Social Security, Occupational Pensions, and Retirement in Sweden

Mårten Palme
Stockholm School of Economics
Box 6501
S-113 83 Stockholm
Sweden
e-mail: stmp@hhs.se

Ingemar Svensson
National Social Insurance Board
S-103 51 Stockholm
Sweden
and
Department of Economics
Stockholm University
S-106 91 Stockholm
Sweden

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Abstract: This paper provides an overview of the Swedish social security system and its impact on individual retirement behavior. First, we give some historical facts, as well as a more detailed description of the current situation, of labor market behavior of older persons. Second, we describe the social security system. We also describe the different occupational pension schemes, which have an increasing importance. Finally, we show the results from a simulation, where we have used the earnings path of several representative workers to calculate the implicit tax (or subsidy) rate on additional work after age 55 generated by the social security system in interaction with occupational pensions, income taxes as well as housing allowances. We find that the observed labor market behavior of older men is in accordance with the economic incentives generated by the social security system and in particular with the occupational pension scheme for blue collar workers.

Keywords: Pensions; labor force participation; labor supply of older men

JEL-Codes: H55; J14; J26

The social insurance system has a very important role in the Swedish economy. In 1994, the amount of the benefits from this system represents 20% of Sweden's GDP, which is about 32% of all public spending. Table 1 shows the size of the different parts of the social insurance system. From this table, it is apparent that the largest share of social insurance spending is directed to individuals who have permanently left the labor market, mostly older people. This social security spending consists of three main parts: the basic pension, the supplementary pension (ATP), and the partial retirement pension. The payments from these systems amounted to 42.4%, 55.3%, and 1.3% respectively of total pension payments in 1994. The supplementary pension and the basic pension can be paid as an old-age pension, a survivor's pension, or as a disability pension. People, who have permanently left the labor market in Sweden, are largely dependent on payments from social security. On average, about 74% of the income of individuals older than age 65 consists of payments from the social security system.[1]

Foreseen financial problems in the system led to a major reform to be fully implemented by 2001. The majority in the Swedish Parliament agreed on the principles of the new pension system in 1994, although all the details are not yet decided. There are two causes for the foreseen financial problems of the current system: demographic changes and low economic growth in the Swedish economy. The ratio between the number of persons over age 65 to the number aged 16-64 rose from 0.184 in 1950 to 0.278 today. This ratio is projected to rise to 0.35 by 2050 and to 0.37 by 2070. There are two aspects of the changes in the demographic structure: the increase in life expectancy and the aging of the baby-boom generation. The increase in life expectancy increases the financial pressure — for the basic pension system, which is a pure pay-as-you-go scheme, and for the supplementary pension system, which is a mixture of a funded and a pay-as-you-go scheme. The aging of the baby-boom generation creates extra financial pressure in the basic pension system. But because the supplementary pension system is a partly funded system, this source of financial pressure could be solved if the fund is built when this generation is active in the labor market.

The risk of continuing slow economic growth of the Swedish economy is primarily a problem for the supplementary pension system. The National Social Insurance Board studies show that this scheme is not viable if the long-run rate of growth falls below about 2% (see National Social Insurance Board, 1993).

Another important component of the pension system is the centrally bargained, occupational pension schemes. As is well known, Sweden has a highly unionized labor market. Occupational pension schemes are decided in central agreements between the central unions' and the employers' confederations. Although the unionization rate is about 81%, the occupational pensions are compulsory for most workers and cover about 95% of the labor market The influence of the centrally bargained pension plans is growing.

An explicit goal of the pension-system reform is to raise work incentives (especially for older people). However, very little is known about what economic incentives for leaving the labor market the current social insurance system provides, and to what extent the systems affect the behavior of older workers since very few empirical studies have been done in this area.[2] The aim of this paper is to provide an overview of the incentives erected by the social security system for older people to participate in the labor force. We will also consider the occupational pension scheme for blue collar workers. We compare the estimates of these incentives with the observed pattern of labor force participation of older people historically, and by age groups.

The paper is organized as follows: Part I describes labor market behavior of older workers in Sweden, the present situation, and development over time. Part II provides an overview of the social security system and the occupational pension schemes. Part III presents the results from a simulation model designed to reveal the economic incentives implied by the Swedish social security system and the occupational pension scheme for blue collar workers (STP) for a representative individual. We conclude our study in Part IV.

Part I: Labor Market Behavior of Older Persons in Sweden

Figures 1 and 2 show the historical trends in labor-force participation rates since 1963 for men and women over age 44. Four different age groups are studied: 45-54, 55-59, 60-64, and 65-74. Considering the entire historical period, Figure 1 shows that the labor-force participation rate of older men decreased in all age groups. But in the youngest age group, 45-54, the decrease is comparatively small. Labor force participation for the 55-59 age group goes from about 95% to about 82% in 1995. There is a comparatively large decrease in labor-force participation for the 60-64 age group: from 85% in 1963 to 55% in 1995, which is a decrease of 30 percentage points. Figure 1 also shows that labor-force participation in the three youngest age groups decreased more in the most recent recession in the Swedish economy in 1991 than in the years preceding the recession. The largest decrease is in the 60-64 age group also for this period. The historical trend in labor force participation of the 65-74 age group reveals that the change in mandatory retirement age, from age 67 to 65 in 1976,[3] was preceded by a steady decrease in labor force participation of the age group affected by the reform, that is, here, the actual effect of the reform was small.

The trend in labor force participation of older women, shown in Figure 2, shows a very different picture compared to that of men: for the entire 1963-1990 period, labor force participation rates increased for all age groups between 45 and 64, although at a decreasing rate. The smallest increase is in the 60-64 age group, viewed over the entire period. Labor force participation decreased somewhat in all three groups after the 1991 recession. The largest decrease for women, about 7 percentage points between 1991 and 1994, is in the 60-64 age group.

Of course, the extent to which social security might have affected the observed pattern of labor-force participation depends on the coverage and generosity of the schemes. Ever since the introduction of the compulsory old-age pension (*folkpension*) in 1913, all Swedish citizens are entitled to an old-age pension. Figure 3 shows the percentage share of men and women older than 55 years, who actually receive an old-age (SS) or disability (DI) pension for the 1964 to 1994 period. It reveals that the share of women in this age group who receive old-age or disability pension is somewhat higher (about 4 percentage points) than for men in this age group—throughout the entire period. It is interesting to compare the big *leap* for the number of men who received old-age pension in 1976 with the smooth decrease in labor-force participation before 1976. The difference was caused by the change in mandatory retirement age that was preceded by agreements between the trade unions and the employers' confederations on occupational pensions that offer benefits between age 65 and 67.

But the most striking fact in Figure 3 is the dramatic increase between 1964 and 1994 in the share of men and women receiving old-age or disability pension: about a 25 percentage-points increase for men and about 28 for women. About 6 percentage points of this increase for men and women can be attributed to increased number of disability pensions; the number of old-age pensions increased by about 8 percentage after the 1976 pension reform, when the mandatory retirement age was decreased from age 67 to 65; a very small part of the increase can be attributed to a small increase in early withdrawal of SS benefits. The rest, about 11 percentage points for men and 14 percentage points for women, might be caused by changes in the demographic structure, primarily the increase in life expectancy.

Figure 4 shows the replacement level from the national Swedish pension system,[4] that is, the amount of the first year's pension as a share of the preceding year's earnings provided that the worker continues to work until he or she reaches the age of mandatory retirement.[5] The calculation is made using an earning history of an *average production worker* (APW).[6] The compensation levels are calculated for net income, that is, income taxes are considered in the calculations. Figure 4 shows the compensation level for four hypothetical single workers; one who has: (1) An earning history amounting to half of the earnings of the APW in each year. (2) Always earned the same as the APW. (3) Earned double the APW. (4) Always earned three times as much as the APW.

Figure 4 also shows the compensation level for a married couple, where the husband is assumed to have had the same earnings as the APW. Here, it is assumed that the wife never worked.[7] The worker is assumed to retire at age 65. The replacement rate is generally different if the individual elects to retire earlier than the mandatory retirement age — as Parts II and III show. Figure 4 shows that the replacement level increased a lot in the years between 1960 and 1980. The maturing of the supplementary pension system explains the largest part of the increase.

Labor-Market Behavior in 1995

To get a more detailed picture of the current pattern of exiting from the labor force, 1994 and 1995 *Labor-Force Surveys* are used.[8] Figure 5 shows labor-force participation by age and sex for individuals older than 45 years. To improve the precision in the estimates, the 1994 and 1995 *Labor Force Surveys* are combined. Figure 5 also shows two properties of labor-force participation of older workers: Firstly, labor-force participation decreases with age, except for women in their late forties and for some age groups between 65 and 69 for men and women.[9] It could also be seen that the decrease in labor force participation is fairly moderate until the workers reach age 57. Labor force participation for e.g. 56-year-olds is above 80% for men and women. Among individuals in their late fifties and early sixties, labor force participation rates fall for every year, and with an increasing rate. Labor force participation for individuals of age 64, one year before the age of mandatory retirement, is about 30% for women and 43% for men. Second, labor force participation rates are higher for men in all age groups. But the difference is very small for people in their late forties, but then increases gradually with age. At age 64, the difference is as large as about 13 percentage points.

Figure 6 distinguishes among employed, unemployed, disabled[10] or retired, by age for older men. Figure 7 provides the same information as Figure 6 for women. Figures 6 and 7 show that the graphs for *unemployed* and the graph for *disabled* only continue to age 64 years. This is because the *Labor Force Survey* only counts people younger than the mandatory retirement age at 65 as unemployed. People older than 65 are not entitled to support from the unemployment insurance. Our definition of disabled is people who receive a disability benefit from the national pension system, which is only possible for people below 65 years of age.[11]

By comparing the graphs for *retired* and *disabled*, Figures 6 and 7 show that the most common way to leave the labor market for men and women is to become a disability pensioner, in all age groups between 45 and 64. At age 64, as much as about 37% of all men and 35% of all women receive full-time disability pension. A comparison of Figures 6 and 7 shows that women, on average, retire somewhat earlier than men: at age 64, about 20% of the men and 25% of the women are retired. A study of the *unemployed* graphs shows that unemployment is about equal in all age groups. A comparison of Figure 6 with Figure 7 shows that the unemployment rate is somewhat higher for men than for women for the entire age range considered in the figures.

Income Sources of Older Persons

Figures 8 and 9 reveal the incidence of private, occupational, and public pensions among older persons in 1994. The data source for these calculations is the *Household Income Survey* (HINK) provided by the *Statistics Sweden*.[12]

Figure 8 shows the share of all men between age 45 and 75, divided in one-year age groups, who receive old-age pension, disability pension or any other form of public assistance. The graphs for disability pension confirm what is already known from Figure 6, although another data source is used for these figures: about 35% of the 64 year olds receive disability pension, and the rate of recipiency increases rapidly starting from about age 57.

Comparing the figures of the share of retired men in Figure 6 with the estimates of the share of men receiving old-age pension shown in Figure 8, two things should be noted: First, for men age 60 to 64, the rate of take up of old-age pension is about 10 percentage points lower than the rate of retired men in this age group. So about half of the men, who retire before the mandatory retirement age of 65, do not claim old-age pension from social security until age 65. Second, according to the data in Figure 8, almost all people claim old-age pension benefits at age 65, although as shown in Figure 6, only about 85% are retired at that age. The rate of all other public transfers are very high for men in the younger age groups considered in Figure 8: about 70% for men age 45.[13] This graph decreases steadily in older age groups.

Figure 9 shows the proportion of men and women between age 45 and 75, and again divided in one-year age groups, who receive occupational and private pensions, respectively. As expected, the proportion receiving private and occupational pension increases rapidly at age 65. But Figure 9 also shows that the proportion decreases steadily after age 65. This is due to the increase in the coverage of both occupational and private pensions in younger birth cohorts. The increased gender gap that is most evident for occupational pensions in older age groups is also due to changes in the work patterns of younger birth cohorts, that is, increased rate of labor force participation of women.

Figure 10 displays the average share of different sources of household income by the age of the head of the family. Although, as explained in Appendix I, these figures should be interpreted with caution because the sample sizes for some components of household income are very small, it is interesting to note that the observations made in Figure 9 are confirmed: The importance of private and occupational pensions is decreasing among older pensioners. The share consisting of earnings is decreasing from about 75% at age 50 to about 65% at age 58. After that age, the share of earnings is decreasing with an increasing rate. The share of capital income is around 10% in the younger and around 15% in the older age groups considered.

Part II: Key Features of the Social Security System

History of the Social Security System in Sweden

In 1913, the first compulsory old-age pension insurance was implemented. It was a fully funded system. It consisted of two parts: a means-tested basic pension and a supplementary pension, which was related to individual contributions. Although the compensation levels from the means-tested part of this pension scheme were very low—only 11.3% of the earnings of an industrial worker (Elmér, 1960)—the 1913 reform was fundamentally important: all Swedish citizens were covered by an old-age pension scheme. This Swedish system was the first pension system in the world that covered all citizens, regardless of occupation.

In 1935 and 1946, two major reforms were implemented. Criticism from conservatives and liberals about large, state-controlled pension funds, which influenced capital markets, dominated the political debate preceding the 1935 reform. The Social Democrats wanted to increase benefit levels without increasing expenditures for the pension system. This debate led to a switch to a *pay-as-you-go* system in the 1935 reform. The financing of the system was changed to employers' contributions, and the levels of the pensions were substantially increased.

In 1941, the minimum pension was about 29.4% of the earnings of an industrial worker (Elmér, 1960). Due to means testing, the increase in the replacement rates also implied that the share of the population that actually received pension payments increased from about 70 to 90% after the reform. In the 1946 reform, which was implemented in 1948, the basic pension replaced the old means-tested pension. A housing supplement in the most expensive cost-of-living areas was also introduced.

The supplementary pension (ATP) was implemented after a 1959 referendum. The two main alternatives in the referendum were a: compulsory system (which was finally implemented), proposed by the blue-collar trade union and the Social Democratic party, and voluntary system, proposed by the employers' confederation and the conservative and liberal parties. The first birth-cohort affected by the supplementary pension were those born in 1896. The first year when pension-right income for supplementary pension was recorded in 1960.

In 1976, the mandatory retirement age was decreased from age 67 to 65, and the right to a *partial-retirement* pension was introduced. In 1990, a gender-neutral survivor's pension replaced the widow's pension.

In 1994, a majority in the Swedish Parliament reached an agreement on principles for a new old-age pension. Details of the new system will be decided in 1998. The first cohort to be affected by the new system are those born in 1938. They are covered by the new system by weight of 0.20 and by 0.80 in the old system. The weight of the new system then increases by 0.05 in every cohort. So the cohort born in 1939 will be in the new system by 25%. The cohort born in 1954 will be entirely in the new system. The first pensions, according to the new system, will not be paid until 2001.

Current Features of the Social Security System

Employer contributions levied on wages finance the social security system. In 1994, the level of *all* social contributions was 31.36 percentage points on gross earnings. The level of the contribution for the national basic pension was 5.86, for the supplementary pension (ATP) 13.00, and for the part-time pension 0.20 percentage points. In the current system, there is no ceiling for the contributions. General tax revenues partially finance the national basic pension.

All Swedish citizens and all persons living in Sweden are entitled to a basic pension. In principle, all receive the same amount irrespective of previous earnings. There is a reduction of the amount if the time of residence in Sweden is below 40 years and the number of years with income in Sweden is below 30 years.

Like all social insurance, the basic pension is related to the *basic amount* (BA). The BA is linked to the consumer price index (CPI). As the BA is decided each year by the government, it is possible for a majority in the Swedish Parliament to make discretionary changes, which are not according to the development of CPI. This has happened on several occasions since 1960. During the period between November 1980 and November 1982, the BA was temporary linked to another price index, which to a lesser extent than the CPI, reflected large increases in oil and electric energy prices during that period. In addition, the price increases due to the large devaluation of the Swedish currency in 1982 were not fully reflected in the BA. And during the 1990s, pensions have not been fully aligned with price indexing due to several measures to cut the government budget deficit. In 1995, the BA was SEK 34,986 (USD 26,576),[14] and the annual wage of an average production worker was SEK 189,488 (USD 4,907).

The basic pension for a single old-age pensioner is 96% of the basic amount. The basic pension is reduced to 78.5% if the person is married. Before 1995, it was only reduced if the person was married to someone who also received the basic pension. Individuals with no, or low, ATP are entitled to a special supplement. The special supplement is independent of marital status and is 55.5% of a basic amount. The special supplement is reduced on a one-to-one basis against the supplementary pension. Thus a single old-age pensioner with only basic pension and special supplement receives 151.5% of the BA. In 1995, that was SEK 53,004 (USD 7,434) in annual pension or 28.0% of annual earnings of an average production worker. In 1994, about 20% of all old-age pensioners did not have supplementary pension, that is, they only received a basic pension and a special supplement. This group mainly consists of older women, for example, 63% of female old-age pensioners older than age 85 did not receive a supplementary pension. The corresponding figure for male old-age pensioners between age 65 and 69 was 1.7%; and for women in the same age group, 13.8%.

As previously mentioned, the survivor's pension was changed in 1990 and women born before 1945 follow different rules for survivor's pension — compared to those born after 1945. For women born before 1945, the rules for the widow's pension still apply. They get 90% of a BA until they reach the age of 65. The rules for the new gender-neutral *transitional* survivor benefit apply for those born after January 1, 1945.

According to these rules the survivor's benefit is paid to the insured individual's spouse within 12 months after the death. From January 1, 1997, the period is reduced to 6 months. It could be prolonged under special circumstances (widows with dependent children). This means that for most women born before 1945, a survivor's benefit is a possible income supplement for about the next 10-15 years.

