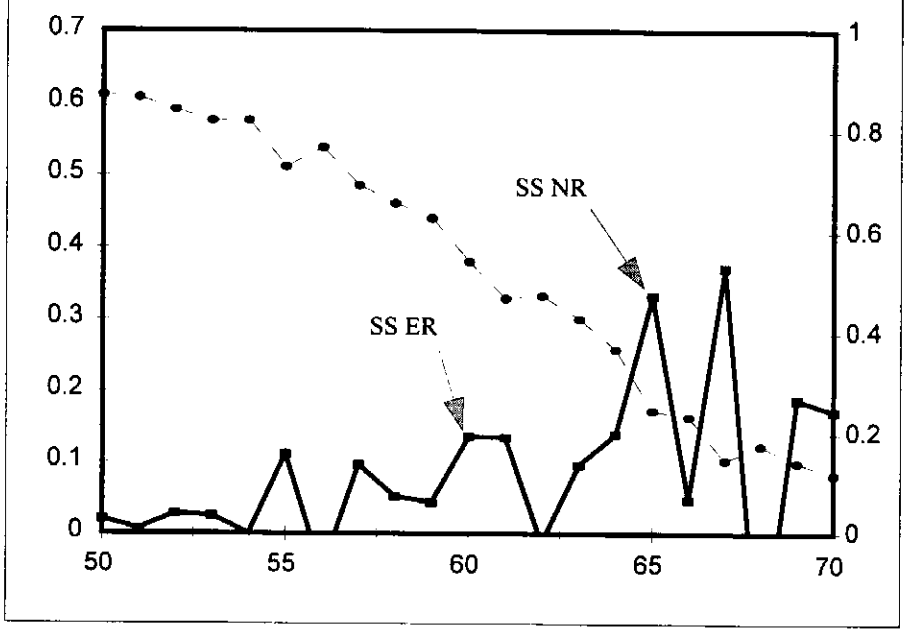
F15d. Status of Men in the Neth.



