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9 Social Security, Occupational Pensions, and Retirement in Sweden

Mårten Palme and Ingemar Svensson

The social insurance system plays a very important role in the Swedish economy. In 1994, benefits paid out by this system represented 20 percent of Sweden's GDP, or about 32 percent of all public spending. Table 9.1 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 toward individuals who have permanently left the labor market, mostly older people. 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 percent, respectively, of total pension payments in 1994. The supplementary pension and the basic pension can be paid as an old age pension, a survivor pension, or 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 percent of the income of individuals older than age sixty-five consists of payments from the social security system.[1]

Forecast 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 have yet to be determined. There are two causes for the forecast financial problems of the current system: demographic change and slow growth in the Swedish econ-

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1. Figures are our own calculations from the 1994 Household Income Survey provided by Statistics Sweden. Appendix A contains information on the sample properties of this survey.

Table 9.1 **Social Insurance Expenditures in Sweden, 1994**

	Expenditures in SKr Million	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	.8	.2
Sickness and parental insurance	53,800	17.6	3.8
Work injuries insurance	7,999	2.6	.6
Allowances	32,204	10.5	2.3
Other	15,920	5.2	1.1
Total	305,737	100	21.5

omy. The ratio between the number of persons over age sixty-five to the number aged sixteen to sixty-four 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 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 alleviated if the fund is built up when this generation is active in the labor market.

The continuing slow economic growth in Sweden causes problems primarily for the supplementary pension system. National Social Insurance Board studies show that this scheme is not viable if the long-run rate of growth falls below about 2 percent (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 determined in central agreements between the central unions and the employers' confederations. Although the unionization rate is about 81 percent, the occupational pensions are compulsory for most workers and cover about 95 percent of the labor market. The influence of the centrally bargained pension plans is growing.

An explicit goal of pension reform is to increase work incentives (especially

for older people). However, very little is known about what economic incentives to leave the labor market the current social insurance system provides and the extent to which the system affects the behavior of older workers since very few empirical studies have been conducted 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 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. Section 9.1 describes the labor market behavior of older workers in Sweden, the present situation, and development over time. Section 9.2 provides an overview of the social security system and the occupational pension schemes. Section 9.3 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. Section 9.4 concludes.

9.1 The Labor Market Behavior of Older Persons in Sweden

Figures 9.1 and 9.2 show the historical trends in labor force participation rates since 1963 for men and women over age forty-four. Four different age groups are studied: forty-five to fifty-four, fifty-five to fifty-nine, sixty to sixty-four, and sixty-five to seventy-four. Considering the entire historical period, figure 9.1 shows that the labor force participation rate of older men decreased in all age groups. But, in the youngest age group, forty-five to fifty-four, the decrease is comparatively small. Labor force participation for the age group fifty-five to fifty-nine goes from about 95 to about 82 percent in 1995. There is a comparatively large decrease in labor force participation for the age group sixty to sixty-four: from 85 percent in 1963 to 55 percent in 1995, or 30 percentage points. Figure 9.1 also shows that labor force participation in the three youngest age groups decreased more in the most recent recession in the Swedish economy (1991) than in the years preceding the recession. The largest decrease is in the age group sixty to sixty-four for this period as well. The historical trend in labor force participation of the age group sixty-five to seventy-four reveals that the change in mandatory retirement age, from age sixty-seven to age sixty-five 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 the labor force participation of older women, shown in figure 9.2, is very different from that of men: for the entire period 1963–90, labor

2. The economic literature on the labor supply of the elderly and its relation to social insurance spending is reviewed in app. B.

3. Section 9.2 below provides a more detailed description of labor market institutions and mandatory retirement ages.

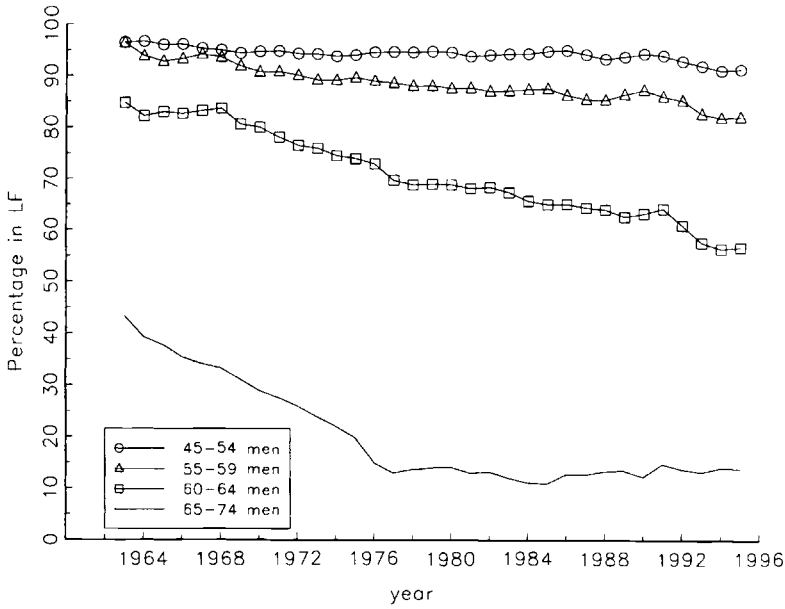

Fig. 9.1 Historical trends in the labor force participation of older men
Source: Various reports of the Swedish Labor Force Survey, provided by Statistics Sweden, adjusted to be comparable between different points of time.
Note: LF = labor force.

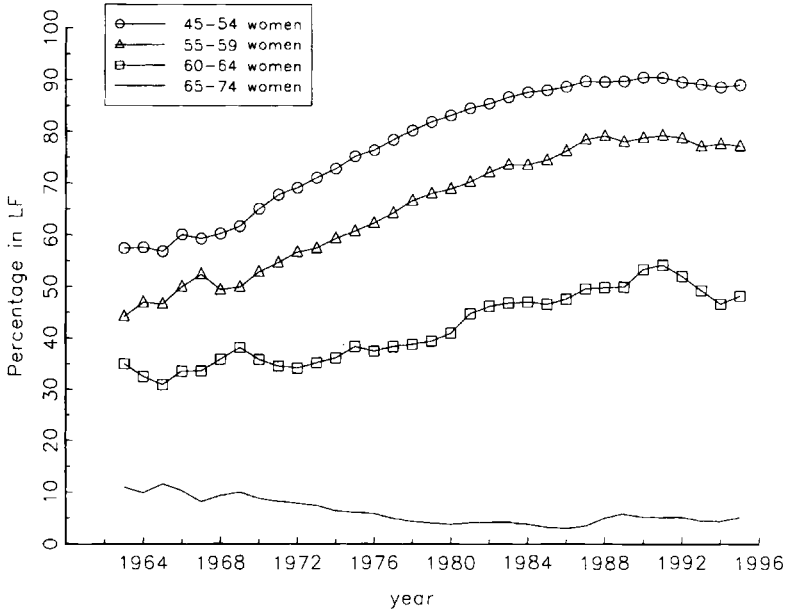

Fig. 9.2 Historical trends in the labor force participation of older women
Source: See fig. 9.1 above.
Note: LF = labor force.

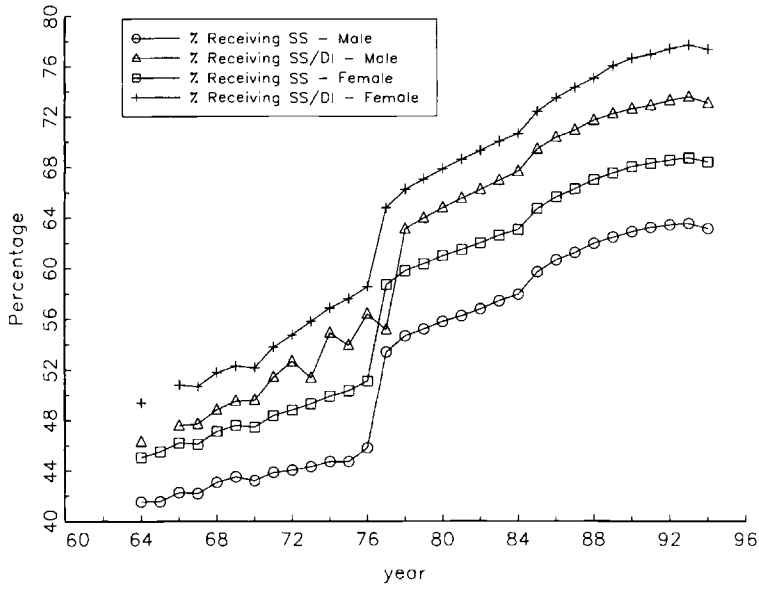

Fig. 9.3 Share of Swedish men and women age fifty-five and over who receive disability pension and old age pension

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

Note: SS = social security; DI = disability insurance.

force participation rates increased for all age groups between forty-five and sixty-four, although at a decreasing rate. The smallest increase is in the age group sixty to sixty-four, 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 age group sixty to sixty-four.

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 9.3 shows the percentage share of men and women older than fifty-five years who actually receive an old age or disability pension for the period 1964–94. It reveals that the share of women in this age group who receive an old age or disability pension is somewhat higher (about 4 percentage points) than it is 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 an 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, which was preceded by agreements between the trade unions and the employers' confederations on occupational pensions that offer benefits between age sixty-five and age sixty-seven.