The supplementary pension (ATP) is related to the individual's earning history. The benefit level is determined in three steps. The first step is to determine the *pension-rights* income for each year from the age of 16. The calculation of pension-rights income is based on income from labor recorded in the annual tax return. Pension-rights income is the share of the income exceeding 1 BA, and it is set to zero if the annual income from labor does not exceed 1 BA.[15] Besides earnings and income from self-employment, transfer payments from social insurance, such as income from sickness and unemployment insurance, the parental cash benefit, and the partial retirement pension are included in pension-rights income. Three years of pension-rights income greater than zero between the ages of 16-65 are required to receive an old-age pension from the ATP scheme. Income above 7.5 BAs, the social security ceiling, is not included in pension-rights income.[16]

The second step is to calculate the average pension points. This is done by dividing the pension-rights income with the corresponding year's BA to obtain the pension points for each year. Thus, due to the social security ceiling at 7.5 BA, the maximum number of pension points an individual could get in a particular year is 6.5. The average pension point becomes the average from the individual's best 15 years regarding pension points.

The final step is to calculate the individual's ATP pension income (Y_i) by applying this formula:

$$Y_i = 0.6 \cdot AP_i \cdot \min\left(\frac{N_i}{30}, 1\right) \cdot BA,$$

where AP_i is individual average pension points, BA is the basic amount, N_i is the number of years the individual has recorded a pension-rights income greater than zero. The number of years with pension points that are required for full ATP pension is 30 for individuals born 1924 and later. Setting the amount of the BA in 1995 in the ATP formula reveals that the maximum pension amount from the Swedish national pension system in 1995 was SEK 170,032 (USD 23,847), which is about 90% of the annual wage of an average production worker.

There are no dependent's benefit within the ATP scheme, that is, the amount of the pension is independent of marital status, and there are no rules for splitting future ATP benefits in a divorce. As previously mentioned, the survivor's benefit in the ATP scheme has recently changed. Those who were born before 1945 receive 35 or 40% of the deceased husband's ATP pension until they reach the normal retirement age of 65: 35% if there are children in the household that are eligible for children's pension and 40% otherwise. After the widow reaches age 65, her ATP pension is reduced, taking into account her own ATP pension. The rules are somewhat different for different birth cohorts. The survivor's pension for those born after January 1, 1945 are gender neutral. The surviving spouse of an individual, who has qualified for ATP pension, is entitled to the ATP survivor benefit within 12 months after the death according to the rules implemented in 1990. The amount is 20% of the deceased spouse's ATP pension

— if there are also surviving children entitled to the children's pension and 40% otherwise.

The principal rules of the new pension system, which will replace the basic and ATP pension schemes were decided in 1994. The main changes are: Earnings from the entire life cycle are counted when the individual's pension income is determined, rather than only the 15 best years. The pension is related to the real growth rate in the entire economy — rather than price indices. Changes in life expectancy also affect individual pension income, that is, increased life expectancy and lower economic growth rates decrease individual pension income at a given retirement age.

Social Security and Pathways to Early Exit from the Labor Market

Sweden has a normal retirement age of 65 years.[17] Older workers are not covered by the employment security law,[18] that is, workers older than age 65 are excepted from the seniority rules and if a firm wants to scale down, these workers are the least protected. Furthermore, workers older than age 65 are not entitled to support from the unemployment insurance. On the other hand, the wage cost for the employers is lower for workers older than age 65, because the employers do not pay the part of the payroll tax for the national or occupational pensions.

Employees in central government and in municipalities automatically lose their jobs at age 65. But exceptions from this rule are permitted for one year. In the private sector, there are often collective agreements between the trade unions and the employers confederations, prescribing strict rules for mandatory retirement at age 65. As the number of these agreements is very large, it is hard to get an overview of the overall strictness in the rules for mandatory retirement. There may also be a social convention to stop working at age 65, at least in areas with high unemployment.

The basic pension and ATP can be claimed in advance from age 60 and postponed until age 70. If the individual chooses withdrawal in advance, the monthly amount of the benefit is permanently reduced by 0.5% for each month of early withdrawal, for example, if the individual retires at 60, the permanent reduction is 30% (5·12·0.5). If the individual decides to begin to receive a pension later than at age 65, the pension income is permanently increased by 0.7% for each month of postponement.

Beside the national old-age pension scheme, there are two other pathways to early retirement: the partial retirement pension and the disability pension.

A partial retirement pension allows workers age 60 and older to reduce their hours of work and receive a benefit to replace the lost earnings. To be eligible for part-time retirement, the worker must have had 10 years of pension-rights earnings after age 45 and must work at least 22 hours before the reduction. The benefit is 65% of the difference in earnings between before and after part-time retirement.

The most common pathway of exiting from the labor market before age 65 is through disability pension. Figure 6 for men and Figure 7 for women illustrate this. In 1994, 37% in the male age group of 64 years old and 35% of the corresponding group of females received full-time disability pension.

The disability pension consists of the basic pension and the income-related ATP supplement. The determination of pension income is the same as for an old-age pension benefit without the actuarial reduction for withdrawal in advance. Disability pension can be received from age 16. To be entitled, a physician must certify that the individual's capacity to work is permanently reduced by at least 25% for reasons of sickness or similar causes. If the capacity to work is reduced for a long period but not permanently, the individual is entitled to a *temporary* disability pension. If the individual's working capacity is reduced by at least 25% but not 50%, he is eligible for a 25% disability pension. If the working ability is reduced by at least 50% but not 75%, he is eligible for a 50% disability pension. For full disability pension, working ability must be completely lost. A 75% disability pension is also possible. In practice, the strictness in the application of the medical screening has varied over time. A significant tightening up of the availability of disability pension has occurred through successive changes in legislation in July 1993, October 1995, and January 1997. Figure 11[19] shows the number of new disability pensions between 1971 and 1995. Studies of the long-term variations in the number of new disability pensions between the mid-1970s until 1992 (see, for example, Hedström, 1987 or Wadensjö, 1985) suggest that they could be explained by variation in access to such pensions and increased compensations. Between 1970 and 1991, it was possible to receive disability pension for *labor market reasons*. The requirement for receiving such disability pension was that the insured individual was more than 60 years old and had exhausted his or her right to unemployment insurance.[20] During 1992 and 1993, the number of new disability pensions was very high. This was because the social security administration, during these years, tried to decrease the number of ongoing long periods with sickness benefits. In some cases, the individual was granted a disability pension because of these measures.

Occupational Pensions

There are basically four different centrally bargained pension plans for Swedish workers:

- Two separate pension plans for employees in the private sector—one for white-collar workers (ITP) and one for blue-collar workers (STP).
- Two separate plans for public-sector employees—one for those employed by the central government and one for persons employed by the municipalities and counties.

In 1985, ITP covered about 32.6% of all insured workers; STP covered 39.8%; the pension for employed in central government covered 10.7%; the pension scheme for employed in municipalities covered 16.9% (Kangas and J. Palme, 1989). Like social insurance, all the occupational pension schemes are price indexed. Pension rights are portable among these four main occupational pension schemes.

STP. The STP pension scheme was introduced after a central agreement between LO (blue-collar workers union) and SAF (employers' confederation in the private sector) in 1971. It is entirely a pay-as-you-go pension plan, and it is financed through employers' contributions. In 1996, the rate of the employers' contribution was 3.15% of gross earnings. STP has been radically changed in 1996 and replaced by a partially funded pension. The new pension scheme affects workers born after 1931. The main reason for the reform of the STP pension plan was the long-term decrease in the number of blue-collar workers in the private sector.

The size of the individual STP pension depends on the number of years the worker has contributed to the scheme and annual earnings between ages 55 and 59. Full STP pension requires that the insured worker has contributed at least 30 years between ages 28 and 65, and it is required that he or she has contributed at least three years between ages 55 and 65 to be eligible for an STP pension. Provided that the insured worker has contributed the maximum number of years, the STP pension is 10% of the average earnings below 7.5 BA of the three best years between age 55 and 59. Payments from the STP pension cannot be collected before the month of the individual's 65th birthday nor can the payments be postponed. But the pension payments are not reduced if the worker decides to continue to work after age 65. To summarize, the worker gets no, or a comparatively small, cut in the pension wealth from this pension if he or she decides to quit at age 58 or later, but will not receive a pension at all if he or she quits before age 57.

ITP. The ITP pension plan existed before the introduction of ATP in 1960. But then it covered only about 50% of the white-collar workers in the private sector, and since then it has gradually been expanded to cover almost all private-sector white-collar workers. It is financed through an employer contribution. In 1996, it was 1.15 on gross earnings for employees below age 28. These contributions are made between ages 28 and 62 for the insured individual.

The size of the individual ITP pension depends on the number of years between ages 28 and 65 that the individual has contributed to the ITP pension and on the salary the year before the individual starts to collect ITP pension. In general, full ITP pension requires 30 years of contributions. Otherwise, the ITP pension is reduced proportionally. Provided that the individual has contributed the required number of years, the ITP pension is 10% of last year's salary up to 7.5 BA, 65% of the salary between 7.5 and 20 BA, and 32.5% between 20 and 30 BA. The pension-rights age for the ITP pension is 65. But it can be claimed from age 62 with a life-long reduction of 0.6% for each month the ITP pension is collected in advance. It can also be postponed until age 70, with a lifelong increase of 0.6% for each month the pension postponed. The ITP pension could also be claimed before age 62; the amount of the pension is then determined individually depending on sum of the individual's contributions to the pension scheme. Because the individual contributes to the scheme only until age 62, the reduction is generally larger if the individual decides to quit before rather than after age 62.

State employees' pensions. The supplementary occupational scheme for employees in the central government consists of two schemes: one basic pension and one supplementary pension. The basic pension is entirely a pay-as-you-go scheme, and the pensions are paid directly from the central government budget. But the supplementary pension is a fully funded system, and 1.7% of the annual salary is offset to a pension fund. The size of the basic pension is determined in a way very similar to the ITP pension. Thirty years of work in central government is required for a full pension, and the same rules as for the ITP pension are applied if the individual does not fulfill this requirement. Apart from this requirement, the average of the five years preceding the year the individual decides to collect pension payments determines the size of the pension. It is 10% of this five-year average up to 7.5 BA, 65% between 7.5 and 20 BA, and 32.5% between 20 and 30 BA.

The retirement age is 65 for most people employed in central government. But there are several exceptions — most important are military personnel who are in general pensioned at age 55 and receive a full occupational pension from that date. Pension can voluntarily be claimed before the pension-rights age. The amount of the pension is then decreased by 0.4% for each month the pension is collected in advance for the rest of the individual's life; and by 2.4% on the share of the income below 7.5 BA, when the individual who has started to collect pension payments in advance becomes 65 years old. The pension payments could also be postponed. This increases the pension by 0.4% for the rest of the person's life for each month the pension is postponed after the pension-right age.

Local government employees' pensions. The pension plan for employees in the municipalities is administered by an insurance company owned by Sweden's 283 municipalities. Full pension requires 30 years of employment in the local government sector between ages 18 to 65; otherwise the pension is reduced proportionally. The size of the pension is determined by the average of the five best years of the seven years preceding the year before the year the individual decides to retire. This pension scheme is fully coordinated with the basic and ATP pensions from the national scheme. Including the two national schemes, the pension is 96% of the average calculated salary (as previously described) below 1 BA, 78.5% between 1 and 2.5 BA, 60% between 2.5 and 3.5 BA, 65% between 7.5 and 20 BA, and 32.5% between 20 and 30 BA.

The pension-rights age is 65 for most people employed by municipalities. But pension payments could be collected from age 60 and postponed until 67. If the individual decides to retire before age 65, the pension is reduced for the rest of the individual's life by 0.3% per month between age 63 and 65, by 0.4% between age 62 and 63, and by 0.5% per month between age 60 and 62. The pension is increased by 0.1% for each month the individual decides to continue to work after age 65.

Income Taxes and Housing Allowances

Besides the social security system, retirement incentives are also affected by income taxes.[21] Sweden has an integrated income tax system. Individuals pay local and national income tax. The national government determines the tax base for national and local taxes. The tax base is divided into *earned* income and *capital* income. All income from the social insurance system is included in earned income — together with wages and salaries. Income from capital is taxed with a national proportional tax of 30% on taxable income. Earned income is taxed with national and local taxes. The tax rate for the local tax is determined independently by each of Sweden's 286 municipalities. But there is a clustering of these tax rates around about 30%.

Local income taxes are proportional, while the national income tax is progressive. After the major income tax reform in 1991, the national income tax was set to zero below a certain breakpoint (about USD 25,000 in 1996), and to 20% on all income above that income level. In 1995, this tax was temporarily increased to 25%. This may give the false impression that there are only two possible marginal tax rates on earned income. But there is a basic deduction that varies among different brackets of earned income. There are special rules for the basic deduction for old-age pensioners, which largely determine their marginal tax rates.

For a single pensioner with only basic pension, the basic deduction is equal to the amount of his pension income, i.e. he pays no income tax at all. If the pension income is higher than the amount of a basic pension (in 1995, SEK 53,000 or USD 7,434) the deduction is reduced by 65% of the amount in excess of SEK 53,000. But earnings, self-employment income, and private pension insurance income do not reduce the deduction. High income pensioners are covered by the rules of basic deduction for non-pensioners. The basic deduction for non-pensioners has a humped-shaped relation to income: For income below SEK 66,800 (USD 9,369) it was SEK 8,900 in 1995; then it increased linearly with taxable income to SEK 18,100 at SEK 103,200; then it decreased linearly for taxable incomes between SEK 108,700 and 199,700, to again be 8,900 for higher taxable incomes. At income levels where the deduction for non-pensioners is not applicable, the deduction for a married pensioner is SEK 10,100 lower — compared to a single pensioner at a given income level. A pensioner has a right to the deduction for non-pensioners if it is higher.

Old-age, disability, and survivor's pensioners with low income are entitled to a housing allowance. In 1995, this allowance was at most 85% of the housing cost up to a certain ceiling and above a certain floor. It is reduced by 40% (45 at high income levels) of income in excess of a basic pension and special supplement and by 2% of wealth. In 1994, about 30% of all old-age pensioners received housing allowances, and the average amount was about SEK 17,673 (USD 2,479), that is, 33% of the amount of the lowest pension from the national pension system.

Retirement Behavior

Figures 12 and 13 depict the hazard rate out of the labor force for men and women, respectively. These figures are obtained by comparing the size of each one year age group in the 1994 and 1995 *Labor Force Surveys.*[22] The small negative estimates that are obtained for some of the age groups can thus be explained by sample errors. The sample size does not permit us to present calculations for the age groups beyond age 65. But a clear pattern emerges in Figures 12 and 13: the hazard rate out of the labor force increases slowly until age 60, when there is a marked increase in the rate of exiting from the labor force, that is, for the ages between 60 and 64. At age 65, the mandatory retirement age, there is a spike, which indicates that almost 70% of the remaining labor force, for men and women, decides to exit at this age.

Part III: Retirement Incentives

Simulation Modeling of Retirement Incentives

This part of the paper provides an overview of the economic incentives for labor force participation generated by the Swedish social security and the occupational pension system for blue collar workers in private sector. In order to provide this overview, we simulate the social security outcome for a representative individual. First, we assume that the representative individual is a man born on January 1, 1930. As a *base case,* we assume that his life-cycle earnings path will follow the earnings of the median income earner in each age among men born in 1930. We also examine the case where the representative individual earning path for each year corresponds to the earnings of the 10th and 90th percentiles of this birth cohort. To obtain the synthetic earning history of our representative individual, we use administrative records of the National Social Insurance Board. The sample we use includes all individuals born the 5th, 15th or 25th in each month, that is, about 10% of the Swedish population. We selected men born in 1930 for the estimation of the 10th, 50th and 90th percentile incomes. This sample contains about 4200 people. Between 1978 and 1994, except for the year 1983, we have data that are obtained from tax records, which include income shares below the floor and above the ceiling for pension right income. For the entire 1960-1994 period, we have data on the individual's pension points, which are registered at the National Social Insurance Board.

Figure 14 a, b, and c show the earning histories that we obtained from the data for the median earner and the 10th and 90th percentiles, respectively. These figures show the results from the tax records and the pension point records. The potential problem of using pension points for measuring earnings is that earnings below the social security floor are excluded; the same is true for earnings above the social security ceiling. For the birth cohort that we selected, it turned out that the median earner has about the same income measured by pension points as measured by the corresponding variable from tax records in the 1978-1994 period. This means that the number of men with income below the floor (that is, 1 BA) is so small that it does not affect the measure of median income by pension points. But for both individuals at the 10th and 90th percentiles, there is, as expected, a substantial difference between the results from these two data-sets. For the simulations for individuals at the 10th and 90th percentiles we have imputed incomes for the years where only pension points are observed. This is described in Appendix III.

In our data, we found a decline in real earnings in ages 51 to 56 due to the recession of the Swedish economy in the early 1980s. We also found a sharp decline in earnings after age 60 for the median earner and the earner of the 10th percentile. It could also be seen for the 90th percentile earner but less markedly. This is probably explained in part by the fact that many people decrease the number of hours of work, which could not be observed in the data, after age 60. But in the calculations, we assume full-time earnings. To deal with this problem, we make our calculations for two cases. In the first case, we assume that after age 50, the individual's income increases at the same rate as the change in the real hourly wage rate for the entire Swedish economy, obtained from the national accounts. This is treated as the base case in our calculations. These imputed incomes are shown with a dotted line in Figure 15. As a sensitivity analysis, we also calculate the *actual synthetic* earning history for the individual with median income in each year until age 64 and with the diminishing trend in ages 63-64 prolonged to age 70. As Figure 15 shows, the difference between the two earning profiles is rather small for ages 51-61. After age 61 the difference increases considerably. This is partly due to the fact that men born in 1930 reached the age of 62-64 in the recession of the Swedish economy in the early 1990s.