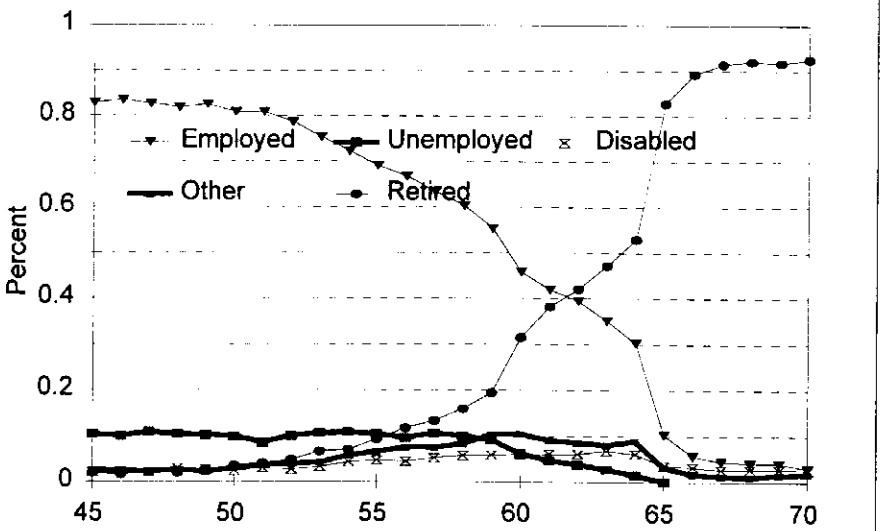
F15g. Hazard & LFP Rates for Spain



F15h. Hazard & LFP Rates for Canada

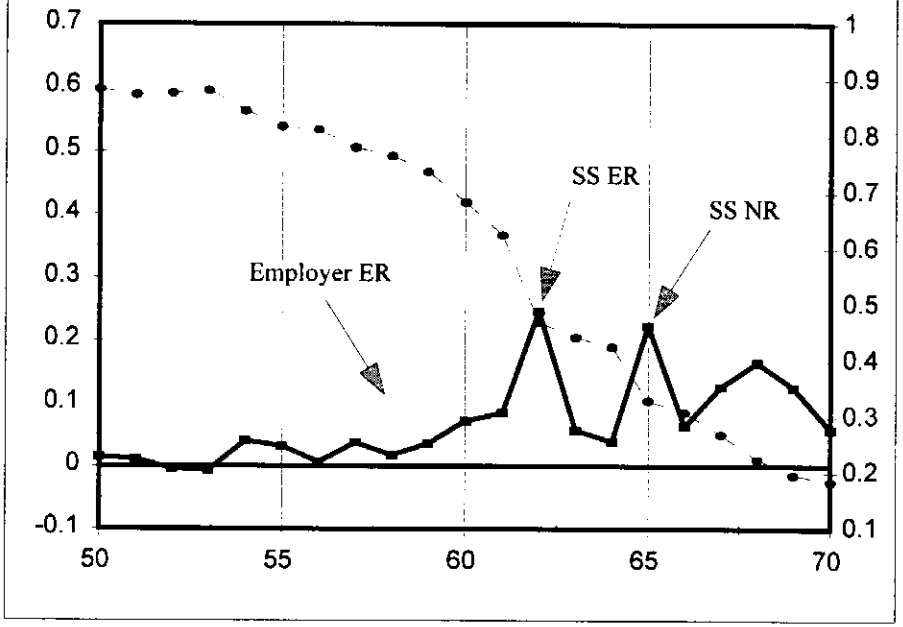


F15g. Status of Men by Age in Spain