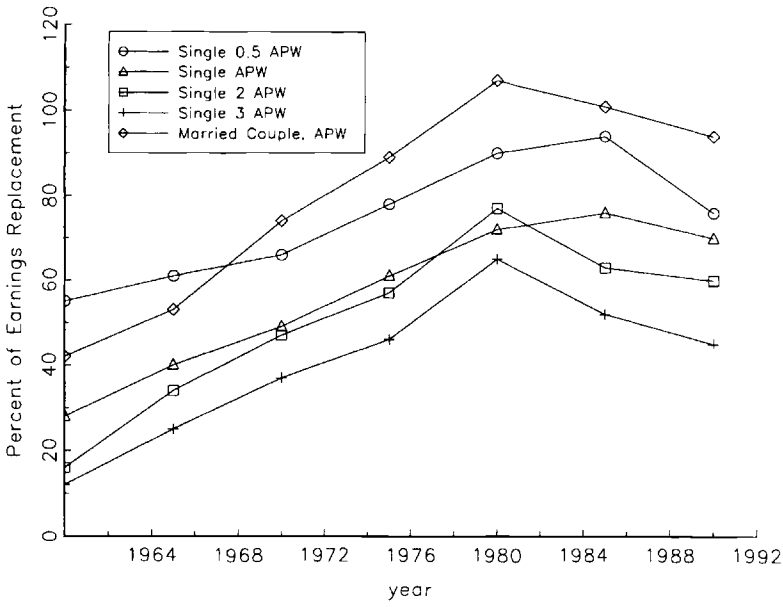

Fig. 9.4 Replacement rates of old age pension from the national pension system for a production worker with average wage
Source: Palme (1990).

But the most striking fact in figure 9.3 is the dramatic increase between 1964 and 1994 in the share of men and women receiving old age or disability pensions: an increase of about 25 percentage points for men and about 28 for women. About 6 percentage points of this increase for men and women can be attributed to the increased number of disability pensions; the number of old age pensions increased by about 8 percentage points after the 1976 pension reform, when the mandatory retirement age was decreased from sixty-seven to sixty-five; a very small part of the increase can be attributed to a small increase in the early withdrawal of social security 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 9.4 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 the

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 fig. 9.4 is Palme (1990), where the compensation levels in eighteen OECD countries are compared, and Kangas and Palme (1989), where the compensation levels in the Nordic countries are compared.

earnings 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 9.4 shows the compensation level for four hypothetical single workers: (1) one who has an earnings history amounting to half the earnings of the APW in each year; (2) one who has always earned the same as the APW; (3) one who has earned double the APW; and (4) one who has always earned three times as much as the APW.

Figure 9.4 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 sixty-five. The replacement rate is generally different if the individual elects to retire earlier than the mandatory retirement age—as sections 9.2 and 9.3 below show. Figure 9.4 shows that the replacement level increased a great deal in the years between 1960 and 1980. The maturing of the supplementary pension system explains the largest part of the increase.

9.1.1 Labor Market Behavior in 1995

To get a more detailed picture of the current pattern of exiting from the labor force, the 1994 and 1995 Labor Force Surveys are used.[8] Figure 9.5 shows labor force participation by age and sex for individuals older than forty-five years. To improve the precision in the estimates, the 1994 and 1995 Labor Force Surveys are combined. Figure 9.5 shows two properties of the labor force participation of older workers. First, labor force participation decreases with age, except for women in their late forties and for some age groups between sixty-five and sixty-nine for men and women.[9] It could also be seen that the decrease in labor force participation is fairly moderate until workers reach age fifty-seven. Labor force participation for, for example, fifty-six-year-olds is above 80 percent for men and women. Among individuals in their late fifties and early sixties, labor force participation rates fall every year and at an increasing rate. Labor force participation for individuals age sixty-four, one year before the mandatory retirement age, is about 30 percent for women and 43 percent 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, increasing gradually with age. At age sixty-four, the difference is as large as about 13 percentage points.

Figure 9.6 distinguishes among the employed, unemployed, disabled,[10] and

6. The *average production worker* is a concept frequently used for comparing wages in different countries (see, e.g., U.S. Department of Labor 1996). The Swedish APW is used for the calculations in fig. 9.4

7. But note that this situation is very uncommon in Sweden.

8. Appendix A describes these surveys.

9. The latter finding should be interpreted with care since, in the Labor Force Survey, the sample sizes for individuals older than age sixty-five are very small (for details, see app. A).

10. Because the Labor Force Survey does not distinguish between the individuals who receive an old age pension and those who receive a disability pension, we used the number of individuals who receive a disability pension provided by the National Social Insurance Board to obtain figures on the share of the disabled in each age group.

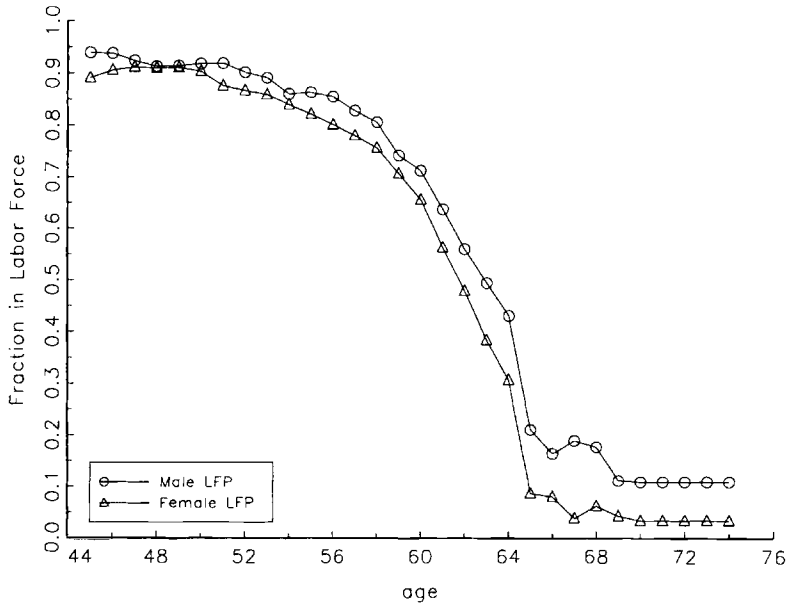

Fig. 9.5 Labor force participation (LFP) rates by age and sex
Source: Authors' calculations based on the Swedish Labor Force Survey, 1994 and 1995 (provided by Statistics Sweden), combined.

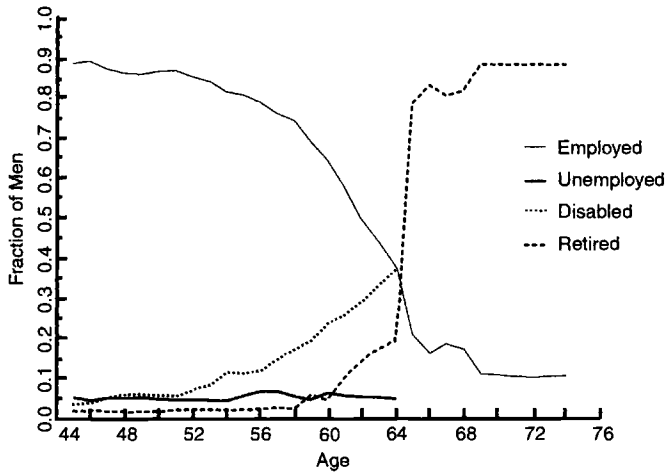

Fig. 9.6 Distribution of activities of older men by age
Source: Authors' calculations based on the Swedish Labor Force Survey, 1994 and 1995 (provided by Statistics Sweden), combined. For the graph of the share of individuals receiving a disability pensions, we have used statistics from the entire Swedish population published in *Allmän Försäkring 1995* (National Social Insurance Board, Stockholm).

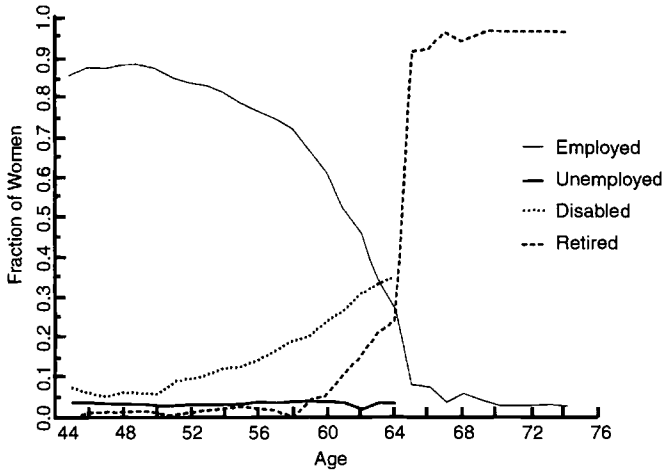

Fig. 9.7 Distribution of activities of older women by age
Source: See fig. 9.6 above.

retired, by age, for older men. Figure 9.7 provides the same information for women. Figures 9.6 and 9.7 show that the graphs for the unemployed and for the disabled continue only to age sixty-four. This is because the Labor Force Survey counts only people younger than the mandatory retirement age, sixty-five, as unemployed. People older than age sixty-five are not entitled to unemployment insurance. Our definition of *disabled* is an individual who receives a disability benefit from the national pension system, which is only possible for those under sixty-five years of age.[11]

By comparing the graphs for the retired and the disabled, figures 9.6 and 9.7 show that in all age groups between forty-five and sixty-four, the most common way to leave the labor market for men and women is to become a disability pensioner. At age sixty-four, as many as about 37 percent of all men and 35 percent of all women receive a full-time disability pension. A comparison of figures 9.6 and 9.7 shows that women, on average, retire somewhat earlier than men: at age sixty-four, about 20 percent of men and 25 percent of women are retired. A study of the graphs for the unemployed shows that unemployment is about equal in all age groups. A comparison of figure 9.6 with figure 9.7 shows that the unemployment rate is somewhat higher for men than for women for the entire age range considered in the figures.

11. Section 9.2 below describes the rules for selecting delayed payments from the basic and supplementary pension schemes (including possible economic gains from the selection).

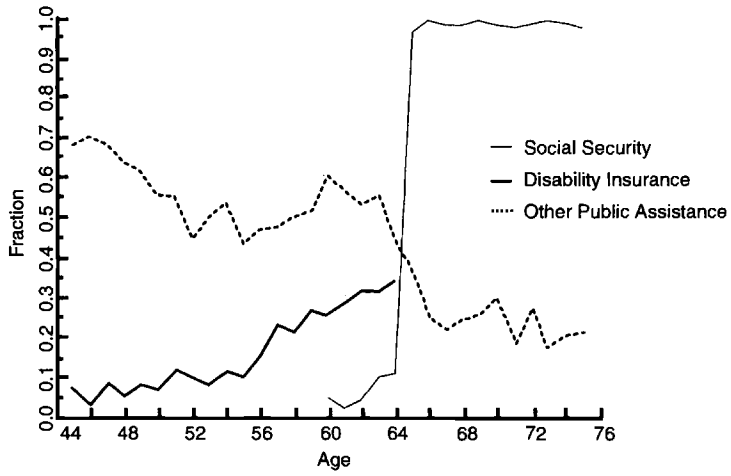

Fig. 9.8 Share of older men who receive different kinds of support from the public sector by age

Source: Authors' calculations based on data from 1994 Household Income Survey, provided by Statistics Sweden.