Part II explains that the Swedish social insurance system provides benefits for two different pathways of early exiting from the labor market: a disability pension and an old-age pension. Figure 6 in Part II shows that the most frequent way to leave the labor market is to become an old-age pensioner. But as is also evident from Figure 6, the most common way of *early* exit, i.e. exit before the normal retirement age at 65, is to start to collect payments from the disability insurance: About 9% of the 64 year old men have taken the opportunity for early withdrawal from the old-age pension, compared to 37% who receive benefits from the disability insurance.[23]

According to Swedish law an individual is eligible for a full disability pension if his working ability is completely lost due to health reasons. If this rule were interpreted and applied in a strict sense and if true working ability were easy to observe, there would be no point in calculating economic incentives for continued work for an eligible person, since he couldn't work anyway. However, neither of these conditions apply. It is not plausible that 37% of 64 year old men have completely lost their working ability in a strict sense.[24] In the U.S., the corresponding disability rate among 64 year olds is 8%.[25] And even if the intention of the legislation had been that a full disability pension should not be granted unless the individual is completely unable to work, the economic incentives would be of interest because the evaluation of working ability is not perfectly reliable. For these reasons we begin the simulations by considering the case of an individual who is judged eligible for full disability pension and who considers working full time one additional year. However, in the base case calculations, we will also consider the national old-age pension. For both these base cases, we also include the STP pension scheme and income tax rules and housing allowance. The reason for choosing the STP scheme is that this occupational pension scheme covers the largest number of workers.

To reduce the complexity of the calculations, we applied the 1995 rules for all ages between 55 and 70. This implies that we disregard several minor changes of benefit rules and the tax reform in 1990-1991. The simulations show the incentives inherent in the 1995 rules and not those actually confronting a man born in 1930. But apart from taxes, the structure of the system has been rather constant.

Applying the rules to the earnings history of the hypothetical individual, it is fairly straightforward to calculate the monthly payments conditional on the date the hypothetical individual chooses to leave the labor market. But the main objective of the simulations is to calculate the social security wealth (SSW), and for this we need additional information. SSW is defined, for each point of time, as the net present expected value of future payments from the social security system (net of income taxes) less the present expected value of future contributions to the system. So there are three additional pieces of information we need: (1) the mortality rates of the hypothetical individual and his wife; (2) the individual's discount rate; and (3) the contributions to the system that the hypothetical individual is expected to pay. The formulae for computing SSW is provided in Appendix IV.

In the base case calculations, we assume that the hypothetical individual is married and that his wife is exactly three years younger, that is, born on January 1, 1933. We also assume that she never worked. As described in Part II, benefit levels differ between a married and a single pensioner. So when calculating the social security wealth for this couple, we must consider the probabilities for three different states for each year:

(1) Both spouses are alive; (2) The husband is alive, and the wife is dead; (3) The wife is alive, and the husband is dead. To do this, we used gender-specific life tables (provided by Statistics Sweden), which are conditional on the individual living to age 55. We assumed independence in mortality rates between the spouses. Note that we use the unconditional mortality risk beyond age 55. So there is always some mortality risk for all ages older than age 55. Our calculations thus give the economic incentives (implied by the SS system) that face the representative worker at age 54. But this is not appropriate if we are interested in the economic incentives for year-to-year behavior.

As Part II explains, the Swedish SS system is primarily financed through payroll taxes. In the simulations, we assume that the incidence of these payroll taxes are such that the entire cost is directly passed on to wages.[26] The basic pension is partly financed by income taxes. We deducted this part of the expenditures and payroll taxes for old-age, survivor's, and occupational pension in the calculation of net SSW. In the disability option case we also deduct payroll taxes for disability pension. In the base case calculations, we assume a discount rate of 3%.

Besides SSW, we present three different concepts from the simulations:

1. *The replacement rate*. This is defined as the pension benefit net of taxes as a share of the earnings net of taxes during the last year of work.
2. *The accrual rate.* This is defined as the percentage change in SSW compared to the previous year.

3. *The tax/subsidy rate.* This is defined as the absolute change in SSW from an additional year of work divided by net earnings during the year. If the absolute change in SSW is zero, the expected present value of the hypothetical individual's contributions to the system equals the increase in the present value of the amount he expects to receive from the system. Thus, the combined effect of the SS system, income taxes, occupational pensions, and housing allowances implies neither an implicit tax nor a subsidy on one year's additional work. But if the change in SSW is negative, that is, the individual's contribution to the SS system of one additional year of work exceeds the increase in expected benefits from the SS system, it could be interpreted as an implicit tax on one additional year of work induced by the systems we analyze. If the increase in what the individual expects to receive from the system from one year of additional work exceeds his contributions to the system, it could be interpreted as subsidy of additional work. By relating this amount to the individual's net earnings it could be interpreted as a tax (or subsidy) rate.

Before continuing, let us take a closer look at the various effects of additional work at the early retirement ages on the SSW in our calculations:

- The share of the payroll tax that constitutes the fee to the pension system will decrease the worker's SSW if he continues to work. This is not the case after age 65, because the employers need not pay payroll taxes for these workers.
- There is some risk that the worker will die for each year he decides to continue to work. This will lower his SSW.
- If the worker decides to continue to work beyond age 60, his monthly pension payments from the public pension scheme will increase by 0.5% for each month he

continues to work beyond age 60 until 65 and by 0.7% beyond age 65 until his 70th birthday. This actuarial adjustment will increase the individual's SSW. Note that the adjustment of the pension benefit does not occur if the individual receives disability insurance.

- An additional year of work means fewer years when pension benefits could be claimed, which decreases the SSW. However, as it is not possible to claim benefits before age 60 in the old-age pension scheme, this applies only for the disability insurance case before age 60.
- Because the *net* income streams constitute the SSW, income taxes on pension incomes will decrease the SSW. The housing allowance will also affect net income. If an individual decides to work one additional year, he may increase his annual pension income. But this might reduce his housing allowance, net income, and thereby his SSW.[27]
- The ATP and the STP benefits are related to the worker's previous earnings. The requirement for full ATP benefit is 30 years of earnings and for full STP pension, 28 years of earnings starting from 1965.[28] Furthermore, the STP scheme requires 3 years of earnings between 55 and 64 to be eligible for any benefit at all. Apart from these requirements, the ATP pension is determined by the average of the individual's best 15 years, and the STP pension is determined by the best three years between 55 and 59. So the levels of the pensions from both schemes could be affected depending on when the individual decides to leave the labor force.

Besides the base case simulations, we perform simulations, where we alter the assumptions of the second *base case*. In this context, we investigate the results assuming that our representative individual follows the earnings path of the 10th and

90th percentile earners for each year — rather than the median. We also use an earnings path for the median earner with decreasing earnings toward the end of the career. We alter the composition of the household of the hypothetical individual, that is, assume a single hypothetical individual. Finally, we investigate what happens if the hypothetical individual has an incomplete earning history starting at age 35.

For the simulations with these alternative assumptions we use the rules for the old-age pension rather than the disability pension. The reason for choosing the old-age pension scheme for the sensitivity analyses is that the actuarial adjustment in this scheme generally provides us with a richer set of results because it interacts with the income tax system and the housing allowances.

Base Case Results

Tables 2 and 3 show the *base case* results. Table 2 shows the results for a worker who is eligible for disability pension and Table 3 the results for one who is not. Each row in these tables gives the various results provided that the representative individual works until the age depicted in the first column, i.e. provided that he retires at the birthday of the following age. The second column gives the replacement rate. As it is not possible to start to receive payments from the national old-age pension scheme before age 60, the first five numbers in Table 3 are left out in the second column.

Comparing column three in Table 2 and 3, we see that there is a large difference in SSW depending on whether disability is an available option or not: the value of his

SSW on his 55 year birthday is SEK 2,020,280 (USD 283,349) with disability pension and SEK 1,168,183 (USD 163,841) without. This 73% difference in SSW represents the present value of the gain the representative worker can do if he decides to retire at age 55 and is eligible for disability insurance compared to if he is not.[29,30] By comparing column 4 in Table 2 and 3, it can also be seen that the change in SSW is equal in the two *base cases* if the representative worker decides to work his last year at age 64 or later. This is because the worker is not eligible for disability insurance after age 65 and the *base cases* are therefore equivalent beyond this age.

By studying the column of tax/subsidy rate in Table 2 and 3 several interesting properties of the two schemes can be noted. First, both systems provides a tax rather than a subsidy of additional work throughout the entire period considered. Second, the level of the tax rate is much higher over the entire period for the case where we treat the disability insurance as an old-age pension option. This result is not surprising since the disability insurance, unlike the old-age pension scheme, has no actuarial adjustment of the benefit if the individual begin to claim benefits early. This explains the difference in the tax rate between age 60 and 65. Furthermore, if an individual retires without disability pension before age 60 he can not start to claim benefits until age 60 anyway, i.e. if the individual decides to work one additional year before age 60 the number of pension payments he receives will not be affected, and the tax on additional work will be smaller than it would have been if this were not the case. This is not true for the disability insurance at any age. For each additional year the worker decides to work, he will have to give up benefits from the disability insurance.

For the disability pension case, the tax rate on one year of additional work at age 55 is above 100%. This means that the accrual in SSW is larger, in absolute value, than the net income of the representative worker. The tax rate on additional work remains in general very high, above 70%, until the representative worker reach age 65.

To facilitate the analysis of which parts of the institutional system that generate the variations in the tax/subsidy rates, and the results in general, we have added one table for each of the original tables, Table 2b and 3b. Column four in these tables gives the tax/subsidy rate where we have not considered the housing allowances. Column three shows the tax/subsidy rate where we have neither considered housing allowances nor income taxes. Column two gives the tax/subsidy rate, but without considering the STP pension scheme. The last column gives the total effect of all parts of the system. The results of the four columns are also shown in Figures 16 and 17.

The tax on additional work decreases somewhat for one year of additional work after the 57^{th} birthday for both base cases. Item 6 in the previous section explains this: The STP scheme requires at least three years of work between age 55 and 64, i.e. one additional year of work at age 57 leads to a life-long increase in the monthly pension payments by about 10%. This can be more carefully examined in Tables 2b and 3b as well as in Figures 16 and 17. Comparing the results where we took the STP benefit into account with those were we have not, we can see that the STP benefit creates a dramatic shift in the graph of the tax/subsidy rate. The graphs in Figures 16 and 17 also show that the incentive to stay in the labor force created by STP, to a large extent is counteracted by income taxes and the housing allowance: For the disability pension case, the tax rate increases from 16.9%, when we do not consider income taxes and housing allowances, to 27.5% when we do.

Turning to the case without disability pension, we can see that the accrual and tax/subsidy rates varies between three phases: between age 54 and 59, where there is a relatively low tax on continued work; between age 60 and 64, with a relatively high tax rate; and between age 65 and 69, with a somewhat lower tax rate compared to the preceding phase, but which is increasing within the phase. The pattern of these three phases can be explained by the six institutional factors that determine the SSW, which the previous section summarized. The fact that the number of monthly pension payments will not be affected by whether or not the individual chooses to work one extra year between 55 and 59 because neither the national nor the STP pension could be collected before age 60 (item 4 in the list in the previous section) explains why there is a difference between the tax/subsidy rate in this age group compared to if the individual chooses to work the last year between age 60 and 64. The difference in the tax/subsidy rate between age 60 to 64 compared to between 65 and 69 is attributed to the rule that the employers need not pay payroll taxes for employees beyond age 65.

Figure 17 also gives some background to why the old-age and survivor's pension systems provides a tax rather than a subsidy on additional work throughout the rest of the age interval considered. Following the graph, where we only consider the old-age national pension schemes, we can see that the system is about actuarially fair until age 60. After that, the tax/subsidy rate turns positive, i.e. turns to a tax on additional work, and increases. This result shows that the 0.5% reduction in the monthly pension payments for each month of early withdrawal before age 65 for the basic pension and the ATP, and the 0.7% increase in the payments from these pension schemes for each month of delayed withdrawal after age 65, is not enough to offset the pension payments he gives up and the contributions he pays by working additional years. This result depends on the choice of discount rate. Choosing a discount rate greater than 3% makes the decrease in SSW even greater, while choosing a smaller discount rate makes this decrease smaller. Also note that these results are, at least to some extent, dependent on the option to use unconditional mortality risk beyond age 55. A lower mortality risk gives a higher value to future pension payments and therefore a smaller increase in the implicit tax rate.

Figure 17 also shows the importance of income taxes and housing allowances. By comparing the graph, where we consider income taxes and housing allowances with the graph, where we have not, we can see that income taxes and rules for the housing allowance lead to a large part of the taxes on additional work below age 64.

Other Cases

Table 4a gives the same information as Table 3a for a worker who, instead of following the earnings of the median earner, followed those of the 10 percentile during his work life. We follow the same principles for the imputation of earnings beyond age 50 as we did in the *base case* calculations. Table 4b and Figure 18 give the corresponding information as Table 3b and Figure 17 for this earning history. A comparison of Tables 3 and 4 show that the implicit tax rate largely follows the same pattern as for the *base case* calculations. The main difference is that the implicit tax rate on additional work is higher in this case (being above 50% for those who decide to work one additional year at age 61). The high tax rate also continues for ages 65 and 66. By studying the difference between the graphs for the tax/subsidy rate, where we have and have not considered income taxes and housing allowances, we can conclude that this higher tax — compared to the *base case* — could be explained by high marginal effects of housing allowances and income taxes.

Table 5a, b and Figure 19 explore the results for a worker following the earnings of the 90th percentile. Although the pattern of the changes in the accrual rate over the period considered is similar to the *base case*, there are two interesting differences: First, the spike at age 57 remains when we also consider income taxes and housing allowances. A comparison of Figures 19 and 17 shows that this difference primarily is due to the fact that the representative individual in this case is not eligible for housing allowance. Second, the implicit tax on additional work is much higher for all ages beyond age 62 — compared to the *base case*. In ages 66-68 the difference is explained by the fact that the representative 90th percentile individual has a higher marginal tax rate compared to the base case. In ages 60-61, the median individual has a higher tax on additional work due to the reduction of the housing allowance.

Table 6 a, b and Figure 20 give the results where we assume the representative worker is single. We can see that here, the implicit tax rate is generally higher, especially if the individual chooses to work one additional year between age 57 and 60. This difference is due to the fact that one year of additional work in this age gives a higher survivor's pension from both the ATP and STP schemes. But additional work after age 60 will have no effect on the STP survivor's pension and have a very little effect on the ATP pension, this is why the difference between this case and the base case diminishes with age. If we had selected a larger age difference between the representative worker and his wife in the *base case* calculations, that is, if the wife would have belonged to a younger birth cohort, the difference in the accrual rate between the case with a single worker and the *base case* would have been smaller, because the transition rules for the survivor's pension would have reduced survivor's pension within the ATP.

In Table 7 and Figure 21, we evaluate the sensitivity to the imputation of incomes after age 50 in the synthetic earning history in our *base case* simulations by using the median earning history after age 50 as well, that is, the *actual synthetic* earning history. A comparison of the tax/subsidy rate for this case with the *base case* reveals two effects that work in different direction. Lower earnings between age 55 and 59 means (as pointed out in item 6) lower ATP, and more importantly for this particular phase in the work life, lower STP. But the contributions through the payroll tax is lower. The tables show that the implicit tax rate is somewhat lower when we use the actual synthetic earnings history compared to the *base case*, although the difference is very small. This means that the second effect dominates with a small margin.

Table 8 and Figure 22 show what happens if we decrease the number of years in the labor force of the representative individual. We now assume that he starts to work at age 35, that is, meets the requirement for full ATP of 30-year contributions to this pension scheme at age 64 compared to the base case, where the worker meets the requirement at age 59. Thus, the only phase were we expect the incentives of the social security system to differ between this case and the *base case*, is between age 60 and 64. This is also exactly what we see if we compare Tables 3 and 8: The implicit tax rate on additional years of work is substantially higher between age 60 and 64. For the rest of the period, it is more or less the same.

Part IV: Conclusions

The simulations of how the social security wealth is affected of when a representative worker decides to retire carried out in Part III reveal huge differences in the economic incentives for leaving the labor force provided by the disability insurance and the old-age pension: The implicit tax on additional work generated by the disability insurance is above 100% of the representative worker's net income. Still, the overview of the rates of labor force participation of Part I, shows that labor force participation, despite these economic incentives, is very high until about age 58 and the hazard rate out of labor force is moderate before this age. This observation supports the findings in previous research[31] that the rate of people receiving disability insurance is determined by access to this insurance, i.e. the strictness in the law of eligibility and the application of this law in the social insurance administration, rather than by individual economic incentives. Further research using micro-data is, however, required to finally resolve this issue.

On the other hand, the economic incentives generated by the old-age pension scheme seems to have an impact on retirement behavior. A striking observation that can be made from Part I is that labor force participation in the 55-59 age group is very high compared to the 60-64 age group and the 65 years old and older age group. The historical trends in labor force participation for men also suggest that the decrease in labor force participation in this age group is smaller than in the 60-64 age group. It is unlikely that this difference between these age groups can be explained entirely by biology. In this context, it is interesting to note that the simulations in Part III indicate that the pension system, especially the occupational pension scheme for blue-collar workers, provides stronger economic incentives for not leaving the labor force up to the age of 57 than after this age. The explanations for the very low labor force participation of persons age 65 and older are dominated by the rules for mandatory retirement at age 65.

Another interesting observation, which can be made from the simulations in Part III, is the importance of income taxes and housing allowances. When we only consider the rules for the national pension system in the simulations, the system is close to being actuarially fair regarding when the individual decides to exit from the labor market and start to claim benefits. But when we also consider the effect of income taxes and housing allowances, there is an implicit tax on continued work and the economic incentives provided by the STP occupational pension scheme is largely counteracted. The political objective of the high progressivity of the income tax, in particular for old-age pensioners, and housing allowances is to provide an equal income distribution among the group of old-age pensioners. Obviously, this objective of equity in the distribution of economic outcome conflicts with the objective of equity inherent in actuarial fairness of the pension system.