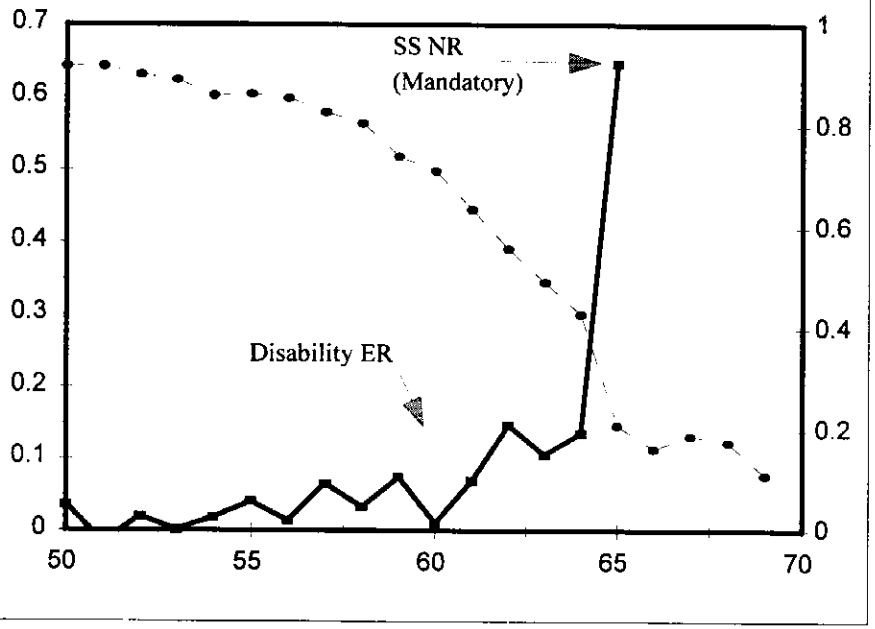


F15h. Status of Men by Age in Canada

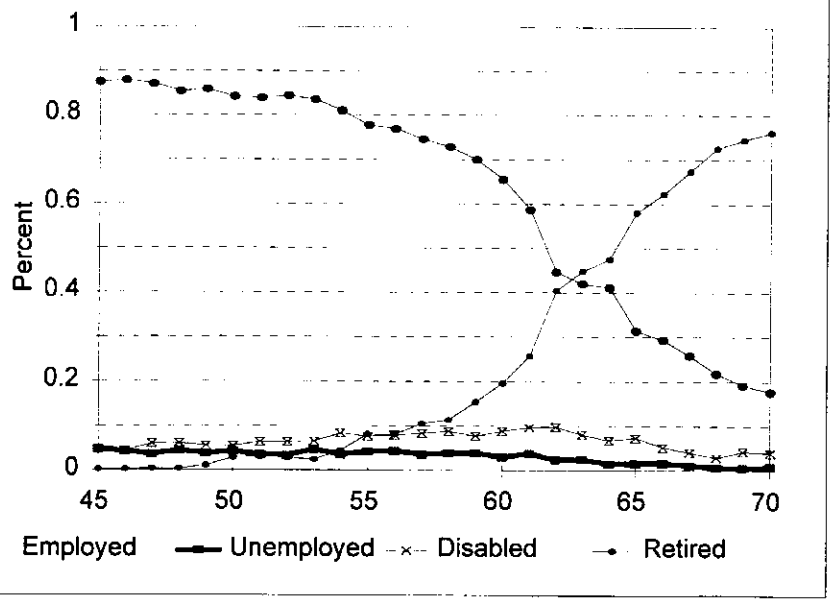
F15i. Hazard & LFP Rates for the US



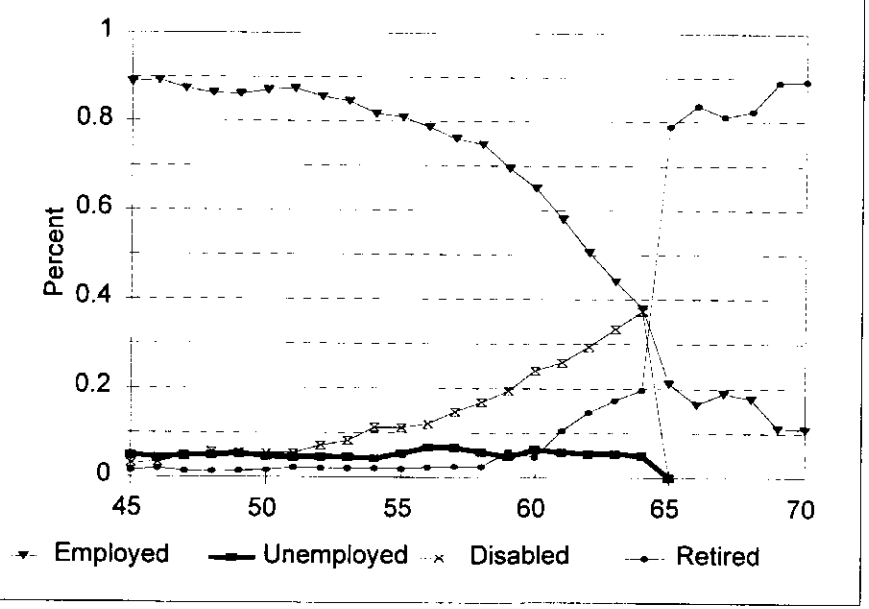