9.1.2 Income Sources of Older Persons

Figures 9.8 and 9.9 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 Statistics Sweden.[12]

Figure 9.8 shows the share of all men between the ages of forty-five and seventy-five, divided into one-year age groups, who receive an old age pension, a disability pension, or any other form of public assistance. The graphs for a disability pension confirm what is already known from figure 9.6 above, although another data source is used for these figures: about 35 percent of the sixty-four-year-olds receive a disability pension, and the rate of receipt increases rapidly starting from about age fifty-seven.

When comparing the share of retired men in figure 9.6 with the estimates of the share of men receiving an old age pension shown in figure 9.8, two things should be noted: First, for men aged sixty to sixty-four, the rate of take-up of old age pensions is about 10 percentage points lower than the rate of retired men in this age group. So about half the men who retire before the mandatory retirement age of sixty-five do not claim an old age pension from social security until age sixty-five. Second, according to the data in figure 9.8, almost all people claim old age pension benefits at age sixty-five, although, as shown in figure 9.6, only about 85 percent are retired at that age. The rate of all other public transfers is very high for men in the younger age groups considered in

12. For a detailed description of this survey, see app. A.

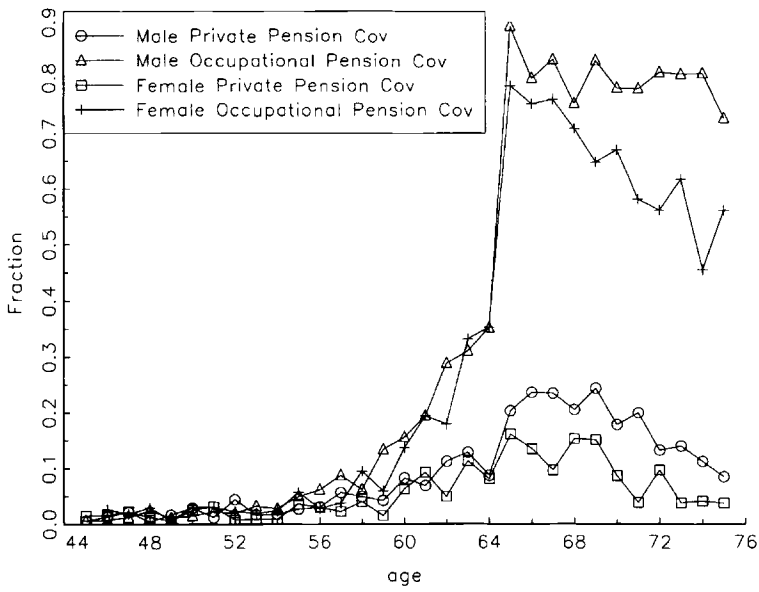

Fig. 9.9 Share of all Swedish men and women who receive occupational and private pensions by age
Source: See fig. 9.8 above.

figure 9.8: about 70 percent for men age forty-five.[13] This graph decreases steadily in older age groups.

Figure 9.9 shows the proportion of men and women between the ages of forty-five and seventy-five, again divided into one-year age groups, who receive occupational and private pensions. As expected, the proportion receiving private and occupational pensions increases rapidly at age sixty-five. But figure 9.9 also shows that the proportion decreases steadily after age sixty-five. 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, the increased rate of labor force participation of women.

Figure 9.10 displays the average shares of different sources of household income by the age of the head of the family. Although, as explained in appendix A, these figures should be interpreted with caution because the sample sizes for some components of household income are very small, it is interesting

13. Note that this figure includes *all* public transfers, e.g., payments from the compulsory sickness insurance and income support programs directed primarily toward households with dependent children, like housing allowances.

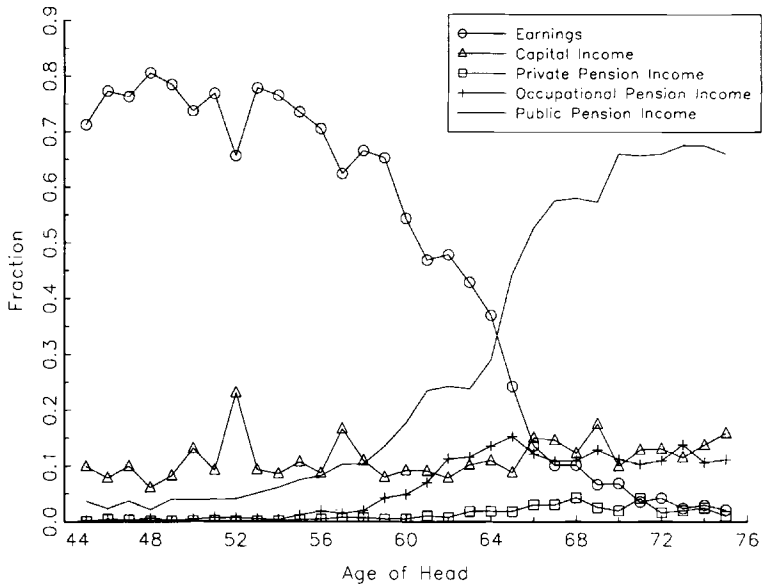

Fig. 9.10 Average shares of different sources of family income by age of family head
Source: See fig. 9.8 above.

to note that the observations made in figure 9.9 above are confirmed. The importance of private and occupational pensions is decreasing among older pensioners. The share consisting of earnings is decreasing from about 75 percent at age fifty to about 65 percent at age fifty-eight. After that age, the share of earnings is decreasing at an increasing rate. The share of capital income is around 10 percent in the younger and around 15 percent in the older age groups considered.

9.2 Key Features of the Social Security System

9.2.1 A 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 consisting 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 percent 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 to cover 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 pensions were substantially increased.

In 1941, the minimum pension was about 29.4 percent of the earnings of an industrial worker (Elmér 1960). Because of 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 percent after the reform. In the 1946 reform, the basic pension replaced the old means-tested pension. A housing supplement in the areas where the cost of living was the greatest 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 a voluntary system, proposed by the employers' confederation and the conservative and liberal parties. The first birth cohort affected by the supplementary pension was that born in 1896. The first year when pension right income for a supplementary pension was recorded was 1960.

In 1976, the mandatory retirement age was decreased from sixty-seven to sixty-five, and the right to a *partial retirement* pension was introduced. In 1990, a gender-neutral survivor 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 determined in 1998. The first cohort to be affected by the new system is that born in 1938. Twenty percent of the pension coverage provided to this group will be determined under the rules of the new system and 80 percent under the rules of the old. The new system determines 5 percent more of the pension coverage of each successive cohort. Hence, 25 percent of the coverage provided to the cohort born in 1939 will be determined under the new system and 75 percent under the old. The coverage provided to the cohort born in 1954 will be determined entirely under the new system. No pensions will be paid out under the new system until 2001.

9.2.2 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 on

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 under forty years and the number of years with income in Sweden is under thirty years.

Like all social insurance, the basic pension is related to the *basic amount* (BA). The BA is linked to the 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 that do not follow the development of the 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 prices during that period. In addition, the price increases that resulted from 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 owing to several measures meant to cut the government budget deficit. In 1995, the BA was SKr 34,986 (U.S.$4,907), and the annual wage of an average production worker was SKr 189,488 (U.S.$26,576).[14]

The basic pension for a single old age pensioner is 96 percent of the BA. The basic pension is reduced to 78.5 percent if the person is married. Before 1995, it was reduced only 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 percent of the BA. The special supplement is reduced on a one-to-one basis against the supplementary pension. Thus, a single old age pensioner with only a basic pension and a special supplement receives 151.5 percent of the BA. In 1995, that was SKr 53,004 (U.S.$7,434) in annual pension, or 28.0 percent of the annual earnings of an average production worker. In 1994, about 20 percent of all old age pensioners did not have a supplementary pension; that is, they received only a basic pension and a special supplement. This group mainly consists of older women; for example, 63 percent of female old age pensioners older than age eighty-five did not receive a supplementary pension. The corresponding figures for male and female old age pensioners between the ages of sixty-five and sixty-nine were 1.7 and 13.8 percent, respectively.

As previously mentioned, the survivor pension was changed in 1990, and women born before and after 1945 follow different rules for the survivor pension. For women born before 1945, the rules for the widow's pension still apply. They get 90 percent of the BA until they reach age sixty-five. The rules

14. To convert Swedish krona to U.S. dollars, we have used the exchange rate of SKr 7.13 = U.S.$1.00, which was the average selling price of Swedish krona in 1995. This exchange rate is used throughout this paper.

for the new gender-neutral *transitional* survivor benefit apply to those born after 1 January 1945. According to these rules, the survivor benefit is paid to the insured individual's spouse within twelve months of the death. From 1 January 1997, the period is reduced to six months. It could be prolonged under special circumstances (widows with dependent children). This means that, for most women born before 1945, a survivor benefit is a possible source of supplementary income for about the next ten to fifteen years.

The supplementary pension (ATP) is related to the individual's earnings history. The benefit level is determined in three steps. The first step is to determine the *pension-rights* income for each year from age sixteen. 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 income exceeding the BA, and it is set to zero if the annual income from labor does not exceed the 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 sixteen and sixty-five are required to receive an old age pension under the ATP scheme. Income above 7.5 times the BA, 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 by the corresponding year's BA to obtain the pension points for each year. Thus, with the social security ceiling at 7.5 times the 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 fifteen years of pension points.

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

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

where AP_i is individual average pension points, BA is the basic amount, and 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 required for a full ATP pension is thirty for individuals born in 1924 or later. Using the amount of the BA in 1995 in the ATP formula gives us a maximum pension amount from the Swedish national pension system in 1995 of SKr 170,032 (U.S. $23,847), which is about 90 percent of the annual wage of an average production worker.