Appendix I: Data Sources

The statistical source of the figures about labor force participation is the *Swedish Labor Force Survey*. This survey has been conducted since 1961 and comparable figures are available since 1963. From 1963 until 1969, the survey was done four times every year, and the sample size was 12,000 individuals (that is,. 48,000 each year). Since 1970, the sample size is about 20,000 and the survey is done every month. We used annual averages in the figures, except for the 65-74 age group between 1986 and 1995, where we used the average for the last three month every year, because this age group is only included in the population of these surveys. The rate of non-response is about 10% in each survey.

Four different measures of attachment to the labor market are reported in the figures: Labor force participation, employed, full-time employed, and working. Individuals who did some kind of paid work for at least one hour in the week of the survey are defined as *employed*. Those who actively search for a job or are expecting to start a job within four weeks are defined as *unemployed*. The *employed* and *unemployed* constitute the labor force. Students and participants in labor-market programs are not considered as members of the labor force. Individuals who regularly work 35 hours per week are defined as *full-time employed*. Employed persons who were not absent all days in the week preceding the time of the survey are defined as *working*.

Statistics Sweden provided the *Household Income Survey 1994*. The data from this survey consists of three parts; information from:

1. Interviews on, for example, employment, housing, and household composition.
2. Tax returns from household members on different components of household income.
3. Administrative records on taxes and transfers from the government.

The rate of non-response is about 11%. The sample size of this survey is about 10,000 households. The total number of observations in single year age groups varies between about 100 and 250. This means that some of the estimates in Figures 11-13 are based on very few observations.

Appendix II: Review of Previous Empirical Studies on SS and Retirement

The effect of the Swedish social security on labor force participation were analyzed in a few empirical studies. The most general is Hansson-Brusewitz (1992), who estimates a life cycle and an atemporal labor-supply model on cross-section data for men aged between 55 and 70. Modeling the dichotomous choice of labor force participation jointly with the choice with hours of labor supply, enables Hansson-Brusewitz to study the effect of the introduction of the partial pension scheme on desired retirement age and desired number of hours of work for those who are not retired. Using the life-cycle model, he finds that this scheme actually has a positive effect on total hours of work. He also simulates the effect of other, hypothetical, reforms in the Swedish income tax and social security systems. Again using the life-cycle model, he finds that a 10 percentage point decrease in the marginal income tax rates will increase the labor supply of elderly men by about 2.5 percentage points. A simulation of the effects of replacing current rules for calculating the benefits in the ATP scheme by a pension benefit that is equal to 60% of lifetime earnings shows a small positive effect on desired labor supply for those who have not retired, although a small negative effect on the desired retirement age.

Sundén (1994) estimates a conditional/multinomial logit model and considers the individual choice among four different options: (1) Fully retire at age 60; (2) Retire with disability insurance at age 60 (3) Partially retire at age 60; (4) Do not retire at all before 65. She estimates this model on cross-sectional data for 1974 and 1981, that is, before and after the introduction of the partial retirement scheme in 1976. She finds that the introduction of the partial pension attributed to a small decrease in the number of individuals receiving benefits from the disability insurance. By decomposing the overall change in retirement behavior between 1974 and 1981 in changes attributed to estimated coefficients (preferences) and individual characteristics (among these changes in individual pension wealth), she concludes that the largest share of the change in retirement behavior seen between 1974 and 1981 can be attributed to changes in preferences. Changes in rules, reflected in the variables of individual characteristics, have a very small effect.

By studying the rules for benefits from the disability insurance and the social security system for different pathways to early retirement, Kruse and Söderström (1989) find that primarily, the disability insurance and the partial retirement scheme provide large subsidies for early retirement and part-time work among elderly. The authors suggest that the decreased labor supply among elderly and the increased dependency ratio in the social security system to a large extent can be attributed to these generous benefits.

Wadensjö (1996) takes a closer look at how the legislation for the disability insurance works in practice. He shows that fluctuations in the number of new disability pensions between 1972 and 1991 can largely be explained by variations in the unemployment level (with a lag of about two years). Wadensjö describes a common pathway to early exiting from the Swedish labor market: A company wants to reduce its personnel. In general, the older workers are best protected by seniority rules in the Swedish legislation. But the company wants to retain at least some of their young workers. A standard procedure is to then investigate if any of the old workers are eligible for disability pension. This is often done by the medical doctor of the company. Including extra severance payments, the compensation level for the dismissed older workers, who are eligible for disability pension, could be more than 100% of foregone earnings. The local unions are then often willing to deviate from the seniority rule. The implementation of new, stricter rules for eligibility of disability pension has made it more difficult for the firms to use this option for reducing personnel. But a market for insurance (guarantee pensions), offered by private insurance companies, which retains the same early labor market exit option for older workers, has been introduced.

Erikssen and Palmer (1996) examine the concept of disability as it is employed in Sweden and find that the increasing rate of disability since 1960 is largely a result of changes in other factors than health, and conclude that labor market factors are predominantly responsible for the trend.

Appendix III: Imputations of income

For the 10^{th} percentile income earners, we had to impute incomes for ages 30 to 47. For ages 48 to 59, the observed difference between true income and income measured by pension points is about 10% on average. We assumed that the corresponding difference decreases from 20% at age 30 to 10% at age 47, which reflects a larger share of earners with income below 1 BA at lower ages. For the 90^{th} percentile income earner, we can only observe true income in ages below 36 and beyond 47 because income is above the social security ceiling between these ages. We assumed that income increases linearly between age 35 and 48.

Appendix IV: Formulae for computing SSW

a_0	worker's age at evaluation of *SSW* (set to 55 in the base case calculations)
r	worker's age of retirement
maxage	maximum potential age
$p(a \| a_0)$	probability of survival of worker at age a conditional on survival at age a_0.
$q(a \| a_0)$	probability survival of the spouse at the workers age a conditional on survival of the spouse at workers age a_0.
$BM(a, r)$	amount of worker's pension benefit at age a if he retires at age r and is married at age a.
$BS(a, r)$	amount of worker's pension benefit at age a if the he retires at age r and is not married at age a.
$S(a, r)$	amount of survivor's benefit the year when the worker would have been of age a if he retires at age r.
$C(a)$	amount of the worker's contribution to the social security at age a.
ρ	discount rate (set to 3% in the base case calculations)

$$PB(a_0, r) = \sum_{a=r}^{a=\max age} \left[\frac{p(a|a_0)q(a|a_0)BM(a,r)}{(1+\rho)^{a-a_0}} + \frac{p(a|a_0)(1-q(a|a_0))BS(a,r)}{(1+\rho)^{a-a_0}} + \frac{(1-p(a|a_0))q(a|a_0)S(a,r)}{(1+\rho)^{a-a_0}} \right]$$

$$SSC(a_0, r) = \frac{\sum_{a=a_0}^{a=r-1} p(a|a_0)C(a,)}{(1+\rho)^{a-a_0}}$$

$$SSW(a_0, r) = PB(a_0, r) - SSC(a_0, r)$$

References

Aronsson, Thomas and James R. Walker. 1997. "The Effects of Sweden's Welfare State on Labor Supply Incentives", in R. B. Freeman, B. Swedenborg and R. Topel, eds., The Welfare State in Transition. Chicago: Chicago University Press.

Edin, P.-A. and Bertil Holmlund. 1995. "The Swedish Wage Structure: The Rise and Fall of Solidarity Wage Policy?," in R. B. Freeman and L. F. Katz, eds., Differences and Changes in Wage Structures. Chicago: Chicago University Press, 307-344.

Elmér, Åke. 1960. "Folkpensioneringen i Sverige" (with a summary in English), C.W.K. Glerups Förlag: Lund.

Eriksen, Tor and Edward Palmer. 1997. "The Concept of Work Capacity", in P. R. De Jong and T. R. Marmor, eds., Social Policy and the Labour Market. Andershot, England: Ashgate Press.

Hansson-Bruzewitz, Urban. 1992. "Labor Supply of Elderly Men: Do Taxes and Transfers Matter?". Ph D thesis Department of Economics, University of Uppsala.

Hedström, Peter. 1987. "Disability Pension: Welfare or Misfortune?" International Journal of Sociology, 16, no 3-4.

Kangas, Olli and Joakim Palme. 1989. “Public and Private Pensions: The Scandinavian Countries in a Comparative Perspective”, Working Paper No 3, Institute for Social Research, Stockholm University.

Kruse, Agneta and Lars Söderström. 1989. “Early Retirement in Sweden” in W. Schmähl (ed.) Redefining the Process of Retirement, Berlin Heidelberg: Springer-Verlag.

National Social Insurance Board (Riksförsäkringsverket). 1993. “ATP och Dess Finansiering i det Medel- och Långsiktiga Perspektivet”, RFV Anser 1993:1.

National Social Insurance Board (Riksförsäkringsverket). 1996. “Nybeviljade Förtidspensioner 1971-1995”, Statistikinformation Is-I 1996:1.

Palme, Joakim. 1990 “Pension Rights in Welfare Capitalism: The Development of Old-Age Pension in 18 OECD Countries 1930 to 1985” . PhD thesis, Department of Sociology, Stockholm University.

Palmer, Edward and Mårten Palme. 1989. “A Macroeconomic Analysis of Employer-Contribution Financed Social Security" in B.A. Gustafsson och N.A. Klevmarken (red.) The Political Economy of Social Security, Amsterdam: North-Holland.

Sundén, Annika. 1994 "Early Retirement in the Swedish Pension System", PhD thesis, Department of Economics, Cornell University: Ithaca, NY.

U.S. Department of Labor. 1996. "International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing 1975-1995: Supplementary Tables for BLS Report 909", Bureau of Labor Statistics: Washington D.C.

Wadensjö, Eskil. 1985. "Disability Pensioning of Older Workers in Sweden. A Comparison of Studies Based on Time-series and Cross-section Data", Meddelande 15/1985, Swedish Institute for Social Research, Stockholm University.

Wadensjö, Eskil. 1989. "Varför har vi normal pensionsålder?", in Eskil Wadensjö, Åke Dahlberg and Bertil Holmlund (eds.), Vingarnas Trygghet. Arbetsmarknad, ekonomi och politik. Lund: Dialogos.

Wadensjö, Eskil. 1996. "Early Exit from the Swedish Labour Market," in E. Wadensjö, ed., The Nordic Labour Markets in the 1990's. Amsterdam: Elsevier Science, pp. 93-128.

Table 1. Social insurance expenditures in Sweden, 1994.

	Expenditures in MSEK	Percentage share of total social insurance expenditures	Percentage share of GDP
Pension Insurance	**195,814**	**64.0**	**13.8**
National Basic Pension	*82,933*	*27.1*	*5.8*
National Basic Old-age Pension	52,602	17.2	3.7
National Basic Disability Pension	14,156	4.6	1.0
National Supplementary Pension	*108,371*	*35.4*	*7.6*
Nation Supplementary Old-age Pension	75,240	24.6	5.3
Nation Supplementary Disability Pension	20,665	6.8	1.5
Part-time Pension	*2,564*	*0.8*	*0.2*
Sickness- and Parental Insurance	**53,800**	**17.6**	**3.8**
Work injuries insurance	**7,999**	**2.6**	**0.6**
Allowances	**32,204**	**10.5**	**2.3**
Other	**15,920**	**5.2**	**1.1**
Total sum	**305,737**	**100**	**21.5**

Table 2a: Incentive Calculations - Base Case with Disability Pension Option

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	0.842	2020280			
55	0.841	1864510	-155770	-0.077	1.171
56	0.814	1717957	-146553	-0.079	1.058
57	0.805	1674099	-43858	-0.026	0.309
58	0.810	1536893	-137205	-0.082	0.971
59	0.792	1409862	-127032	-0.083	0.870
60	**0.789**	**1281354**	**-128507**	**-0.091**	**0.870**
61	0.810	1147275	-134079	-0.105	0.939
62	0.798	1022147	-125129	-0.109	0.860
63	0.808	900608	-121539	-0.119	0.850
64	0.729	785497	-115111	-0.128	0.799
65	0.785	780345	-5152	-0.007	0.036
66	0.841	768133	-12212	-0.016	0.085
67	0.897	749632	-18501	-0.024	0.128
68	0.953	725280	-24353	-0.032	0.169
69	1.011	697510	-27769	-0.038	0.193

Table 2b: Tax/subsidy rate. Base Case with Disability Pension Option

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	1.250	1.502	1.170	1.171
56	1.166	1.341	1.056	1.058
57	0.977	0.204	0.295	0.309
58	1.020	1.228	0.967	0.971
59	0.922	1.085	0.863	0.870
60	**0.893**	**1.095**	**0.865**	**0.870**
61	0.987	1.214	0.941	0.939
62	0.918	1.104	0.861	0.860
63	0.904	1.097	0.852	0.850
64	0.851	1.028	0.800	0.799
65	-0.006	-0.007	0.036	0.036
66	0.062	0.070	0.085	0.085
67	0.123	0.139	0.128	0.128
68	0.178	0.202	0.169	0.169
69	0.227	0.257	0.193	0.193

Table 3a: Base Case Incentive Calculations

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		1168183			
55		1137465	-30717	-0.026	0.231
56		1106826	-30640	-0.027	0.221
57		1098951	-7874	-0.007	0.056
58		1077393	-21558	-0.020	0.153
59	0.459	1056086	-21307	-0.020	0.146
60	**0.485**	**1004338**	**-51749**	**-0.049**	**0.350**
61	0.545	953215	-51123	-0.051	0.358
62	0.572	916429	-36786	-0.039	0.253
63	0.620	874964	-41465	-0.045	0.290
64	0.729	829879	-45086	-0.052	0.313
65	0.785	824727	-5152	-0.006	0.036
66	0.841	812515	-12212	-0.015	0.085
67	0.897	794014	-18501	-0.023	0.128
68	0.953	769662	-24353	-0.031	0.169
69	1.011	741892	-27769	-0.036	0.193

Table 3b: Tax/subsidy rate. Base Case

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	-0.006	0.022	0.147	0.231
56	-0.017	0.010	0.137	0.221
57	-0.035	-0.984	-0.421	0.056
58	-0.044	-0.044	0.056	0.153
59	-0.066	-0.064	0.046	0.146
60	**0.055**	**0.079**	**0.195**	**0.350**
61	0.130	0.153	0.214	0.358
62	0.173	0.194	0.249	0.253
63	0.233	0.254	0.287	0.290
64	0.280	0.300	0.311	0.313
65	-0.006	-0.007	0.036	0.036
66	0.062	0.070	0.085	0.085
67	0.123	0.139	0.128	0.128
68	0.178	0.202	0.169	0.169
69	0.227	0.257	0.193	0.193

Table 4a: Incentive Calculations - 10th Percentile

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		1103805			
55		1080498	-23307	-0.021	0.222
56		1057808	-22691	-0.021	0.210
57		1044762	-13046	-0.012	0.119
58		1024217	-20545	-0.020	0.188
59	0.513	1003353	-20864	-0.020	0.186
60	**0.536**	**949159**	**-54194**	**-0.054**	**0.479**
61	0.577	893650	-55510	-0.058	0.503
62	0.597	846566	-47083	-0.053	0.421
63	0.632	799586	-46980	-0.055	0.425
64	0.797	749420	-50167	-0.063	0.452
65	0.825	718450	-30969	-0.041	0.278
66	0.856	685647	-32803	-0.046	0.294
67	0.910	668093	-17555	-0.026	0.158
68	0.965	648227	-19866	-0.030	0.178
69	1.021	624777	-23450	-0.036	0.210

Table 4b: Tax/subsidy rate. 10th Percentile

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	-0.020	0.008	0.136	0.222
56	-0.041	-0.014	0.120	0.210
57	-0.053	-0.925	-0.331	0.119
58	-0.065	-0.059	0.088	0.188
59	-0.041	-0.034	0.097	0.186
60	**0.064**	**0.087**	**0.339**	**0.479**
61	0.132	0.154	0.363	0.503
62	0.177	0.199	0.279	0.421
63	0.236	0.256	0.285	0.425
64	0.280	0.299	0.312	0.452
65	-0.007	-0.007	0.047	0.278
66	0.061	0.069	0.097	0.294
67	0.123	0.138	0.138	0.158
68	0.179	0.200	0.178	0.178
69	0.228	0.255	0.210	0.210

Table 5a: Incentive Calculations - 90th Percentile

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		1284308			
55		1233428	-50881	-0.040	0.246
56		1181194	-52234	-0.042	0.245
57		1237965	56771	0.048	-0.262
58		1199582	-38382	-0.031	0.178
59	0.389	1161857	-37725	-0.031	0.171
60	**0.415**	**1102060**	**-59797**	**-0.051**	**0.268**
61	0.455	1039183	-62877	-0.057	0.289
62	0.480	970742	-68441	-0.066	0.310
63	0.516	899324	-71419	-0.074	0.328
64	0.613	824144	-75180	-0.084	0.343
65	0.660	820681	-3463	-0.004	0.016
66	0.699	791431	-29250	-0.036	0.133
67	0.731	746173	-45258	-0.057	0.206
68	0.763	697441	-48732	-0.065	0.222
69	0.795	645793	-51648	-0.074	0.235

Table 5b: Tax/subsidy rate. 90th Percentile

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	0.071	0.104	0.171	0.246
56	0.070	0.102	0.173	0.245
57	0.064	-0.831	-0.441	-0.262
58	0.052	0.082	0.157	0.178
59	0.049	0.078	0.151	0.171
60	**0.177**	**0.205**	**0.268**	**0.268**
61	0.217	0.244	0.289	0.289
62	0.259	0.284	0.310	0.310
63	0.294	0.319	0.328	0.328
64	0.327	0.350	0.343	0.343
65	-0.005	-0.006	0.016	0.016
66	0.052	0.060	0.133	0.133
67	0.105	0.119	0.206	0.206
68	0.151	0.173	0.222	0.222
69	0.193	0.220	0.235	0.235