F15j. Hazard & LFP Rates for Sweden

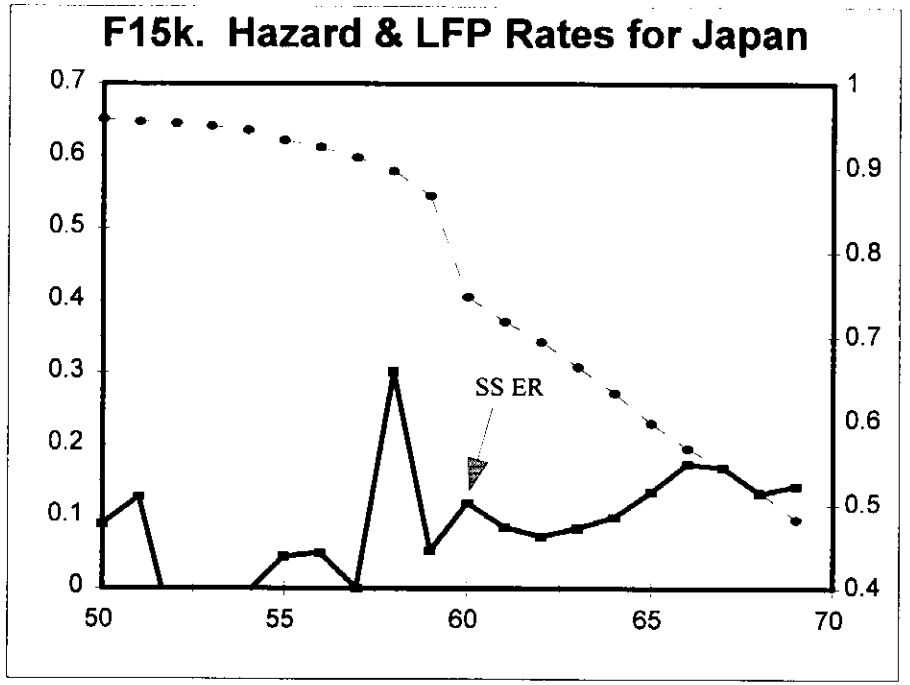


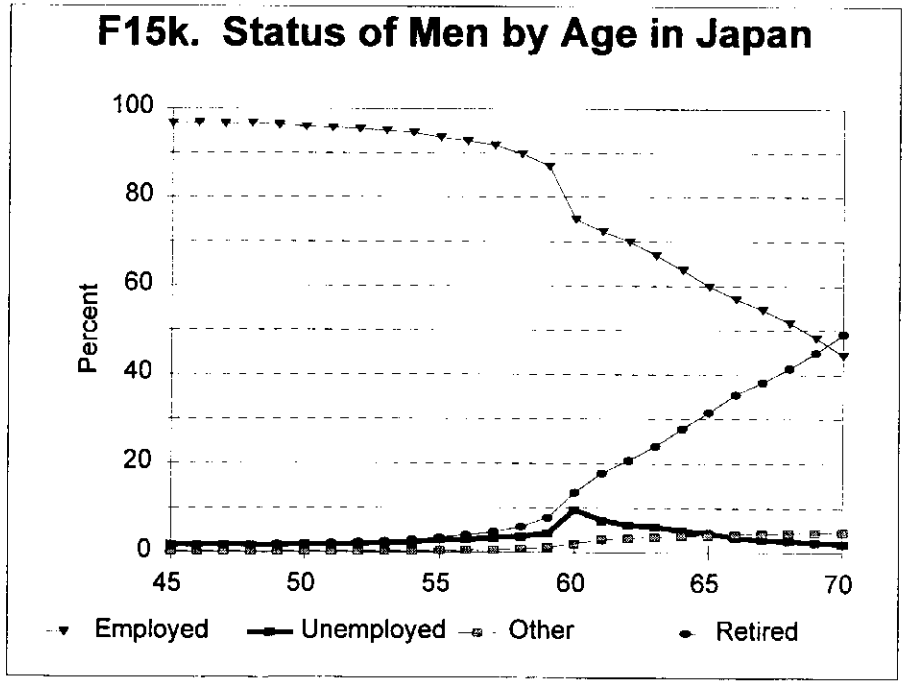
F15i. Status of Men by Age in the US



F15j. Status of Men by Age in Sweden