15. Since 1993, two different basic amounts have been in use. The BA, which is linked to the CPI, is used to calculate pension-rights income (SKr 35,700 in 1995), and a reduced (by 2 percent) BA 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 times the BA.

There is no dependents' 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 benefit in the ATP scheme has recently changed. Those who were born before 1945 receive 35 or 40 percent of the deceased husband's ATP pension until they reach the normal retirement age of sixty-five: 35 percent if there are children in the household who are eligible for a children's pension and 40 percent otherwise. After the widow reaches age sixty-five, her ATP pension is reduced, taking into account her own ATP pension. The rules are somewhat different for different birth cohorts. The survivor pension for those born after 1 January 1945 is gender neutral. The surviving spouse of an individual who has qualified for an ATP pension is entitled to the ATP survivor benefit within twelve months of the death according to the rules implemented in 1990. The amount is 20 percent of the deceased spouse's ATP pension—if there are also surviving children entitled to the children's pension—and 40 percent 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 the following: Earnings from the entire life cycle are counted when the individual's pension income is determined, rather than only the fifteen best years. The pension is related to the real growth rate in the entire economy—rather than price indexed. 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.

9.2.3 Social Security and Pathways to Early Exit from the Labor Market

Sweden has a normal retirement age of sixty-five years.[17] Older workers are not covered by the employment security law;[18] that is, workers older than age sixty-five 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 sixty-five are not entitled to support from unemployment insurance. On the other hand, the wage cost for employers is lower for workers older than age sixty-five because the employers do not pay part of the payroll tax for the national or occupational pensions.

Central and municipal government employees automatically lose their jobs at age sixty-five. But exceptions to 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 sixty-five. As the number of these agreements is very large, it is hard to get an overview of how strict the rules for mandatory retirement are.

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—and only about 5 percent of the Swedish labor market is—workers up to age sixty-seven are covered by the employment security law.

There may also be a social convention to stop working at age sixty-five, at least in areas with high unemployment.

The basic pension and the ATP can be claimed as early as age sixty and as late as age seventy. If the individual chooses to claim early, the amount of the benefit is permanently reduced by 0.5 percent for each month of early withdrawal. For example, if the individual retires at age sixty, the permanent reduction is 30 percent ($5 \times 12 \times 0.5$). If the individual decides to begin to receive a pension later than at age sixty-five, the pension income is permanently increased by 0.7 percent 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 sixty 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 ten years of pension-rights earnings after age forty-five and must work at least twenty-two hours before the reduction. The benefit is 65 percent of the difference in earnings between before and after part-time retirement.

The most common means of leaving the labor market before age sixty-five is through a disability pension. Figure 9.6 above for men and figure 9.7 above for women illustrate this. In 1994, 37 percent of men and 35 percent of women in the age group sixty-four years received a full-time disability pension.

The disability pension consists of the basic pension and the income-related ATP supplement. Pension income is determined in the same way an old age pension benefit is, without the actuarial reduction for withdrawal in advance. A disability pension can be received from age sixteen. To be entitled to one, an individual must have a physician's certification that his or her capacity to work is permanently reduced by at least 25 percent owing to sickness or some similar cause. 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 percent but not by 50 percent, he or she is eligible to receive 25 percent of the full disability pension benefit. If it is reduced by at least 50 but not by 75 percent or by at least 75 but not by 100 percent, he or she is eligible to receive 50 and 75 percent, respectively, of the full pension benefit. To obtain a full disability pension, an individual must be completely unable to work.

In practice, the strictness of medical screening has varied over time. Successive, significant tightening of the eligibility rules was legislated in July 1993, October 1995, and January 1997. Figure 9.11[19] shows the number of new disability pensions granted between 1971 and 1995. Studies of the long-term variation in the number of new disability pensions granted between the mid-1970s

19. New part-time disability pensions have been recalculated as the *equivalent* number of full-time disability pensions.

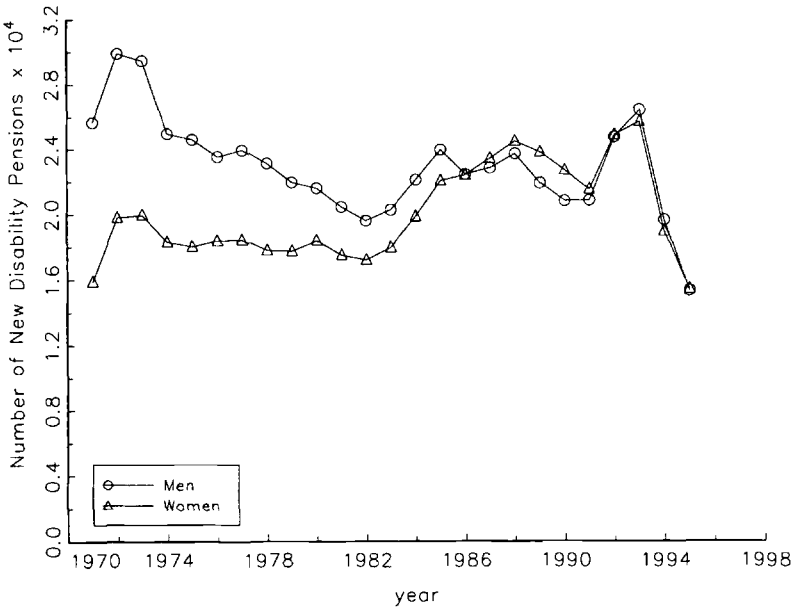

Fig. 9.11 Number of new disability pensions, 1971–95
Source: National Social Insurance Board (1996).

and 1992 (see, e.g., Hedström 1987; or Wadensjö 1985) suggest that it can be explained by variation in access to such pensions and increased compensation. Between 1970 and 1991, it was possible to receive a disability pension for *labor market reasons.* In order to be eligible to receive such a pension, the insured individual had to be over sixty years old and to have exhausted his or her right to unemployment insurance.[20] During 1992 and 1993, the number of new disability pensions granted was very high. This was because, during these years, the social security administration 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.

9.2.4 Occupational Pensions

There are basically four different centrally bargained pension plans for Swedish workers: *(a)* two separate pension plans for employees in the private sector, one for white-collar workers (ITP) and one for blue-collar workers (STP), and *(b)* two separate plans for public-sector employees, one for those employed by the central government and one for those employed by municipalities and counties.

In 1985, ITP covered about 32.6 percent of all insured workers, STP 39.8

20. Workers were generally entitled to unemployment insurance for twenty-one months.

percent, the pension for those employed in central government 10.7 percent, and the pension for those employed in municipalities 16.9 percent (Kangas and 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 (the blue-collar workers' union) and SAF (the 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 percent of gross earnings. STP was radically reformed in 1996: for workers born after 1931, a new, partially funded pension was established. The main reason for the reform of STP 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 the ages of fifty-five and fifty-nine. Receipt of a full STP pension requires that the insured worker have contributed for at least thirty years between the ages of twenty-eight and sixty-five and for at least three years between the ages of fifty-five and sixty-five. Provided that the insured worker has contributed for the maximum number of years, the STP pension is 10 percent of the average earnings below 7.5 times the BA of the three best years between age fifty-five and age fifty-nine. The STP pension cannot be collected before the month of the individual's sixty-fifth birthday, nor can payments be postponed. But pension payments are not reduced if the worker decides to continue to work after age sixty-five. To summarize, the worker's pension wealth is not reduced at all, or by only a comparatively small amount, if he or she decides to quit at age fifty-eight or later, but he or she will not receive a pension at all if he or she quits before age fifty-seven.

ITP

The ITP pension plan existed before the introduction of ATP in 1960. But then it covered only about 50 percent of the white-collar workers in the private sector. Since that time, it has been gradually expanded to cover almost all private-sector white-collar workers. It is financed through an employer contribution, which, in 1996, was 1.15 on gross earnings for employees and contributions made between the ages of twenty-eight and sixty-two for the insured individual.

The size of the individual ITP pension depends on the number of years between the ages of twenty-eight and sixty-five that the individual has contributed to the ITP pension and on the salary the year before he or she starts to collect the pension. In general, receipt of a full ITP pension requires thirty years of contributions. Otherwise, the pension is reduced proportionally. Pro-

vided that the individual has contributed the required number of years, the pension is 10 percent of last year's salary up to 7.5 times the BA, 65 percent of the salary between 7.5 and 20 times the BA, and 32.5 percent between 20 and 30 times the BA. The pension-rights age for the ITP pension is sixty-five. But the pension can be claimed from age sixty-two with a lifetime reduction of 0.6 percent for each month it is collected early. It can also be postponed until age seventy, with a lifetime increase of 0.6 percent for each month the pension is postponed. The ITP pension can also be claimed before age sixty-two; the amount of the pension is then determined individually depending on the sum of the individual's contributions to the pension scheme. Because the individual contributes to the scheme only until age sixty-two, the reduction is generally larger if he or she decides to quit before rather than after age sixty-two.

State Employees' Pensions

The supplementary occupational scheme for employees in the central government consists of two parts: one basic pension and one supplementary pension. The basic pension is entirely a pay-as-you-go scheme, and pensions are paid directly from the central government budget. But the supplementary pension is a fully funded system, and 1.7 percent of the annual salary is redirected to a pension fund. The size of the basic pension is determined in a way very similar to that in which the ITP pension is. Thirty years of work in central government are required for receipt of 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, which is 10 percent of this five-year average up to 7.5 times the BA, 65 percent between 7.5 and 20 times the BA, and 32.5 percent between 20 and 30 times the BA.

The retirement age is sixty-five for most people employed in central government. But there are several exceptions—most important are military personnel, who are in general pensioned at age fifty-five and receive a full occupational pension from that date. A pension can be claimed voluntarily before the pension-rights age. The amount of the pension is then decreased by 0.4 percent for each month the pension is collected early for the rest of the individual's life and by 2.4 percent on the share of the income below 7.5 times the BA when the individual turns age sixty-five. Pension payments can also be postponed. This increases the pension by 0.4 percent for the rest of the person's life for each month the pension is postponed after the pension-rights age.