Table 6a: Incentive Calculations - Single Worker

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		953956			
55		920488	-33468	-0.035	0.252
56		886960	-33528	-0.036	0.242
57		866485	-20475	-0.023	0.144
58		835941	-30544	-0.035	0.216
59	0.487	807084	-28857	-0.035	0.198
60	**0.510**	**750163**	**-56921**	**-0.071**	**0.386**
61	0.556	692330	-57833	-0.077	0.405
62	0.584	654754	-37577	-0.054	0.258
63	0.633	612872	-41882	-0.064	0.293
64	0.743	566912	-45960	-0.075	0.319
65	0.800	561656	-5256	-0.009	0.036
66	0.857	549014	-12642	-0.023	0.088
67	0.914	530163	-18852	-0.034	0.131
68	0.971	505350	-24813	-0.047	0.172
69	1.031	477573	-27777	-0.055	0.193

Table 6b: Tax/subsidy rate. Single Worker

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	0.053	0.081	0.192	0.252
56	0.042	0.070	0.182	0.242
57	0.026	-0.923	-0.308	0.144
58	0.017	0.017	0.144	0.216
59	-0.002	0.000	0.124	0.198
60	**0.068**	**0.092**	**0.236**	**0.386**
61	0.139	0.162	0.265	0.405
62	0.185	0.206	0.258	0.258
63	0.244	0.264	0.293	0.293
64	0.290	0.310	0.319	0.319
65	-0.005	-0.005	0.036	0.036
66	0.065	0.073	0.088	0.088
67	0.127	0.143	0.131	0.131
68	0.184	0.207	0.172	0.172
69	0.233	0.263	0.193	0.193

Table 7a: Incentive Calculations - Diminishing Earnings Profile

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		1164845			
55		1135751	-29094	-0.025	0.221
56		1106538	-29214	-0.026	0.219
57		1096397	-10141	-0.009	0.074
58		1074918	-21479	-0.020	0.155
59	0.475	1054706	-20212	-0.019	0.144
60	**0.498**	**1002527**	**-52179**	**-0.049**	**0.368**
61	0.554	949421	-53107	-0.053	0.385
62	0.628	905100	-44320	-0.047	0.341
63	0.705	865587	-39513	-0.044	0.322
64	0.870	824399	-41188	-0.048	0.351
65	0.982	819128	-5271	-0.006	0.047
66	1.106	807074	-12054	-0.015	0.113
67	1.242	788860	-18213	-0.023	0.180
68	1.394	765220	-23641	-0.030	0.247
69	1.565	737077	-28142	-0.037	0.312

Table 7b: Tax/subsidy rate. Diminishing Earnings Profile

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	-0.046	-0.017	0.126	0.221
56	-0.017	0.010	0.136	0.219
57	-0.036	-0.979	-0.401	0.074
58	-0.042	-0.039	0.060	0.155
59	-0.056	-0.053	0.048	0.144
60	**0.072**	**0.096**	**0.216**	**0.368**
61	0.173	0.195	0.244	0.385
62	0.221	0.243	0.285	0.341
63	0.275	0.296	0.322	0.322
64	0.329	0.349	0.351	0.351
65	-0.008	-0.009	0.047	0.047
66	0.081	0.091	0.113	0.113
67	0.170	0.192	0.180	0.180
68	0.260	0.294	0.247	0.247
69	0.352	0.397	0.312	0.312

Table 8a: Incentive Calculations - Incomplete Earnings History

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		1126679			
55		1095855	-30824	-0.027	0.232
56		1065278	-30577	-0.028	0.221
57		1047490	-17788	-0.017	0.125
58		1019839	-27652	-0.026	0.196
59	0.422	992748	-27090	-0.027	0.185
60	**0.449**	**954794**	**-37954**	**-0.038**	**0.257**
61	0.503	912882	-41911	-0.044	0.294
62	0.546	872770	-40113	-0.044	0.276
63	0.606	853506	-19264	-0.022	0.135
64	0.729	829879	-23627	-0.028	0.164
65	0.785	824727	-5152	-0.006	0.036
66	0.841	812515	-12212	-0.015	0.085
67	0.897	794014	-18501	-0.023	0.128
68	0.953	769662	-24353	-0.031	0.169
69	1.011	741892	-27769	-0.036	0.193

Table 8b: Tax/subsidy rate. Incomplete Earnings History

Last Age of Work	Gross Public Pension	Gross Public Pension +STP	Net Public Pension +STP	Net Public Pension +STP+BTP
55	-0.003	0.025	0.149	0.232
56	-0.012	0.015	0.138	0.221
57	-0.028	-0.977	-0.349	0.125
58	-0.038	-0.038	0.101	0.196
59	-0.057	-0.054	0.089	0.185
60	**-0.166**	**-0.142**	**0.050**	**0.257**
61	-0.116	-0.093	0.074	0.294
62	-0.076	-0.054	0.072	0.276
63	-0.024	-0.003	0.110	0.135
64	0.026	0.046	0.140	0.164
65	-0.006	-0.007	0.036	0.036
66	0.062	0.070	0.085	0.085
67	0.123	0.139	0.128	0.128
68	0.178	0.202	0.169	0.169
69	0.227	0.257	0.193	0.193

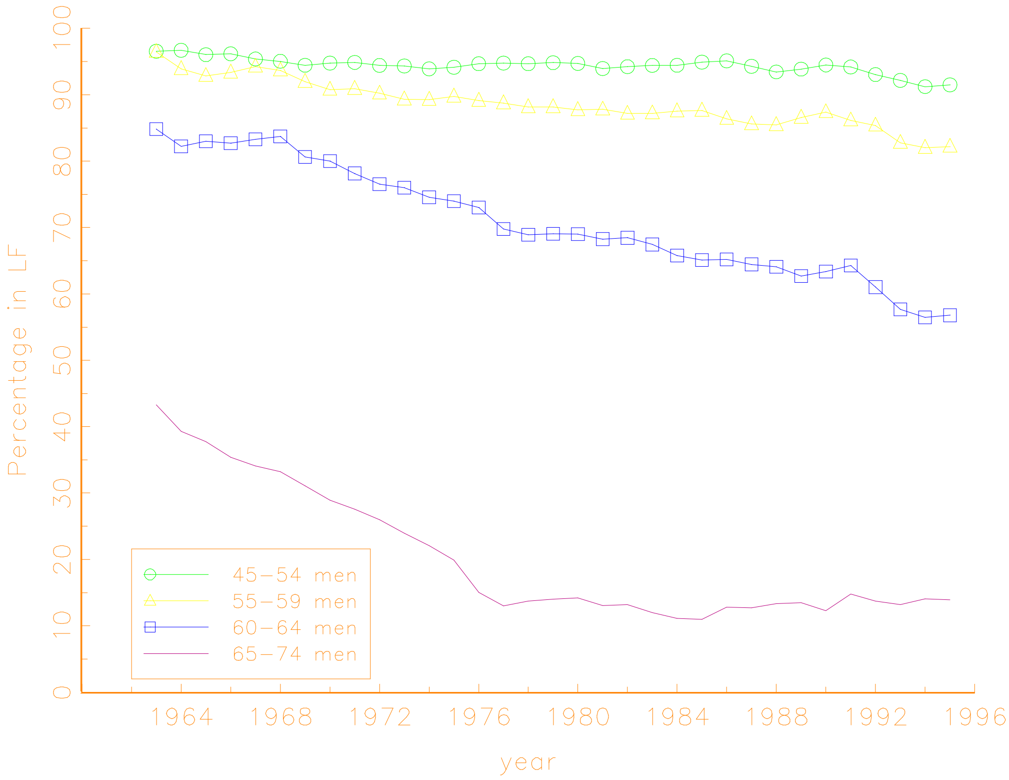


Figure 1: Historical Trends in Labor Force Participation Rates of Older Men.

Source: Different issues of the *Swedish Labor Force Survey*, provided by Statistics Sweden. Adjusted to be comparable between different points of time.

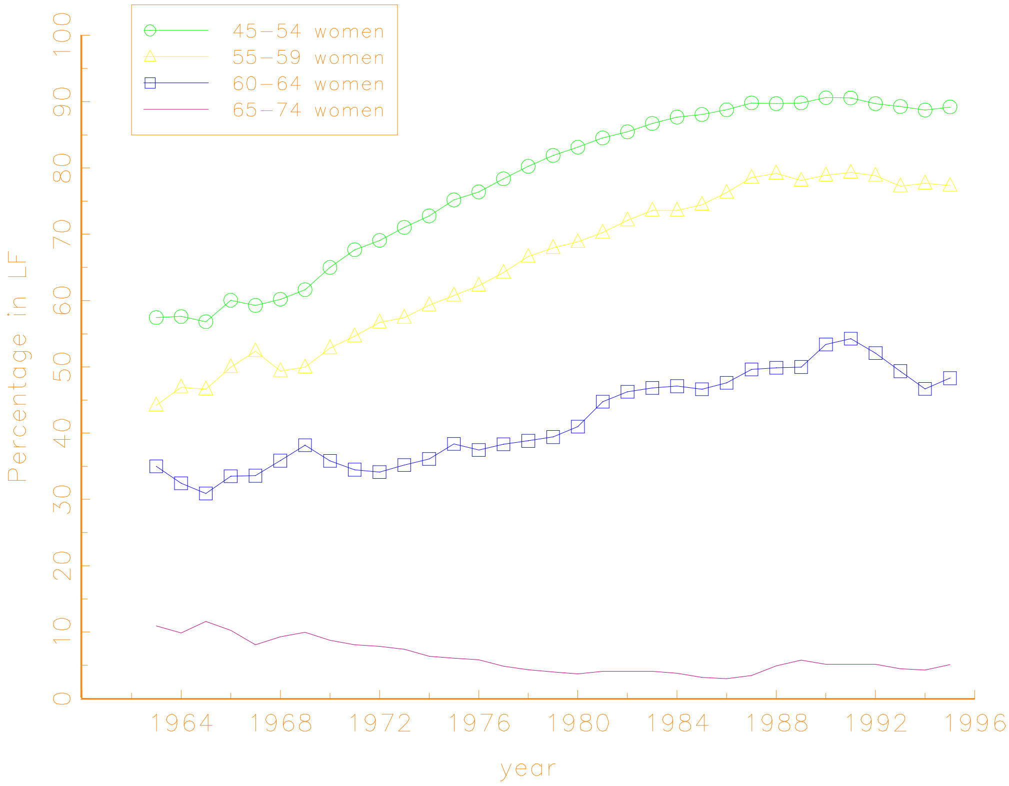


Figure 2: Historical Trends in Labor Force Participation Rates of Older Women.

Source: Different issues of the *Swedish Labor Force Survey*, provided by Statistics Sweden. Adjusted to be comparable between different points of time.

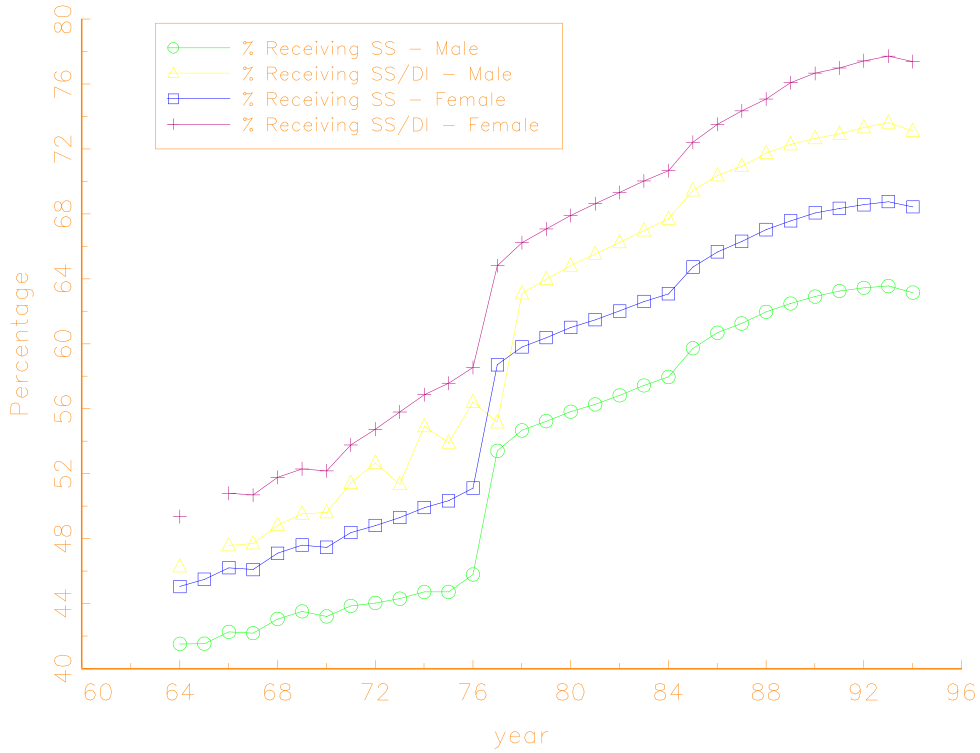


Figure 3: Share of Swedish Men and Women Age 55 and Over Who Receive Disability Pension and Old-age Pension.

Source: Different issues of *Allmän Försäkring,* National Social Insurance Board: Stockholm.

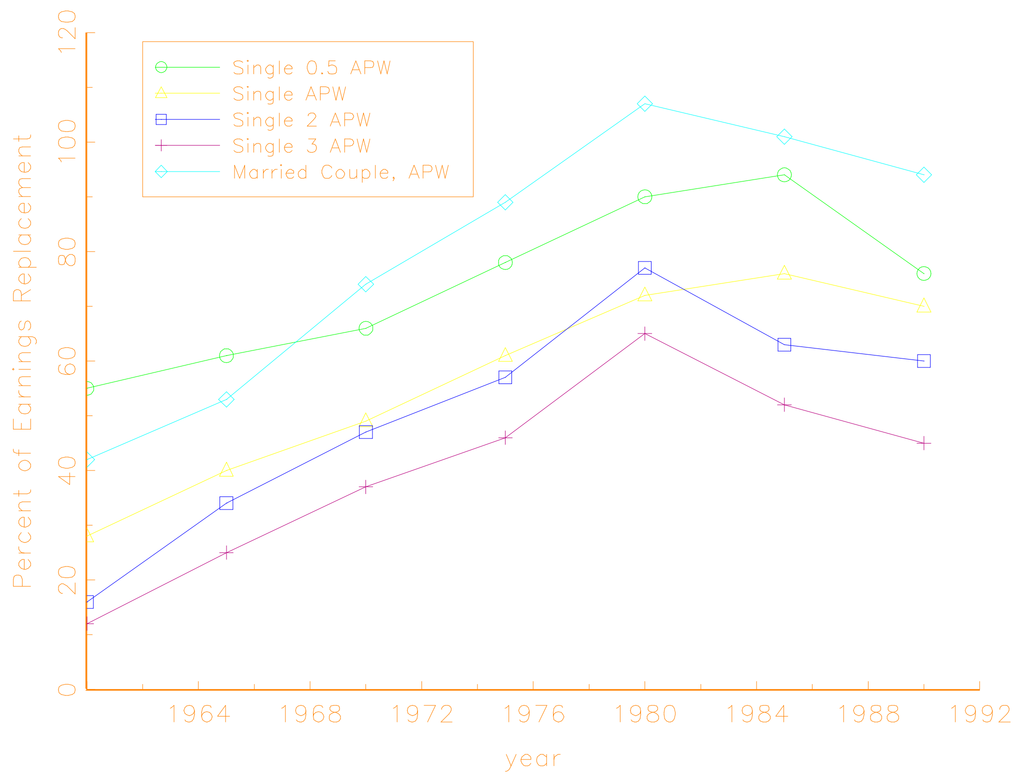


Figure 4: Replacement Rates of Old Age Pension from the National Pension System for a Production Worker with Average Wage.

Source: J. Palme (1990).

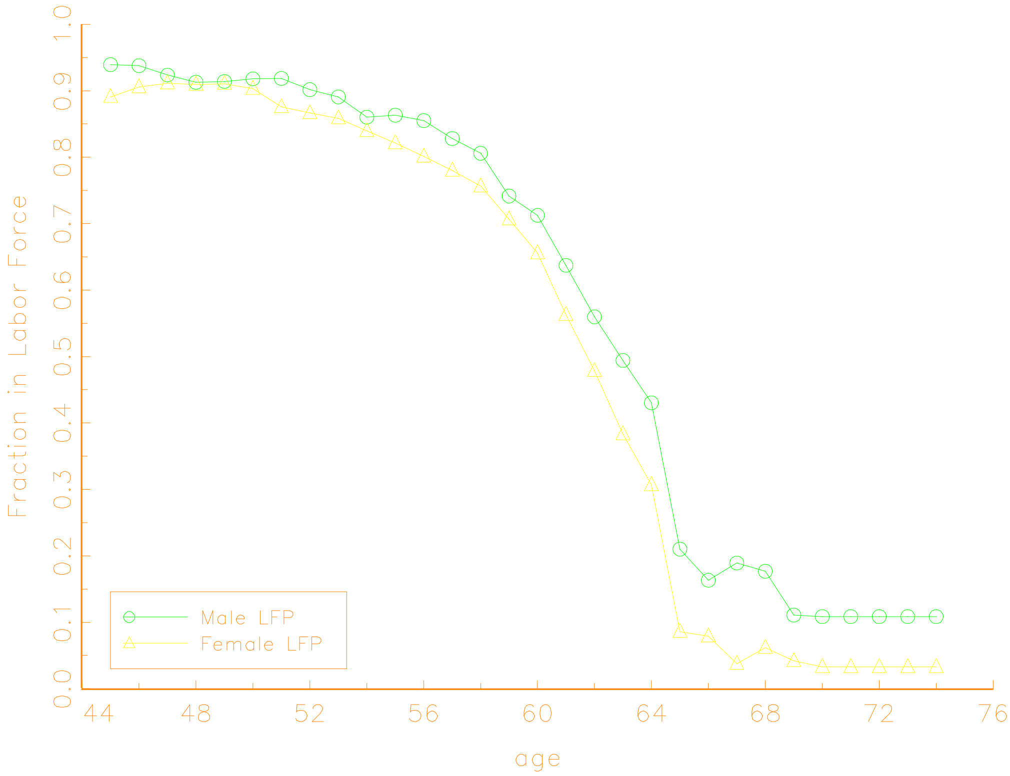


Figure 5: Participation Rates by Age and Sex.