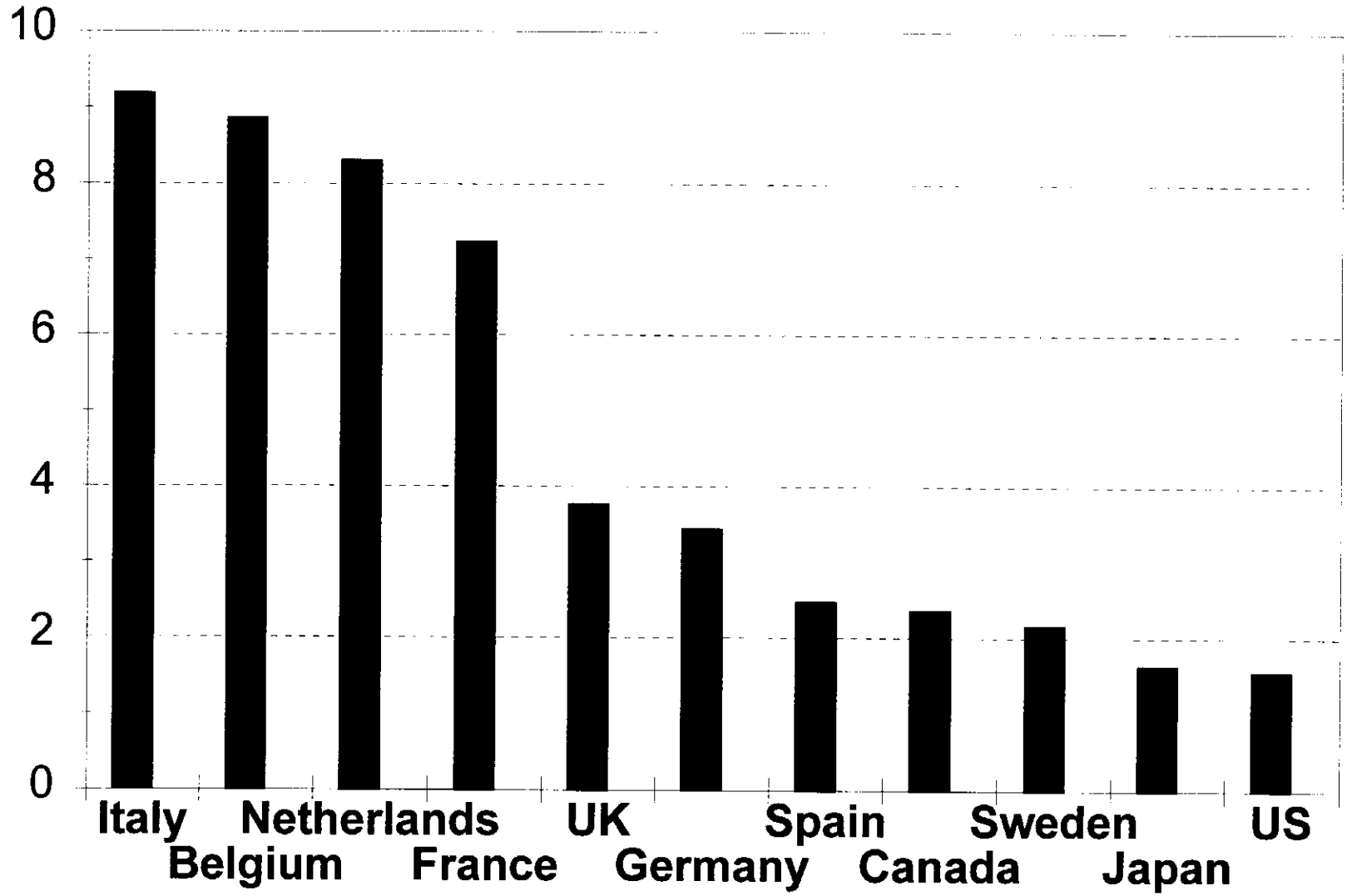



F15k. Hazard & LFP Rates for Japan
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
0.9
0.8
0.7
0.6
0.5
0.4
SS ER
50
55
60
65
70