Local Government Employees' Pensions

The pension plan for employees in the municipalities is administered by an insurance company owned by Sweden's 288 municipalities. Receipt of a full pension requires thirty years of employment in the local government sector

between the ages of eighteen and sixty-five; 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 the ATP pensions from the national scheme. Including the two national schemes, the pension is 96 percent of the average calculated salary (as previously described) below the BA, 78.5 percent between the BA and 2.5 times the BA, 60 percent between 2.5 and 3.5 times the BA, 65 percent between 7.5 and 20 times the BA, and 32.5 percent between 20 and 30 times the BA.

The pension-rights age is sixty-five for most people employed by municipal governments. But pension payments can be collected from age sixty and postponed until sixty-seven. If the individual decides to retire before age sixty-five, the pension is reduced for the rest of the individual's life by 0.3 percent per month between age sixty-three and age sixty-five, by 0.4 percent between age sixty-two and age sixty-three, and by 0.5 percent per month between age sixty and age sixty-two. The pension is increased by 0.1 percent for each month the individual decides to continue working after age sixty-five.

9.2.5 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* and *capital* income. All income from the social insurance system is included in earned income—together with wages and salaries. Income from capital is subject to a national proportional tax of 30 percent. Earned income is subject to national and local taxes. The tax rate for the local tax is determined independently by each of Sweden's 288 municipalities. But there is a clustering of these tax rates at around 31 percent.

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 U.S.$25,000 in 1996) and to 20 percent on all income above that level. In 1995, this tax was temporarily increased to 25 percent. 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 that largely determine their marginal tax rates.

For a single pensioner with only a basic pension, the basic deduction is equal to the amount of his pension income; that is, he pays no income tax at all. If the pension income is higher than the amount of a basic pension (in 1995, SKr 53,000, or U.S.$7,434), the deduction is reduced by 65 percent of

21. For a more detailed description of the Swedish tax system, see Aronsson and Walker (1997).

the amount in excess of SKr 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 nonpensioners. The basic deduction for nonpensioners has a humped-shaped relation to income: For income below SKr 66,800 (U.S.$9,369) it was SKr 8,900 in 1995; it increased linearly with taxable income to SKr 18,100 at SKr 103,200; then it decreased linearly for taxable incomes between SKr 108,700 and SKr 199,700 to once again, SKr 8,900 for higher taxable incomes. At income levels where the deduction for nonpensioners is not applicable, the deduction for a married pensioner is SKr 10,100 lower—compared to a single pensioner at a given income level. A pensioner has a right to the deduction for nonpensioners if it is higher.

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

9.2.6 Retirement Behavior

Figures 9.12 and 9.13 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 error. The sample size does not permit us to present calculations for the age groups beyond age sixty-five. But a clear pattern emerges in figures 9.12 and 9.13: the hazard rate out of the labor force increases slowly until age sixty, when there is a marked increase in the rate of exiting from the labor force, that is, for the ages between sixty and sixty-four. At age sixty-five, the mandatory retirement age, there is a spike that indicates that almost 70 percent of the remaining labor force, both men and women, decide to exit at this age.

9.3 Retirement Incentives

9.3.1 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 occupational pension systems for blue-collar workers in the private sector. In order to

22. Appendix A gives a description of this sample.

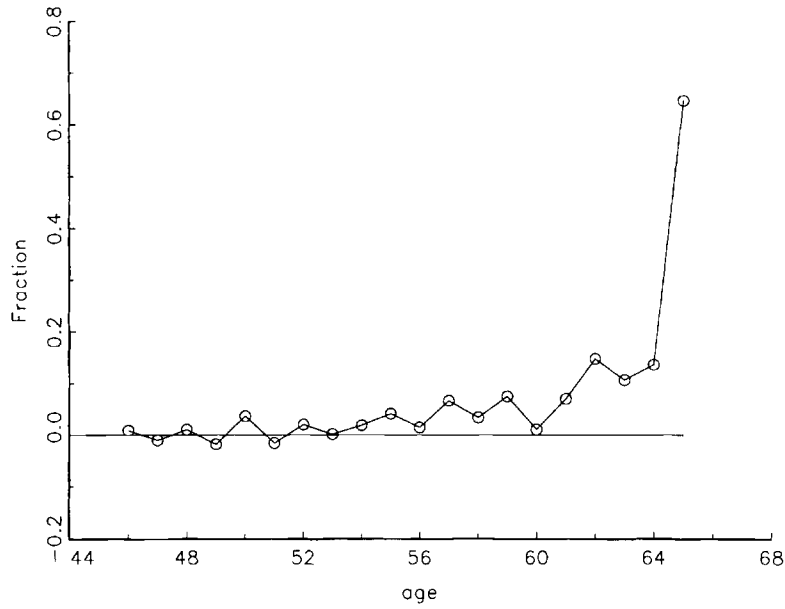

Fig. 9.12 Hazard rate out of the labor force for men by age
Source: Authors' calculations based on the Swedish Labor Force Survey, 1994 and 1995, provided by Statistics Sweden.

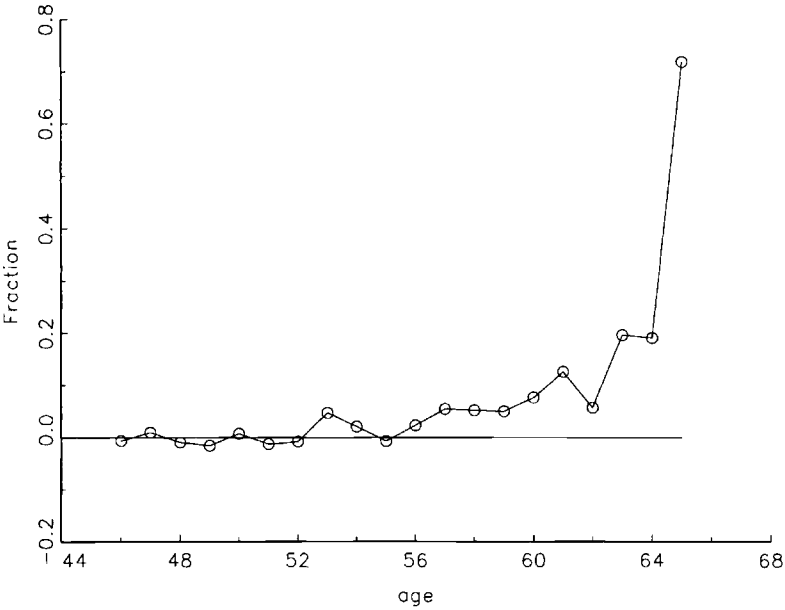

Fig. 9.13 Hazard rate out of the labor force for women by age
Source: See fig. 9.12 above.

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 1 January 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 tenth and ninetieth 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 on the fifth, fifteenth, or twenty-fifth of each month, that is, about 10 percent of the Swedish population. We selected men born in 1930 for the estimation of the tenth, fiftieth, and ninetieth percentile incomes. This sample contains about forty-two hundred 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-rights income. For the entire period 1960–94, we have data on the individual's pension points, which are registered at the National Social Insurance Board.

Figure 9.14 shows the earnings histories that we obtained from the data for the median earner and the tenth and ninetieth 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, as are 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 period 1978–94. This means that the number of men with income below the floor (i.e., the BA) is so small that it does not affect the measure of median income by pension points. But, for individuals at both the tenth and the ninetieth percentiles, there is, as expected, a substantial difference between the results from these two data sets. For the simulations for individuals at the tenth and ninetieth percentiles, we have imputed incomes for the years where only pension points are observed. This is described in appendix C.

In our data, we found a decline in real earnings in ages fifty-one to fifty-six due to the recession experienced by the Swedish economy in the early 1980s. We also found a sharp decline in earnings after age sixty for the median earner and the earner of the tenth percentile. A decline could also be seen for the ninetieth percentile earner, but one less marked. This is probably explained in part by the fact, which could not be observed in the data, that many people decrease the number of hours of work after age sixty. 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 fifty, 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 by a dotted line in figure 9.15. As a sensitivity analysis, we also