Source: Own Calculations on the *Swedish Labor Force Survey* 1994 and 1995, provided by Statistics Sweden, combined.

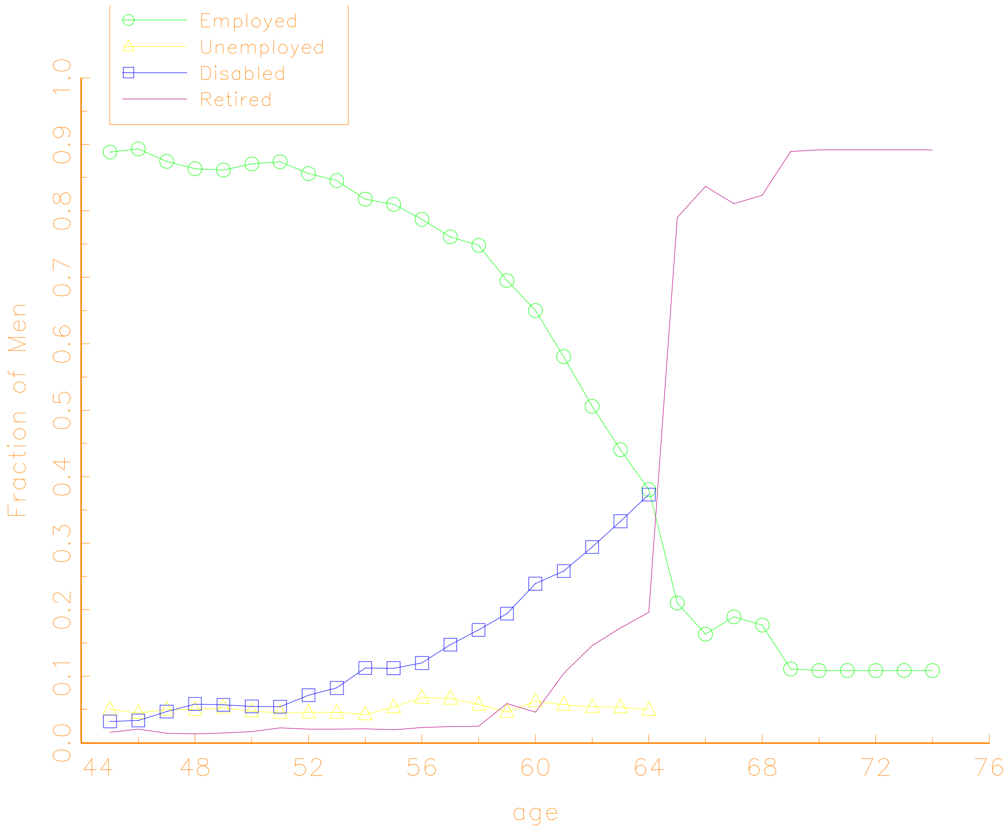


Figure 6: Distribution of Activities of Older Men by Age.

Source: Own Calculations on the *Swedish Labor Force Survey* 1994 and 1995, provided by Statistics Sweden, combined. For the graph of the share of individuals receiving disability pension we have used statistics from the entire Swedish population published in *Allmän Försäkring 1995*, National Social Insurance Board: Stockholm.

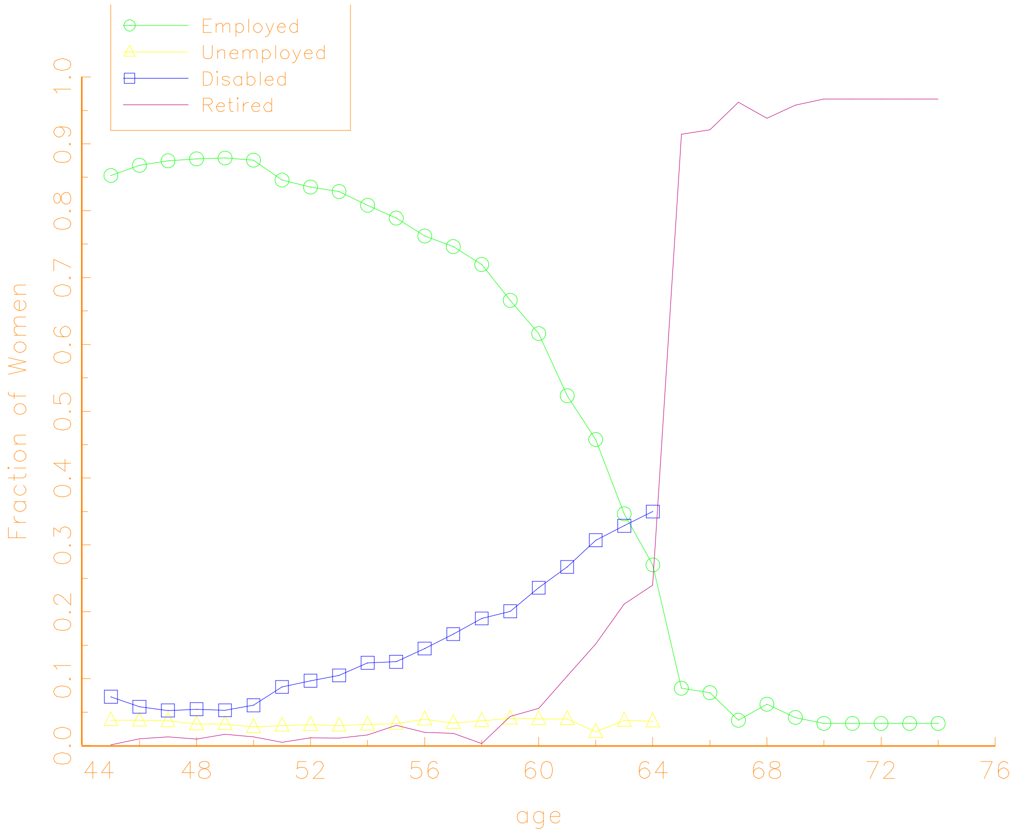


Figure 7: Distribution of Activities of Older Women by Age.

Source: Own Calculations on the *Swedish Labor Force Survey* 1994 and 1995, provided by Statistics Sweden, combined. For the graph of the share of individuals receiving disability pension we have used statistics from the entire Swedish population published in *Allmän Försäkring 1995*, National Social Insurance Board: Stockholm.

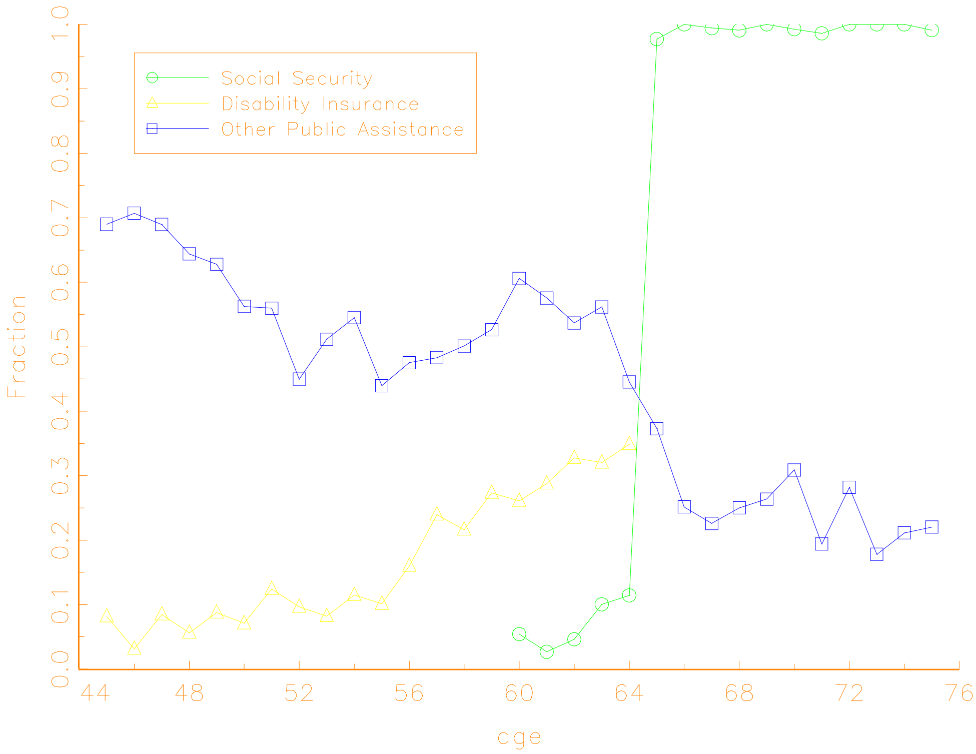


Figure 8: Share of Older Men who Receives Different Kinds of Support from Public Sector by Age.

Source: Own calculations on data from the *Household Income Survey 1994*, provided by Statistics Sweden.

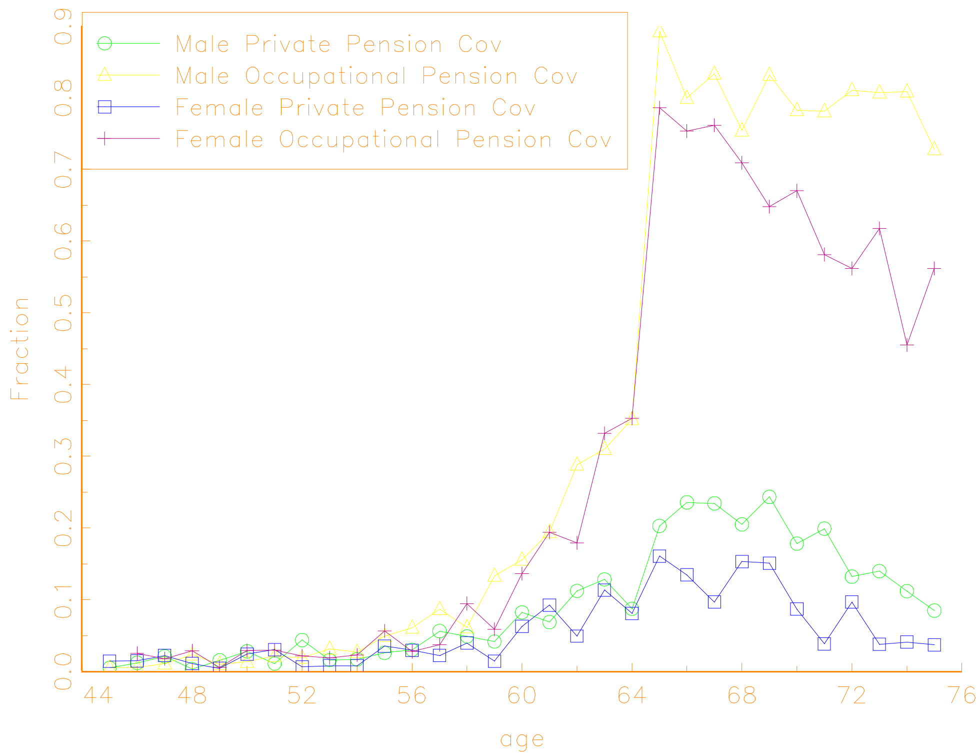


Figure 9: Share of All Swedish Men and Women Who Receive Occupational and Private Pension by Age.

Source: Own calculations on data from the *Household Income Survey 1994*, provided by Statistics Sweden.

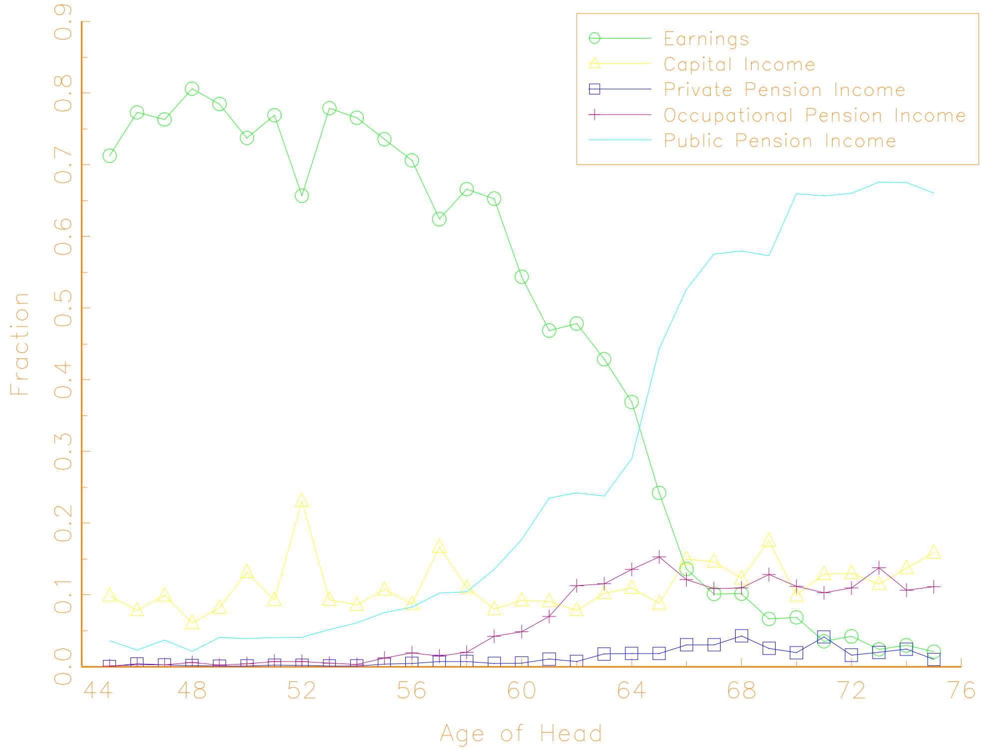


Figure 10: Average Shares of Different Sources of Family Income by Age of Family Head.

Source: Own calculations on data from the *Household Income Survey 1994*, provided by Statistics Sweden.

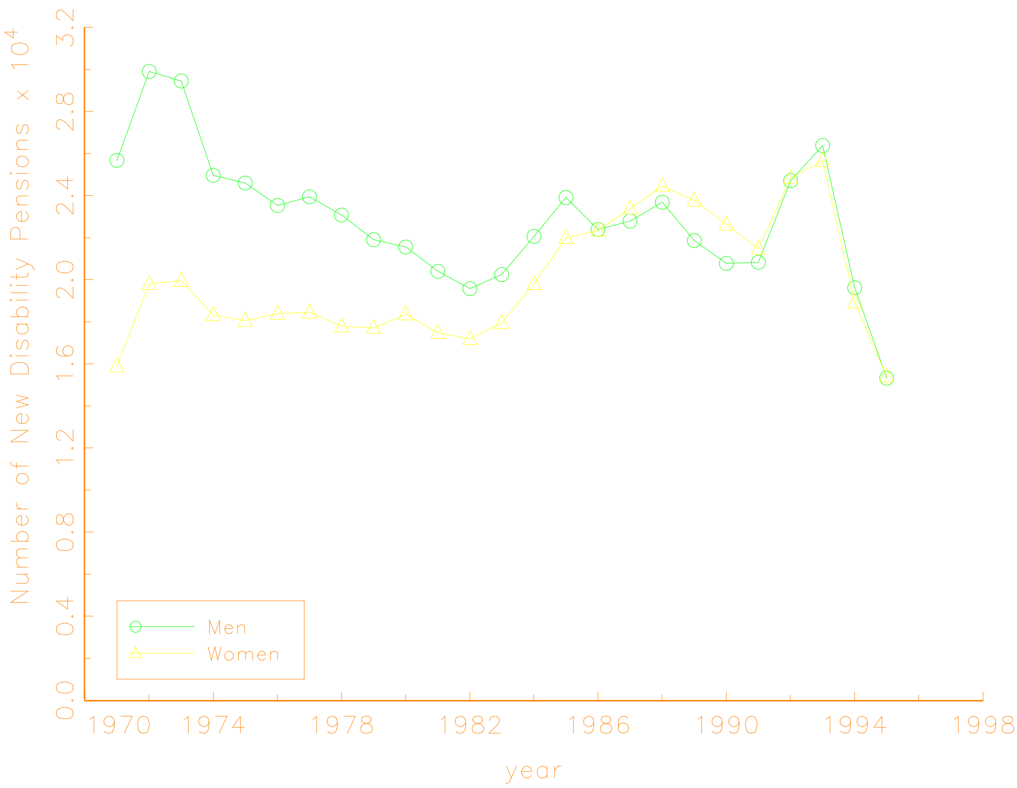


Figure 11: Number of New Disability Pensions 1971-1995.

Source: National Social Insurance Board (1996).