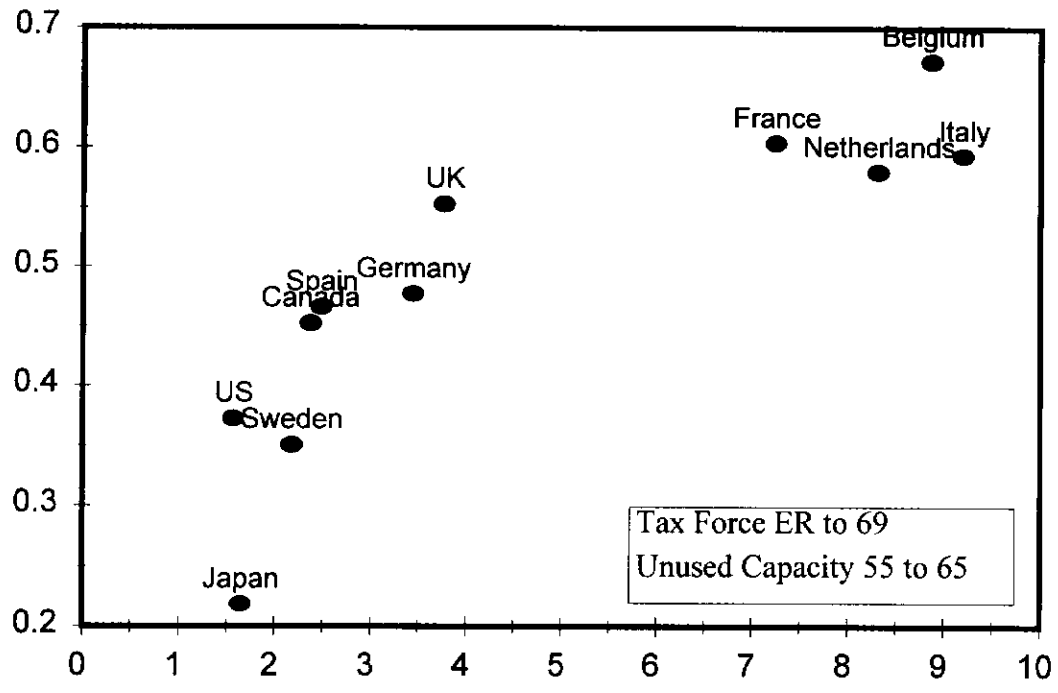

F15k. Status of Men by Age in Japan
100
80
60
40
20
0
Percent
45
50
55
60
65
70
Employed
Unemployed
Other
Retired