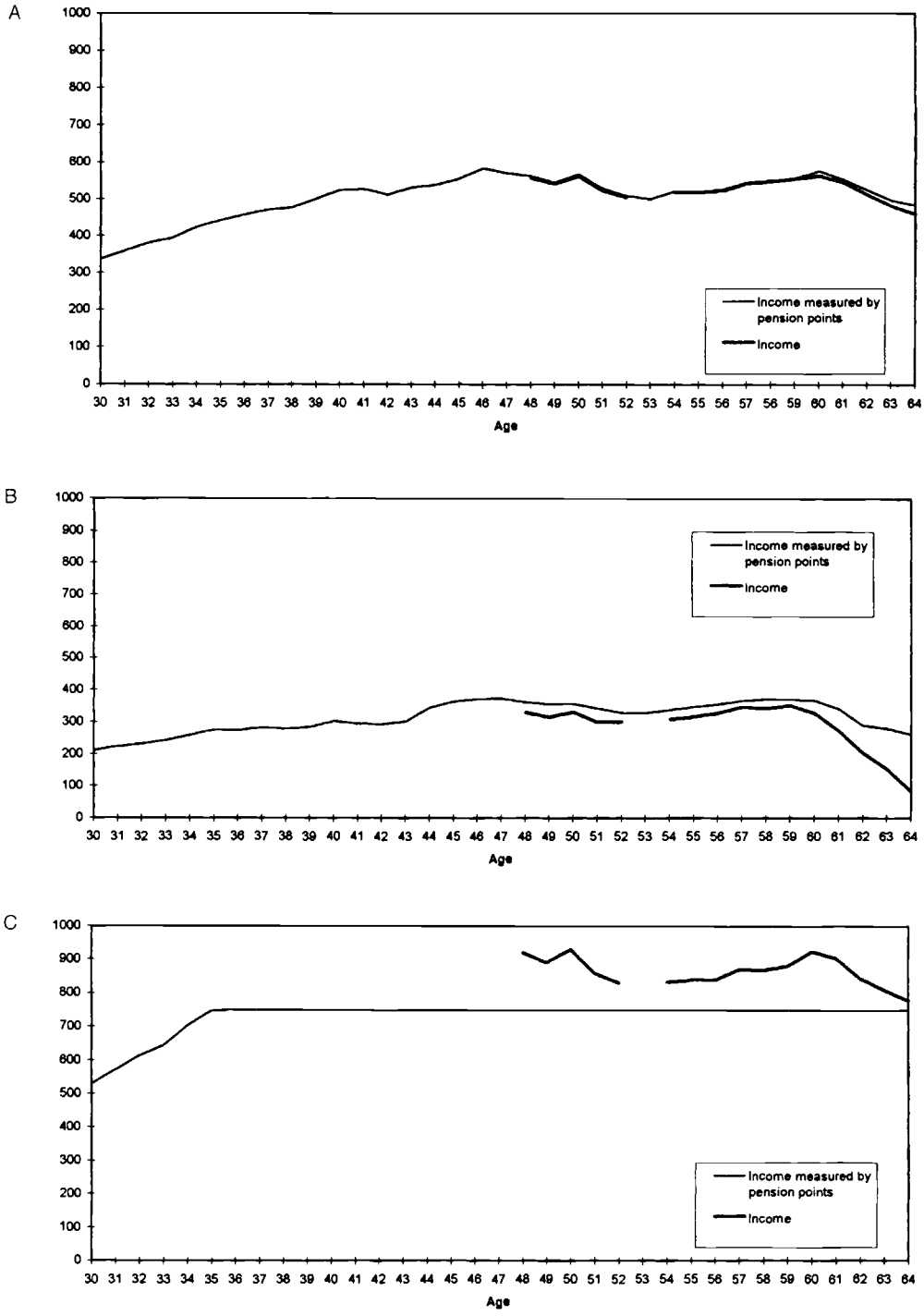

Fig. 9.14 Men born 1930: *a*, median earner; *b*, tenth percentile earner; *c*, ninetieth percentile earner

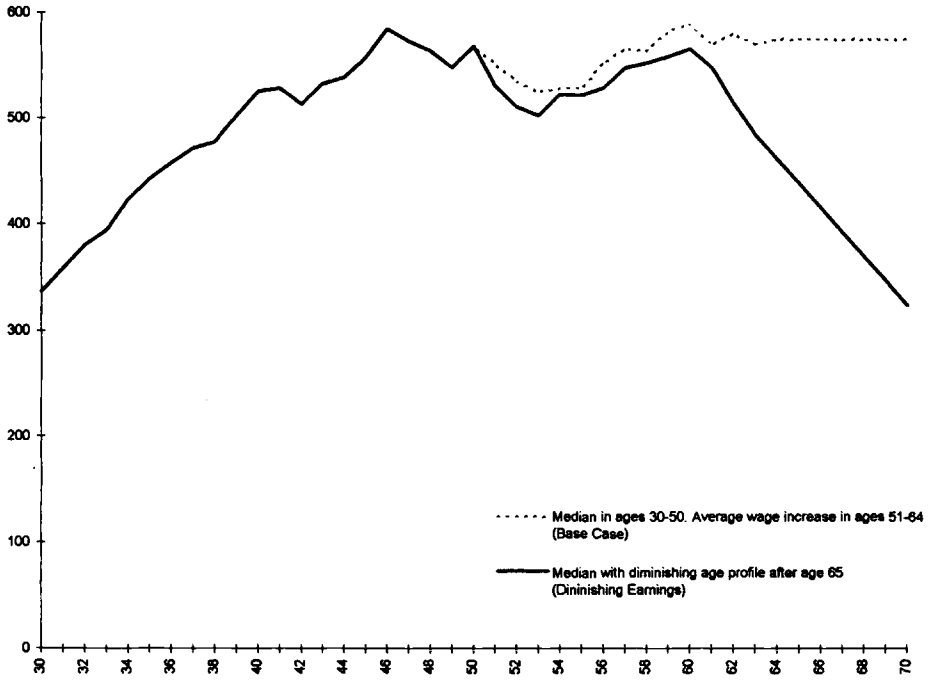

Fig. 9.15 Base case and diminishing earnings case

calculate the *actual synthetic* earnings history for the individual with median income in each year until age sixty-four and with the diminishing trend in ages sixty-three to sixty-four prolonged to age seventy. As figure 9.15 shows, the difference between the two earning profiles is rather small for ages fifty-one to sixty-one. After age sixty-one, the difference increases considerably. This is partly due to the fact that men born in 1930 reached the age of sixty-two to sixty-four during the recession experienced by the Swedish economy in the early 1990s.

Section 9.2 above 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 9.6 above shows that the most frequent means utilized of leaving the labor market is to become an old age pensioner. But, as is also evident from figure 9.6, the most common way of *early* exit, that is, exit before the normal retirement age at sixty-five, is to start to collect disability insurance payments: about 9 percent of sixty-four-year-old men have taken the opportunity for early withdrawal from the old age pension, compared to 37 percent who receive benefits from disability insurance.[23]

23. It should, however, be noted that those who were sixty-four years old in 1994 had the oppor-

According to Swedish law, an individual is eligible for a full disability pension if for health reasons he is completely unable to work. 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 could not work anyway. However, neither of these conditions applies. It is not plausible that 37 percent of sixty-four-year-old men are completely unable to work.[24] In the United States, the corresponding disability rate among sixty-four-year-olds is 8 percent (see Diamond and Gruber, chap. 11 in this volume). 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 to receive a 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 fifty-five and seventy. This implies that we disregard several minor changes in benefit rules and the 1990–91 tax reform. The simulations show the incentives inherent in the 1995 rules, not those actually confronting a man born in 1930. But, apart from taxes, the structure of the system has been constant.

Applying the rules to the earnings history of the hypothetical individual, calculating the monthly payments conditional on the date the hypothetical individual chooses to leave the labor market is fairly straightforward. But the main objective of the simulations is to calculate social security wealth (SSW), and for this we need additional information. Social security wealth 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 we need three additional pieces of information: (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 formula for computing social security wealth is provided in appendix D.

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 1

tunity to obtain a disability pension before the legislative tightening of requirements during the 1990s. The present legislation is considerably more restrictive and can be expected to result in lower disability rates in the future.

24. For a short summary of Wadensjö (1996), which analyzes how Swedish disability insurance works in practice, see app. B.

January 1933. We also assume that she never worked. As described in section 9.2 above, 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 dead; and (3) the wife is alive and the husband dead. To do this, we used gender-specific life tables (provided by Statistics Sweden), which are conditional on the individual living to age fifty-five. We assumed independence in mortality rates between the spouses. Note that we use the unconditional mortality risk beyond age fifty-five. So there is always some mortality risk for all ages older than age fifty-five. Our calculations thus give the economic incentives (implied by the social security system) that face the representative worker at age fifty-four. But this is not appropriate if we are interested in the economic incentives for year-to-year behavior.

As section 9.2 explains, the Swedish social security system is primarily financed through payroll taxes. In the simulations, we assume that the incidence of these payroll taxes is such that the entire cost is directly passed on to wages.[25] The basic pension is partly financed by income taxes. We deduct this part of the expenditures and payroll taxes for old age, survivor, and occupational pensions in the calculation of net social security wealth. In the disability option case, we also deduct payroll taxes for a disability pension. In the base case calculations, we assume a discount rate of 3 percent.

Besides social security wealth, we present three different concepts from the simulations: (1) *the replacement rate,* 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,* defined as the percentage change in social security wealth compared to the previous year; and (3) *the tax/subsidy rate,* defined as the absolute change in social security wealth from an additional year of work divided by net earnings during the year. If the absolute change in social security wealth 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 social security 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 social security wealth is negative, that is, the individual's contribution to the social security system of one additional year of work exceeds the increase in expected benefits from the social security system, it could be interpreted as an implicit tax on one additional year of work induced by the systems that 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 a 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 addi-

25. Empirical studies (e.g., Palmer and Palme 1989) find that this assumption is highly realistic.

tional work at the early retirement ages on the social security wealth in our calculations: (*a*) The share of the payroll tax that constitutes the fee to the pension system will decrease the worker's social security wealth if he continues to work. This is not the case after age sixty-five because employers need not pay payroll taxes for these workers. (*b*) There is some risk that the worker will die for each year he decides to continue to work. This will lower his social security wealth. (*c*) If the worker decides to continue to work beyond age sixty, his monthly pension payments from the public pension scheme will increase by 0.5 percent for each month that he continues to work beyond age sixty until age sixty-five and by 0.7 percent beyond age sixty-five until his seventieth birthday. This actuarial adjustment will increase the individual's social security wealth. Note that the adjustment of the pension benefit does not occur if the individual receives disability insurance. (*d*) An additional year of work means fewer years when pension benefits can be claimed, which decreases social security wealth. However, as it is not possible to claim benefits before age sixty in the old age pension scheme, this applies only in the disability insurance case before age sixty. (*e*) Because the *net* income streams constitute social security wealth, income taxes on pension incomes will decrease social security wealth. 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 social security wealth.[26] (*f*) The ATP and STP benefits are related to the worker's previous earnings. The requirement for receipt of a full ATP benefit is thirty years of earnings and for receipt of a full STP pension twenty-eight years of earnings starting from 1965.[27] Furthermore, the STP scheme requires three years of earnings between the ages of fifty-five and sixty-four if the individual is 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 fifteen years, the STP pension by the best three years between the ages of fifty-five and fifty-nine. 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 tenth and ninetieth 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 earnings history starting at age thirty-five.