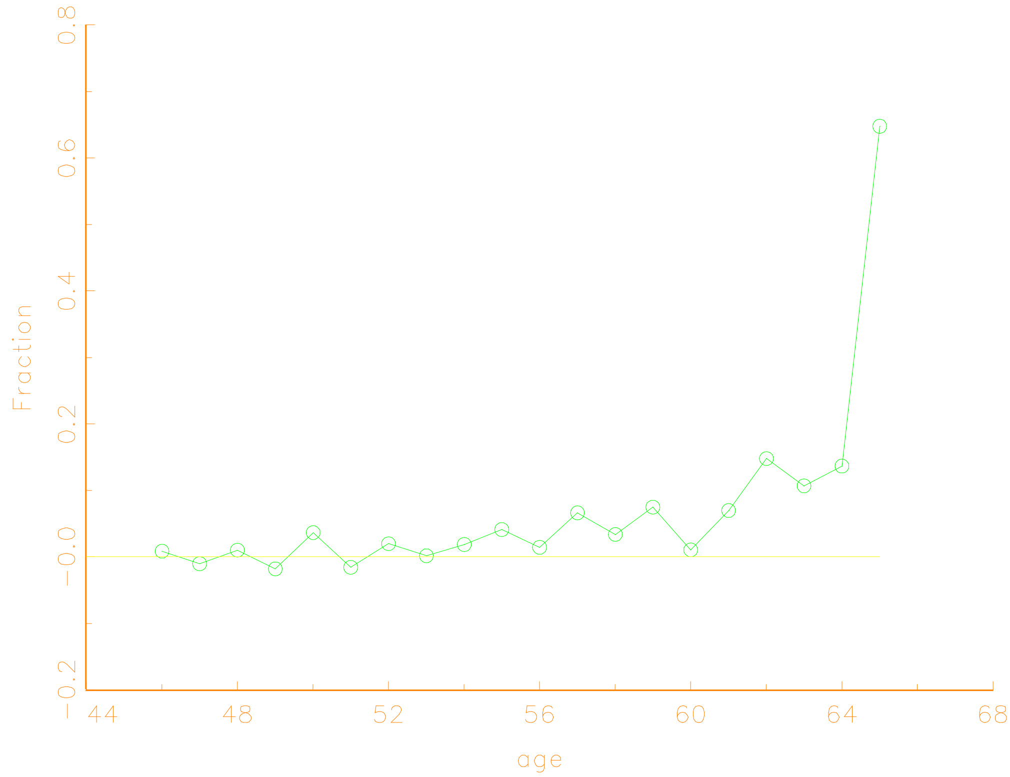


Figure 12: Hazard Rate Out of Labor Force for Men by Age.

Source: Own Calculations on the *Swedish Labor Force Survey* 1994 and 1995, provided by Statistics Sweden.

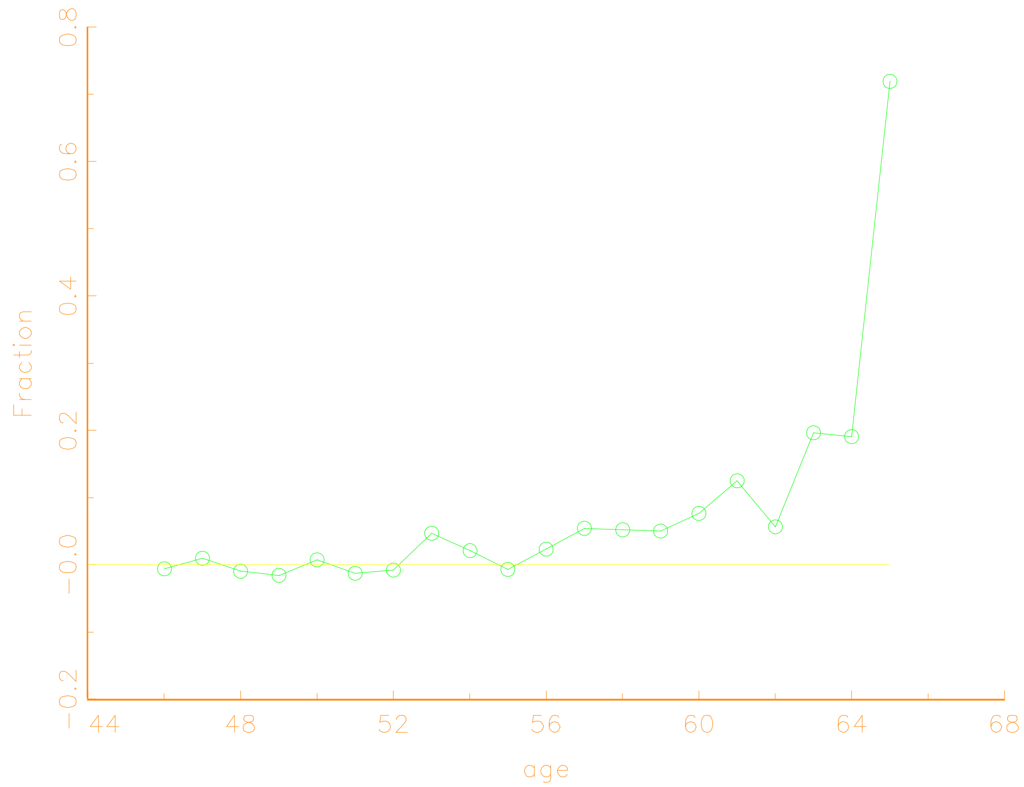


Figure 13: Hazard Rate Out of Labor Force for Women by Age.

Source: Own Calculations on the *Swedish Labor Force Survey* 1994 and 1995, provided by Statistics Sweden.

Figure 14a: Median earner . Men born 1930.

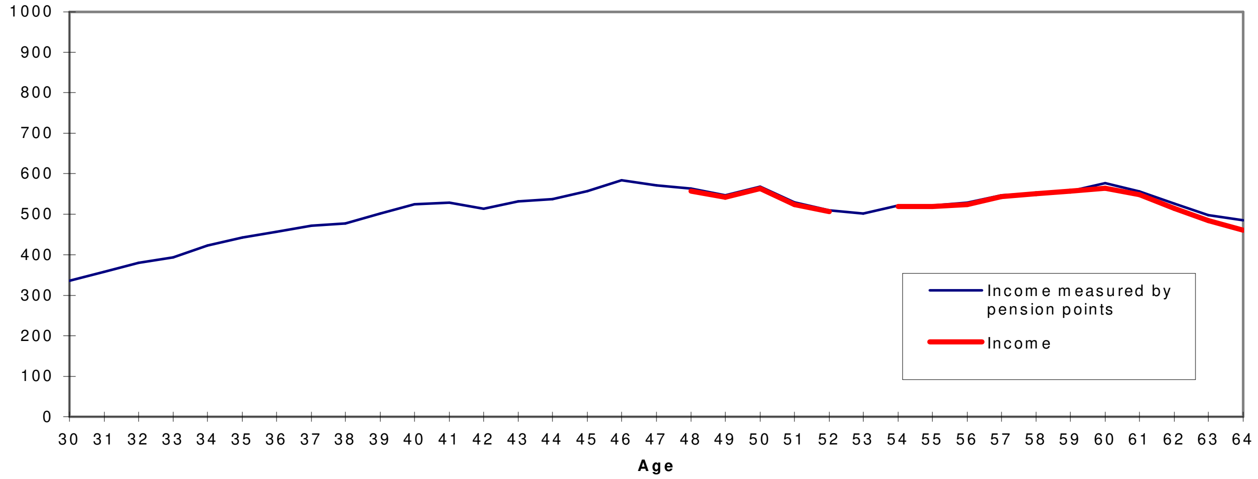


Figure 14b: 10th percentile earner . Men born 1930.

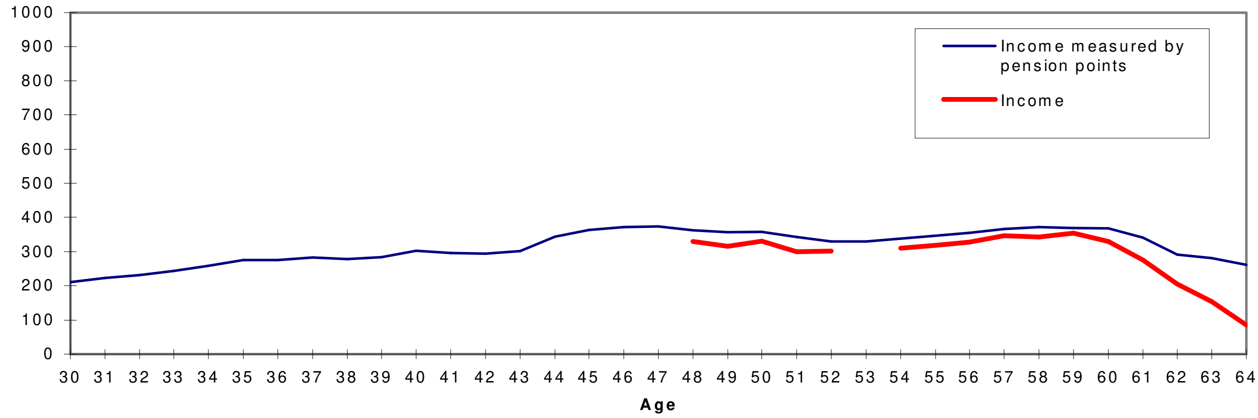
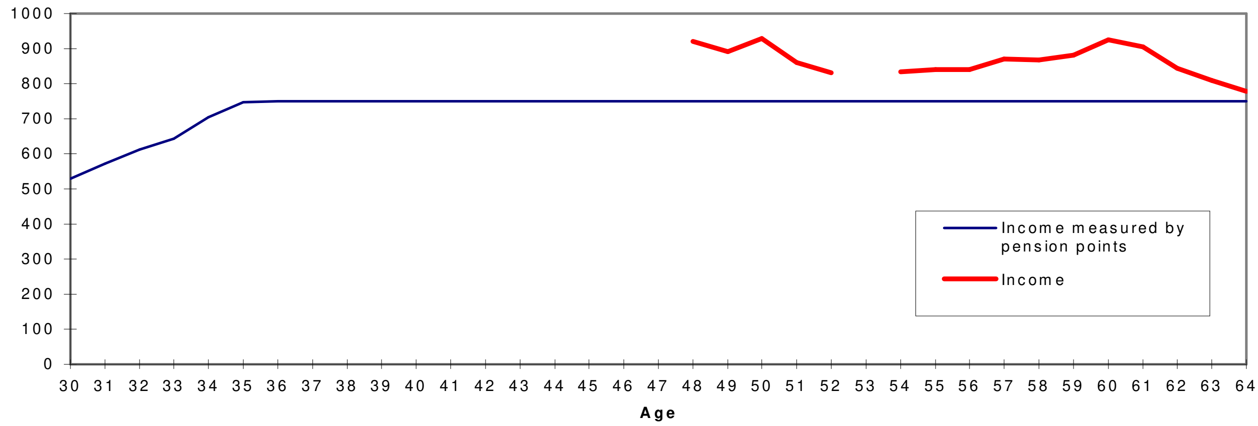


Figure 14c: 90th percentile earner . Men born 1930.



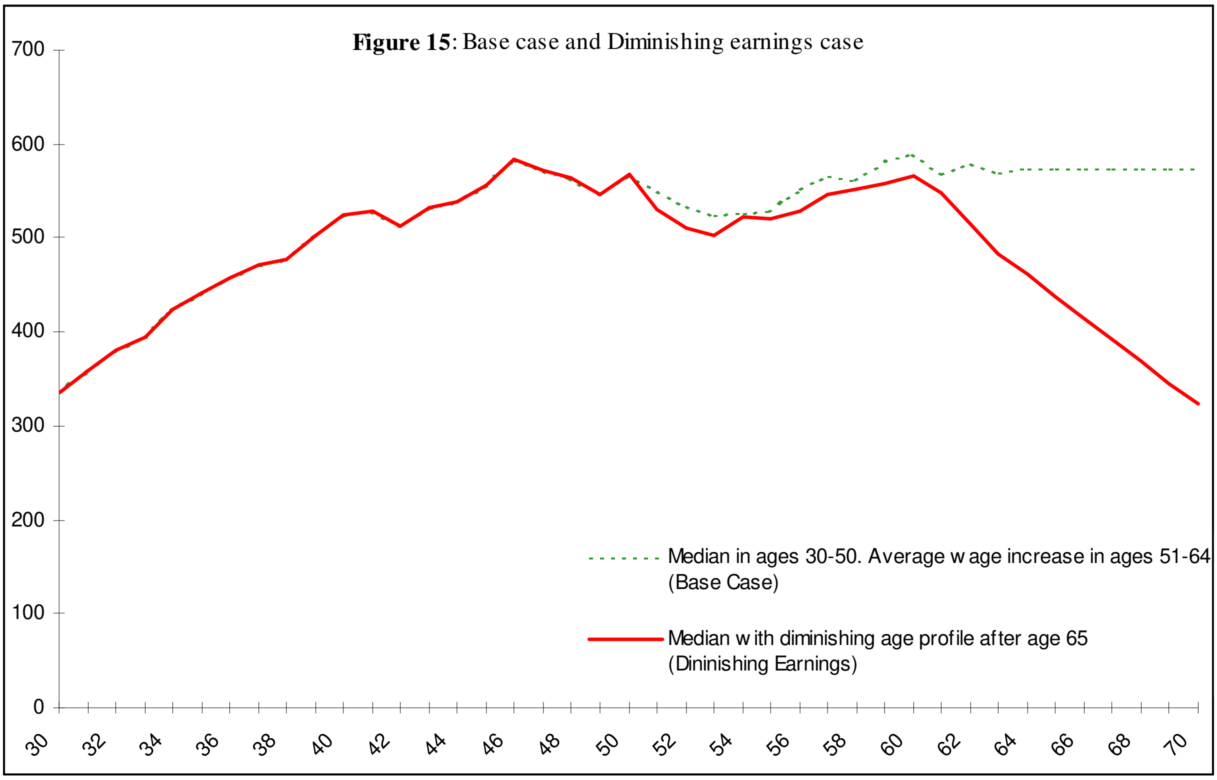


Figure 15: Base case and Diminishing earnings case
700
600
500
400
300
200
100
0
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
Median in ages 30-50. Average w age increase in ages 51-64 (Base Case)
Median w ith diminishing age profile after age 65 (Dininishing Earnings)