F16. Sum of Tax Rates on Work

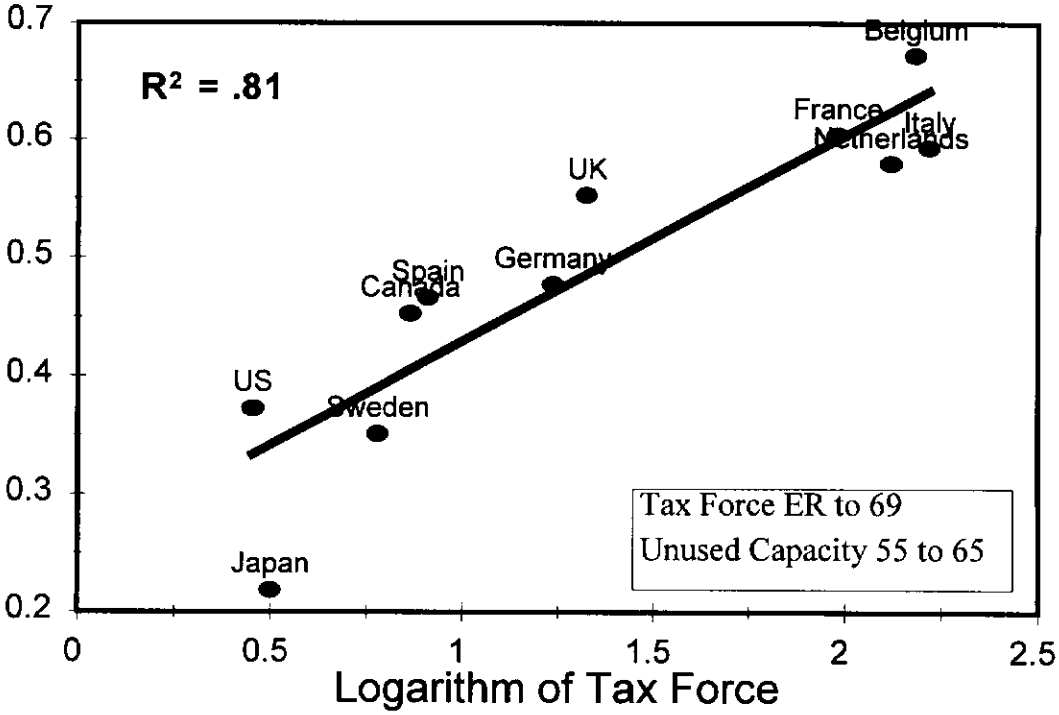
From Early Retirement Age to 69



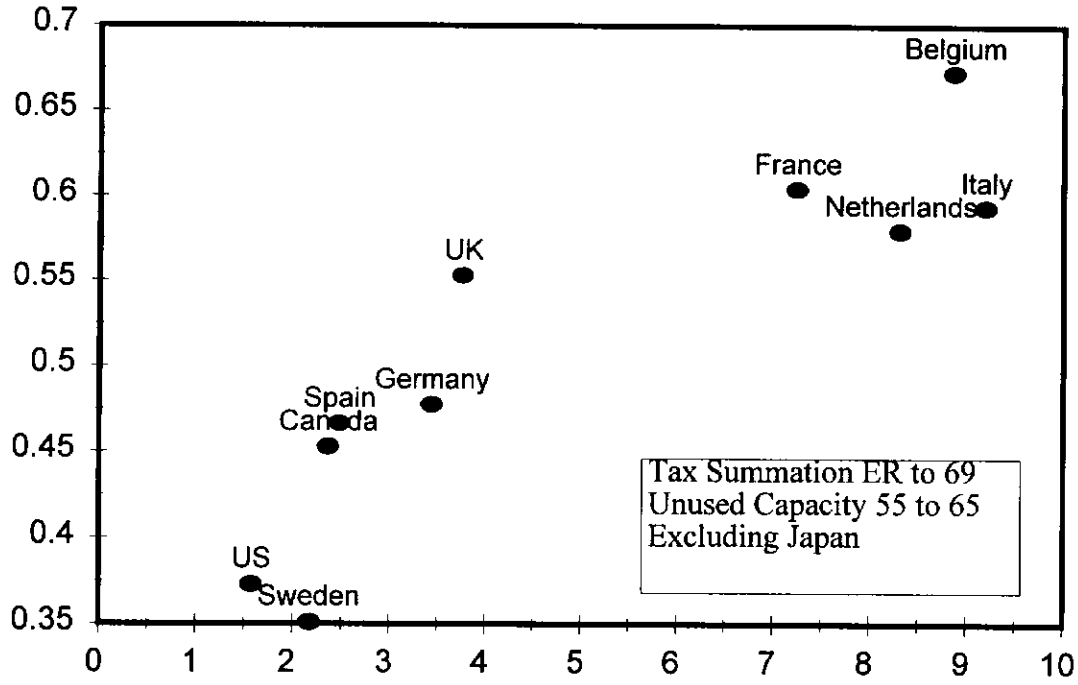
F17a. Unused Capacity v Tax Force



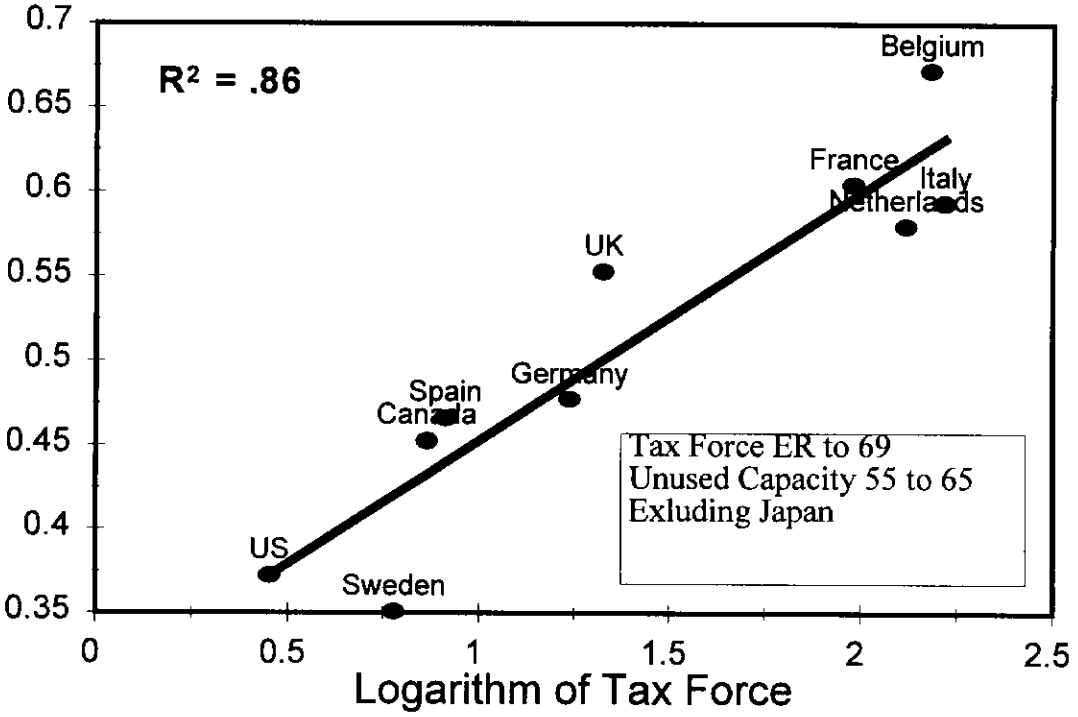