For the simulations with these alternative assumptions, we use the rules for

26. Section 9.2 above provides a short description of the Swedish income tax system and the housing allowance scheme.

27. This rule applies to individuals born in 1930. For those born in 1932 and later, the requirement was thirty years.

Table 9.2 **Incentive Calculations—Base Case with Disability Pension Option**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	.842	2,020,280	...	...	...
55	.841	1,864,510	−155,770	−.077	1.171
56	.814	1,717,957	−146,553	−.079	1.058
57	.805	1,674,099	−43,858	−.026	.309
58	.810	1,536,893	−137,205	−.082	.971
59	.792	1,409,862	−127,032	−.083	.870
60	.789	1,281,354	−128,507	−.091	.870
61	.810	1,147,275	−134,079	−.105	.939
62	.798	1,022,147	−125,129	−.109	.860
63	.808	900,608	−121,539	−.119	.850
64	.729	785,497	−115,111	−.128	.799
65	.785	780,345	−5,152	−.007	.036
66	.841	768,133	−12,212	−.016	.085
67	.897	749,632	−18,501	−.024	.128
68	.953	725,280	−24,353	−.032	.169
69	1.011	697,510	−27,769	−.038	.193

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.

9.3.2 Base-Case Results

Tables 9.2 and 9.3 show the *base case* results. Table 9.2 shows the results for a worker who is eligible for a disability pension, table 9.3 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, that is, provided that he retires on his next birthday. 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 sixty, the first five numbers in table 9.3 are left out in the second column.

Comparing column 3 in tables 9.2 and 9.3, we see that there is a large difference in social security wealth depending on whether disability is an available option: the value of the individual's social security wealth on his fifty-fifth birthday is SKr 2,020,280 (U.S.$283,349) with disability pension and SKr 1,168,183 (U.S.$163,841) without. This 73 percent difference in social security wealth represents the present value of the gain the representative worker can obtain if he decides to retire at age fifty-five and is eligible for disability insurance.[28] By comparing column 4 in tables 9.2 and 9.3, it can also be seen

28. These figures include only 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. In order to obtain the figure of a 73 percent difference, we have used the same conditional

Table 9.3 **Base-Case Incentive Calculations**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,168,183	...	...	...
55	...	1,137,465	−30,717	−.026	.231
56	...	1,106,826	−30,640	−.027	.221
57	...	1,098,951	−7,874	−.007	.056
58	...	1,077,393	−21,558	−.020	.153
59	.459	1,056,086	−21,307	−.020	.146
60	.485	1,004,338	−51,749	−.049	.350
61	.545	953,215	−51,123	−.051	.358
62	.572	916,429	−36,786	−.039	.253
63	.620	874,964	−41,465	−.045	.290
64	.729	829,879	−45,086	−.052	.313
65	.785	824,727	−5,152	−.006	.036
66	.841	812,515	−12,212	−.015	.085
67	.897	794,014	−18,501	−.023	.128
68	.953	769,662	−24,353	−.031	.169
69	1.011	741,892	−27,769	−.036	.193

that the change in social security wealth is equal in the two *base cases* if the representative worker decides to work his last year at age sixty-four or later. This is because the worker is not eligible for disability insurance after age sixty-five and the *base cases* are therefore equivalent beyond this age.

By studying the column giving tax/subsidy rates in tables 9.2 and 9.3, several interesting properties of the two schemes can be noted. First, both systems provide 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 disability insurance as an old age pension option. This result is not surprising since, unlike the old age pension scheme, disability insurance has no actuarial adjustment of the benefit if the individual begins to claim benefits early. This explains the difference in the tax rate between age sixty and age sixty-five. Furthermore, if an individual retires without a disability pension before age sixty, he cannot start to claim benefits until age sixty anyway; that is, if the individual decides to work one additional year before age sixty, 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 were this not the case. This is not true for disability insurance at any age. For each additional year the worker decides to work, he will have to give up disability insurance payments.

survival probabilities as we did for the old age pension case. This represents a case where the individual manages 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, social security wealth is SKr 1,908,873 (U.S.$267,724) if the worker retires at age fifty-five, i.e., 5.5 percent lower.

Table 9.4 **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	.977	.204	.295	.309
58	1.020	1.228	.967	.971
59	.922	1.085	.863	.870
60	.893	1.095	.865	.870
61	.987	1.214	.941	.939
62	.918	1.104	.861	.860
63	.904	1.097	.852	.850
64	.851	1.028	.800	.799
65	−.006	−.007	.036	.036
66	.062	.070	.085	.085
67	.123	.139	.128	.128
68	.178	.202	.169	.169
69	.227	.257	.193	.193

For the disability pension case, the tax rate on one year of additional work at age fifty-five is above 100 percent. This means that the accrual in social security wealth 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 percent, until the representative worker reaches age sixty-five.

To facilitate the analysis of which parts of the institutional system generate the variations in the tax/subsidy rates and of the results in general, we present for the sake of comparison tables 9.4 and 9.5. Column 4 in these tables gives the tax/subsidy rate where we have not considered the housing allowance. Column 3 shows the tax/subsidy rate where we have considered neither the housing allowance nor income tax. Column 2 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 9.16 and 9.17.

The tax on additional work decreases somewhat for one year of additional work after the fifty-seventh birthday for both base cases. Item *f* above explains this. The STP scheme requires at least three years of work between age fifty-five and age sixty-four; that is, one additional year of work at age fifty-seven leads to a lifetime increase in monthly pension payments of about 10 percent. This can be more carefully examined in tables 9.4 and 9.5 as well as in figures 9.16 and 9.17. Comparing the results obtained when we took the STP benefit into account with those obtained when we did not, we can see that the STP benefit creates a dramatic shift in the graph of the tax/subsidy rate. The graphs in figures 9.16 and 9.17 also show that the incentive to stay in the labor force

Table 9.5 **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	−.006	.022	.147	.231
56	−.017	.010	.137	.221
57	−.035	−.984	−.421	.056
58	−.044	−.044	.056	.153
59	−.066	−.064	.046	.146
60	.055	.079	.195	.350
61	.130	.153	.214	.358
62	.173	.194	.249	.253
63	.233	.254	.287	.290
64	.280	.300	.311	.313
65	−.006	−.007	.036	.036
66	.062	.070	.085	.085
67	.123	.139	.128	.128
68	.178	.202	.169	.169
69	.227	.257	.193	.193

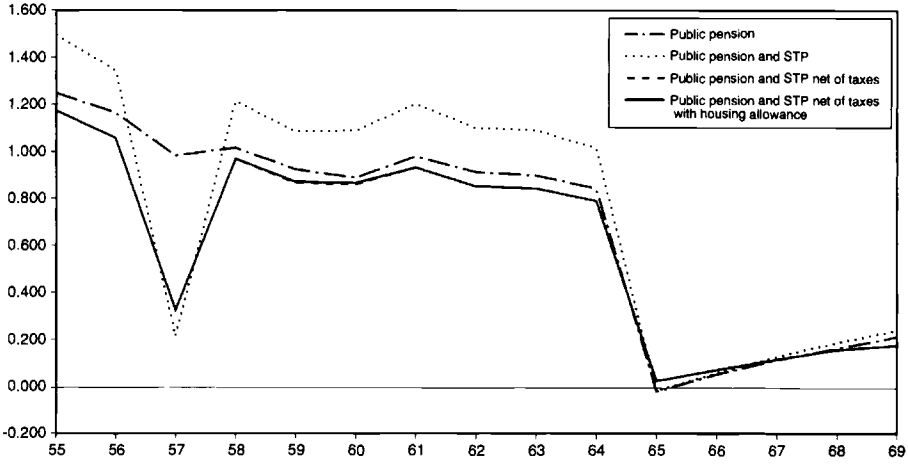

Fig. 9.16 **Tax/subsidy rate, base case with disability pension option**

created by STP is to a large extent counteracted by income taxes and the housing allowance: for the disability pension case, the tax rate increases from 16.9 percent when we do not consider income taxes and housing allowances to 27.5 percent when we do.

Turning to the case without a disability pension, we can see that the accrual and tax/subsidy rates vary between three phases: between age fifty-four and age fifty-nine, when there is a relatively low tax on continued work; between

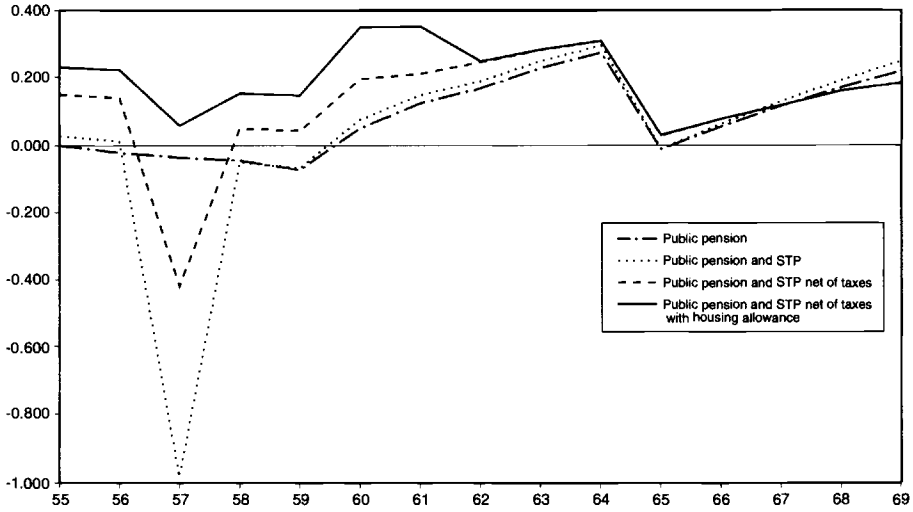

Fig. 9.17 Tax/subsidy rate, base case

age sixty and age sixty-four, when there is a relatively high tax rate; and between age sixty-five and age sixty-nine, when there is a somewhat lower tax rate compared to the preceding phase, but a rate that increases within the phase. The pattern of these three phases can be explained by the six institutional factors that determine social security wealth, which the previous section summarized. The fact that the number of monthly pension payments will not be affected by whether the individual chooses to work one extra year between age fifty-five and age fifty-nine because neither the national nor the STP pension can be collected before age sixty (item *d* above) explains why there is a difference between the tax/subsidy rate in this age group compared to the age group sixty to sixty-four. The difference in the tax/subsidy rate between age sixty to sixty-four and age sixty-five to sixty-nine is attributed to the fact that employers need not pay payroll taxes for employees beyond age sixty-five.