Figure 16: Tax/subsidy rate - Base Case with Disability pension option

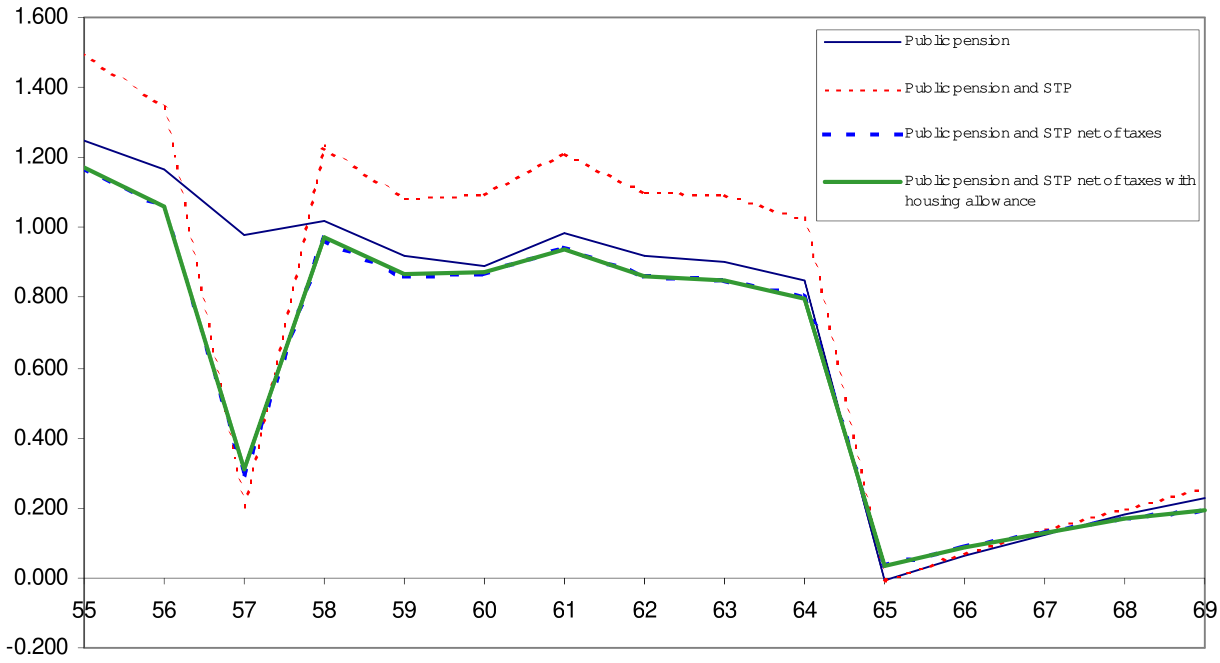


Figure 17: Tax/subsidy rate - Base Case

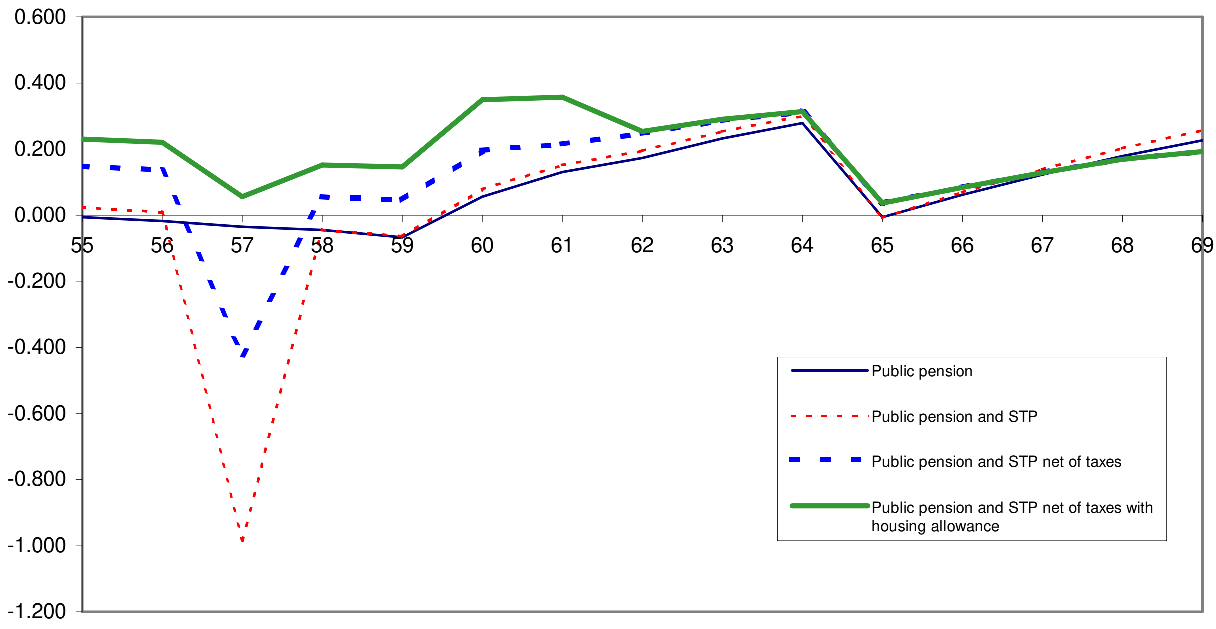


Figure 18: Tax/subsidy rate - 10th Percentile

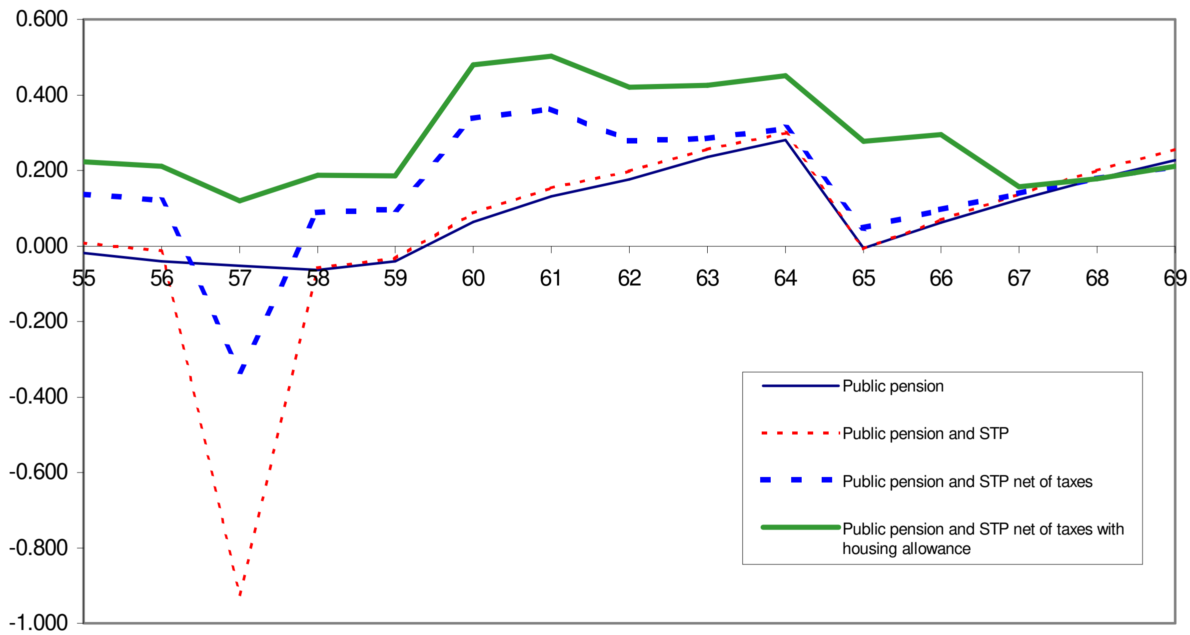


Figure 19: Tax/subsidy rate - 90th Percentile

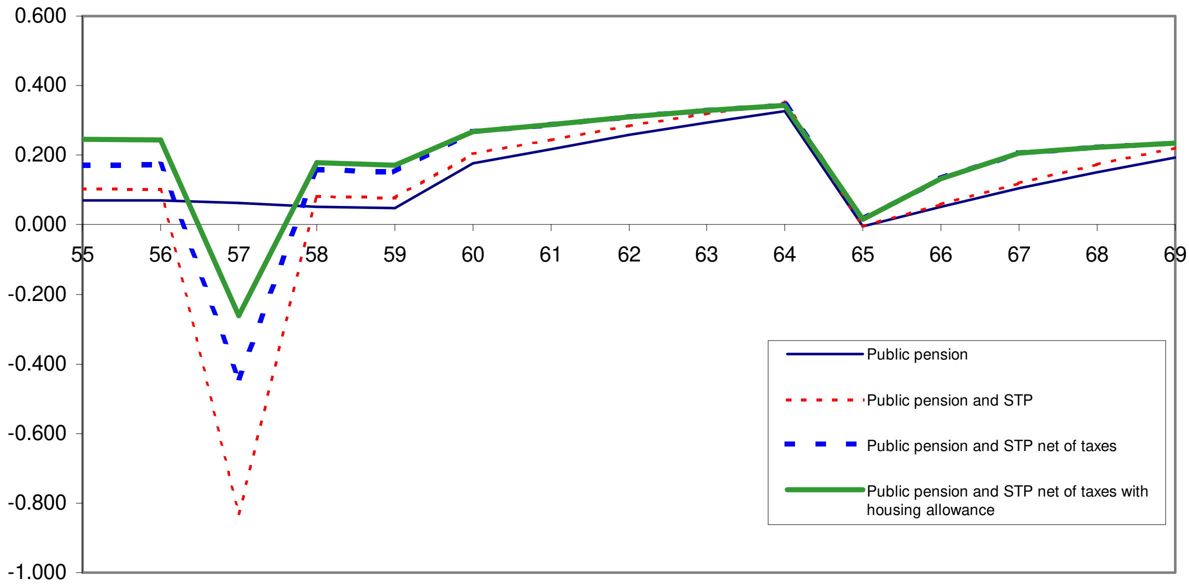


Figure 20: Tax/subsidy rate - Single Worker

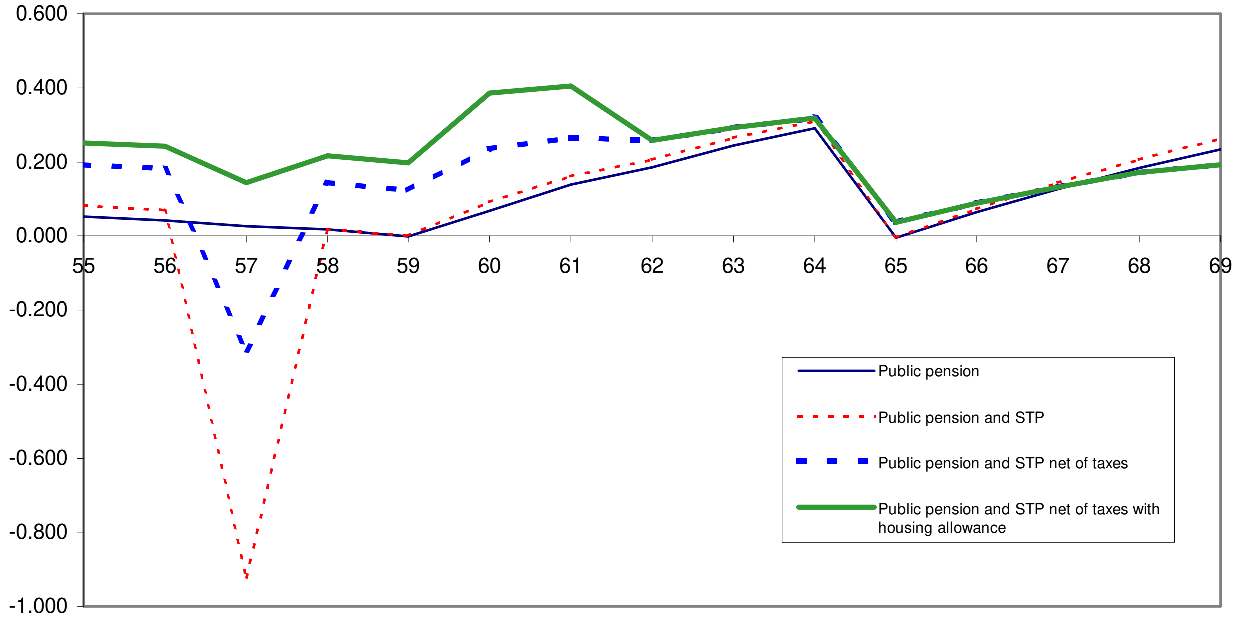


Figure 21: Tax/subsidy rate - Diminishing Earnings Profile

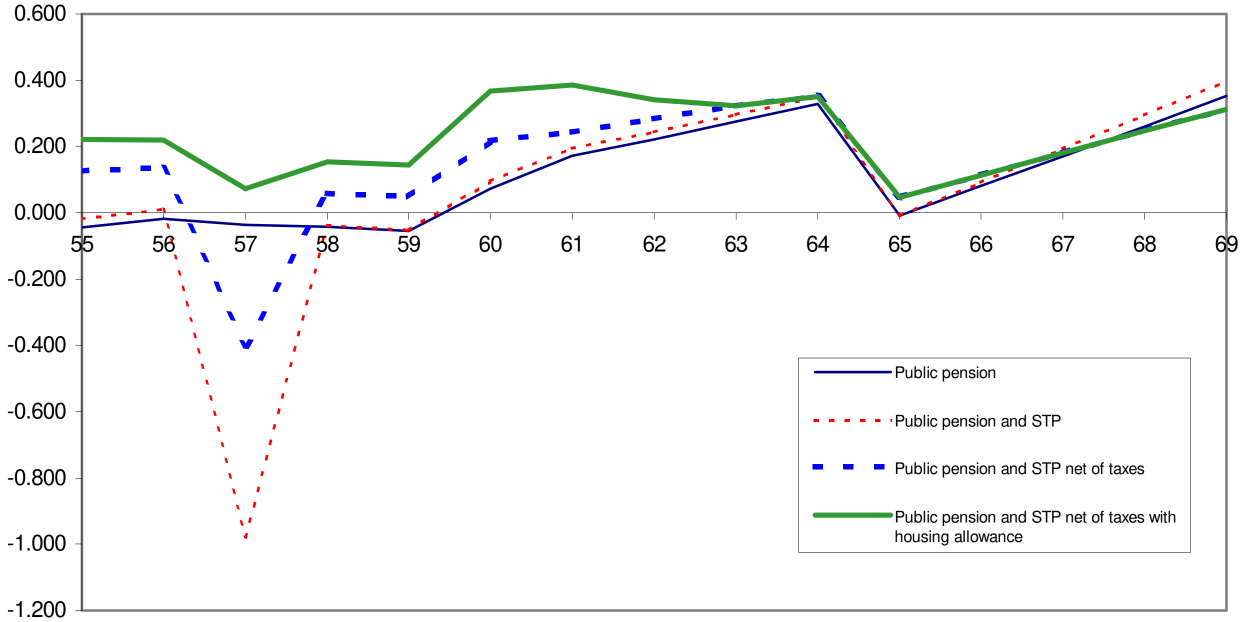
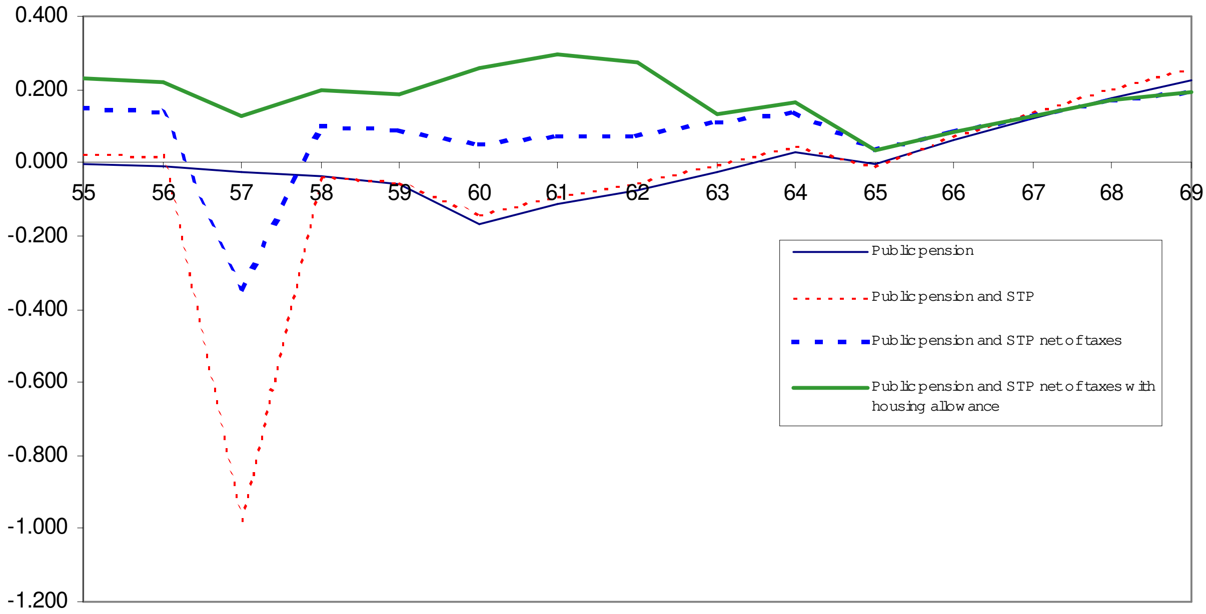


Figure 22: Tax/subsidy rate - Incomplete Earnings History



[1] Own calculations from the 1994 *Household Income Survey* provided by the Statistics Sweden. Appendix I contains information on the sample properties of this survey.
[2] The economic literature on labor supply of elderly and its relation to social insurance spending is reviewed in Appendix II.
[3] Part II provides a more detailed description of labor market institutions and mandatory retirement ages.
[4] This includes the basic pension and the supplementary pension (ATP) schemes. Occupational pension schemes are not included.
[5] The source of the estimates of the compensation levels shown in Figure 4 is J. Palme (1990), where the compensation levels in 18 OECD countries are compared, and Kangas and J. Palme (1989), where the compensation levels in the Nordic countries are compared.
[6] *Average production worker* income published, for example, by the U.S. Dept. of Labor (1996), is a frequently used concept for comparing wages in different countries. The Swedish AWP is used for the calculations in Figure 4.
[7] But note that this situation is very uncommon in Sweden.
[8] Appendix I describes the properties of these surveys.
[9] The latter finding should be interpreted with care since the sample sizes for individuals older than 65 are very small in the *Labor Force Survey* (see Appendix I for details).
[10] Because the *Labor Force Survey* does not distinguish between the individuals who receive old-age pension and those who receive disability pension, we used the number of individuals who receive disability pension provided by the National Social Insurance Board to obtain figures on the share of disabled in each age group.
[11] Part II of this paper describes the rules for selecting delayed payments from the basic and supplementary pension schemes (including possible economic gains from the selection).
[12] See the Appendix I for a detailed description of the properties of this survey.
[13] Note that this figure includes *all* public transfers, for example, payments from the compulsory sickness insurance and income support directed primarily to households with dependent children, like housing allowances.
[14] To convert the SEK to US dollars, we have used the exchange rate of SEK 7.13 for one US dollar, which is the average selling price of SEK in 1995. This exchange rate is used throughout this paper.
[15] Since 1993, two different basic amounts have been in use. The basic amount, which is linked to CPI, is used in the calculations of pension-rights income (SEK 35,700 in 1995), and a reduced (by 2%) basic amount is used to calculate pension benefits.
[16] But the proportional payroll tax that finances the ATP pension is also paid on the share of the income exceeding 7.5 BA.
[17] Wadensjö (1989) examines this issue in detail.
[18] If the employee is not covered by a central agreement between the union and the employers' confederation, which applies for only about 5% of the Swedish labor market, workers up to age 67 are covered by the law of employment security.
[19] National Social Insurance Board (1996) is the source of the numbers in Figure 10. New part-time disability pensions have been recalculated to the *equivalent* number of full-time disability pensions.
[20] Workers were generally entitled to unemployment insurance for 1 year and 9 months.
[21] See Aronsson and Walker (1997) for a more detailed description of the Swedish tax system.
[22] Appendix I describes the properties of this sample.
[23] It should, however, be noted that those who are 64 years old in 1994 have had the opportunity to obtain a disability pension before the tightening up of the legislation during the 1990ties. The present legislation is considerably more restrictive and could be expected to result in lower disability rates in the future.
[24] See also Appendix II for a short summary of Wadensjö (1996), who analyzes how the Swedish disability insurance works in practice.
[25] See Diamond and Gruber's paper in this volume.
[26] Empirical studies find (for example, Palmer and Palme, 1989) that this assumption is highly realistic.
[27] Part II of this chapter provides a short description of the Swedish income tax system and the housing allowance scheme.
[28] This rule applies to individuals born in 1930. For those born in 1932 and later the requirement was 30 years.

[29] These figures only includes the present expected value of future benefits; contributions up to this age are not deducted. But the following rows account for changes in benefits and contributions.

[30] For this figure we have used the same conditional survival probabilities as we did for the old-age pension case. This represents a case where the individual manage to get disability insurance without any severe physical handicap. We have, however, also made calculations where we use an estimate of the survival probabilities for the population of those who receive disability insurance. In this case the SSW is SEK 1,908,873 (USD 267,724) if the worker retire at age 55, i.e. 5.5% lower.

[31] See Hedström (1987) and Wadensjö (1996).