F17a'. Unused Capacity v Tax Force



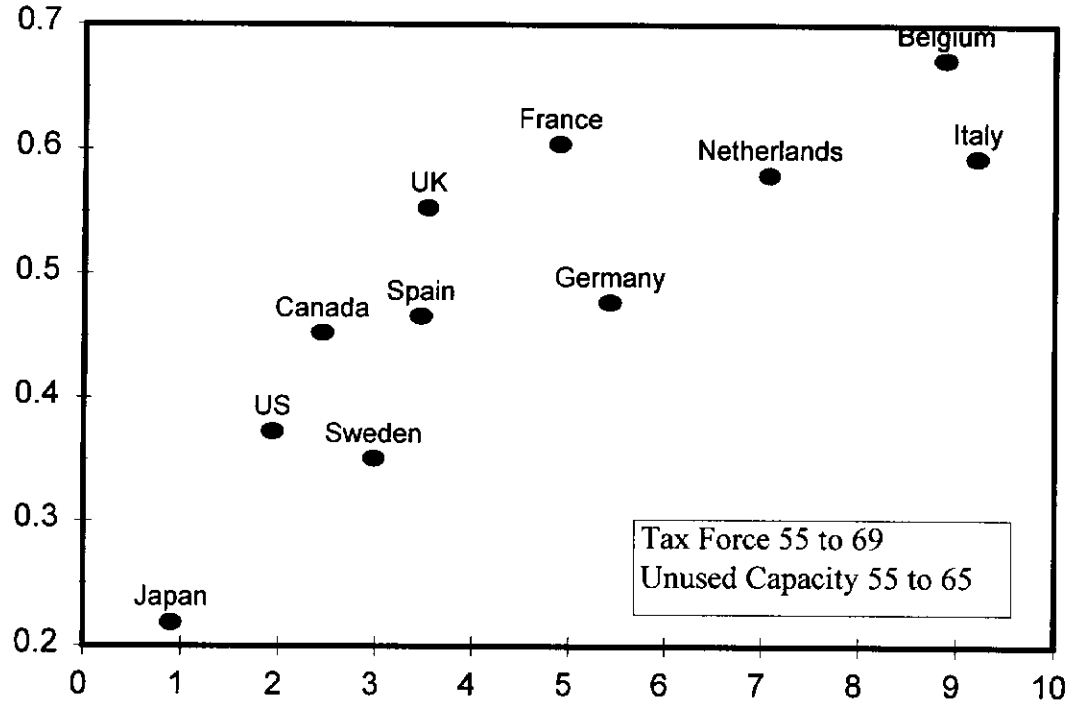
F17b. Unused Capacity v Tax Force



F17b'. Unused Capacity v Tax Force



F17c. Unused Capacity v Tax Force



F17c'. Unused Capacity v Tax Force