Figure 9.17 also gives some background as to why the old age and survivor pension systems provide a tax rather than a subsidy on additional work throughout the rest of the age interval considered. Following the graph, where we consider only the old age national pension schemes, we can see that the system is about actuarially fair until age sixty. After that, the tax/subsidy rate turns positive, that is, turns to a tax on additional work, and increases. This result shows that the 0.5 percent reduction in the monthly pension payments for each month of early withdrawal before age sixty-five for the basic pension and the ATP and the 0.7 percent increase in the payments from these pension schemes for each month of delayed withdrawal after age sixty-five are not enough to offset the pension payments given up and the contributions paid by working additional years. This result depends on the choice of discount rate.

Choosing a discount rate greater than 3 percent makes the decrease in social security wealth 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 of using unconditional mortality risk beyond age fifty-five. A lower mortality risk gives a higher value to future pension payments and therefore a smaller increase in the implicit tax rate.

Figure 9.17 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 under age sixty-four.

9.3.3 Other Cases

Table 9.6 gives the same information as table 9.3 above for a worker who, instead of following the earnings of the median earner, follows those of the tenth percentile during his work life. We follow the same principles for the imputation of earnings beyond age fifty as we did in the *base-case* calculations. Table 9.7 and figure 9.18 give the corresponding information as table 9.5 and figure 9.17 above for this earnings history. A comparison of tables 9.3 and 9.5 above and tables 9.6 and 9.7 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 percent for those who decide to work one additional year at age sixty-one). The high tax rate also continues for ages sixty-five and sixty-six. By studying the difference between the graphs for the tax/subsidy rate where we have and have

Table 9.6 **Incentive Calculations: Tenth Percentile**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,103,805	...	...	...
55	...	1,080,498	−23,307	−.021	.222
56	...	1,057,808	−22,691	−.021	.210
57	...	1,044,762	−13,046	−.012	.119
58	...	1,024,217	−20,545	−.020	.188
59	.513	1,003,353	−20,864	−.020	.186
60	.536	949,159	−54,194	−.054	.479
61	.577	893,650	−55,510	−.058	.503
62	.597	846,566	−47,083	−.053	.421
63	.632	799,586	−46,980	−.055	.425
64	.797	749,420	−50,167	−.063	.452
65	.825	718,450	−30,969	−.041	.278
66	.856	685,647	−32,803	−.046	.294
67	.910	668,093	−17,555	−.026	.158
68	.965	648,227	−19,866	−.030	.178
69	1.021	624,777	−23,450	−.036	.210

Table 9.7 **Tax/Subsidy Rate: Tenth Percentile**

Last Age of Work	Gross Public Pension	Gross Public Pension + STP	Net Public Pension + STP	Net Public Pension + STP + BTP
55	−.020	.008	.136	.222
56	−.041	−.014	.120	.210
57	−.053	−.925	−.331	.119
58	−.065	−.059	.088	.188
59	−.041	−.034	.097	.186
60	.064	.087	.339	.479
61	.132	.154	.363	.503
62	.177	.199	.279	.421
63	.236	.256	.285	.425
64	.280	.299	.312	.452
65	−.007	−.007	.047	.278
66	.061	.069	.097	.294
67	.123	.138	.138	.158
68	.179	.200	.178	.178
69	.228	.255	.210	.210

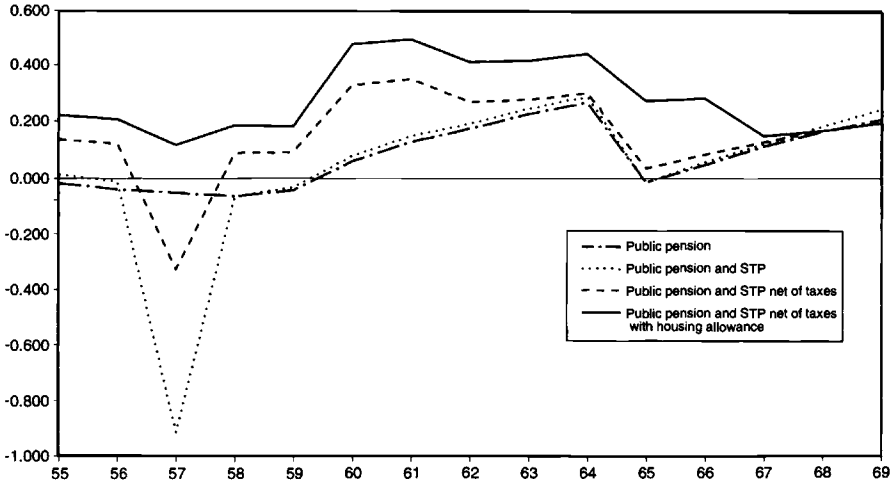

Fig. 9.18 **Tax/subsidy rate, tenth percentile**

not considered income taxes and housing allowances, we can conclude that this higher tax—compared to the *base case*—can be explained by the high marginal effects of housing allowances and income taxes.

Table 9.8 and 9.9 and figure 9.19 explore the results for a worker following the earnings of the ninetieth percentile. Although the pattern of the changes in the accrual rate over the period considered is similar to that of the *base case,*

Table 9.8 **Incentive Calculations: Ninetieth Percentile**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,284,308	...	...	...
55	...	1,233,428	−50,881	−.040	.246
56	...	1,181,194	−52,234	−.042	.245
57	...	1,237,965	56,771	.048	−.262
58	...	1,199,582	−38,382	−.031	.178
59	.389	1,161,857	−37,725	−.031	.171
60	.415	1,102,060	−59,797	−.051	.268
61	.455	1,039,183	−62,877	−.057	.289
62	.480	970,742	−68,441	−.066	.310
63	.516	899,324	−71,419	−.074	.328
64	.613	824,144	−75,180	−.084	.343
65	.660	820,681	−3,463	−.004	.016
66	.699	791,431	−29,250	−.036	.133
67	.731	746,173	−45,258	−.057	.206
68	.763	697,441	−48,732	−.065	.222
69	.795	645,793	−51,648	−.074	.235

Table 9.9 **Tax/Subsidy Rate: Ninetieth Percentile**

Last Age of Work	Gross Public Pension	Gross Public Pension + STP	Net Public Pension + STP	Net Public Pension + STP + BTP
55	.071	.104	.171	.246
56	.070	.102	.173	.245
57	.064	−.831	−.441	−.262
58	.052	.082	.157	.178
59	.049	.078	.151	.171
60	.177	.205	.268	.268
61	.217	.244	.289	.289
62	.259	.284	.310	.310
63	.294	.319	.328	.328
64	.327	.350	.343	.343
65	−.005	−.006	.016	.016
66	.052	.060	.133	.133
67	.105	.119	.206	.206
68	.151	.173	.222	.222
69	.193	.220	.235	.235

there are two interesting differences. First, the spike at age fifty-seven remains when we also consider income taxes and housing allowances. A comparison of figures 9.17 above and 9.19 shows that this difference is primarily due to the fact that the representative individual in this case is not eligible for a housing allowance. Second, the implicit tax on additional work is much higher for all

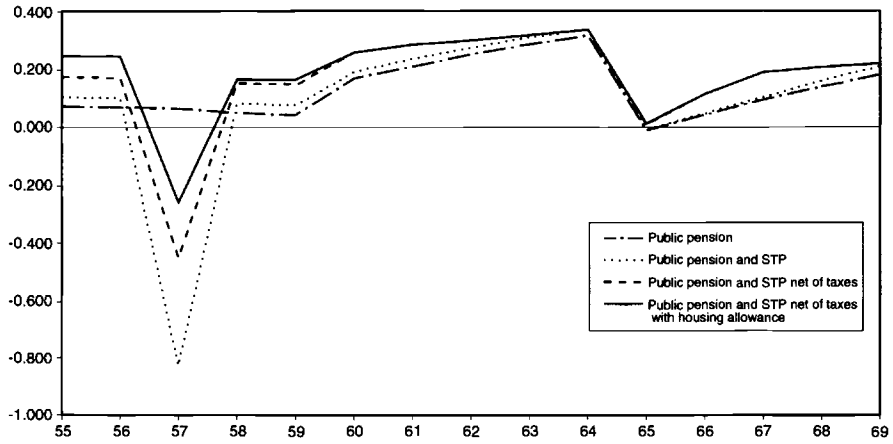

Fig. 9.19 Tax/subsidy rate, ninetieth percentile

Table 9.10 Incentive Calculations: Single Worker

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	953,956	...	...	...
55	...	920,488	−33,468	−.035	.252
56	...	886,960	−33,528	−.036	.242
57	...	866,485	−20,475	−.023	.144
58	...	835,941	−30,544	−.035	.216
59	.487	807,084	−28,857	−.035	.198
60	.510	750,163	−56,921	−.071	.386
61	.556	692,330	−57,833	−.077	.405
62	.584	654,754	−37,577	−.054	.258
63	.633	612,872	−41,882	−.064	.293
64	.743	566,912	−45,960	−.075	.319
65	.800	561,656	−5,256	−.009	.036
66	.857	549,014	−12,642	−.023	.088
67	.914	530,163	−18,852	−.034	.131
68	.971	505,350	−24,813	−.047	.172
69	1.031	477,573	−27,777	−.055	.193

ages beyond age sixty-two—compared to the *base case*. For ages sixty-six to sixty-eight, the difference is explained by the fact that the representative ninetieth percentile individual has a higher marginal tax rate compared to the base case. For ages sixty to sixty-one, the median individual has a higher tax on additional work due to the reduction of the housing allowance.

Tables 9.10 and 9.11 and figure 9.20 give the results where we assume that the representative worker is single. We can see that, here, the implicit tax rate

Table 9.11 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	.053	.081	.192	.252
56	.042	.070	.182	.242
57	.026	−.923	−.308	.144
58	.017	.017	.144	.216
59	−.002	.000	.124	.198
60	.068	.092	.236	.386
61	.139	.162	.265	.405
62	.185	.206	.258	.258
63	.244	.264	.293	.293
64	.290	.310	.319	.319
65	−.005	−.005	.036	.036
66	.065	.073	.088	.088
67	.127	.143	.131	.131
68	.184	.207	.172	.172
69	.233	.263	.193	.193

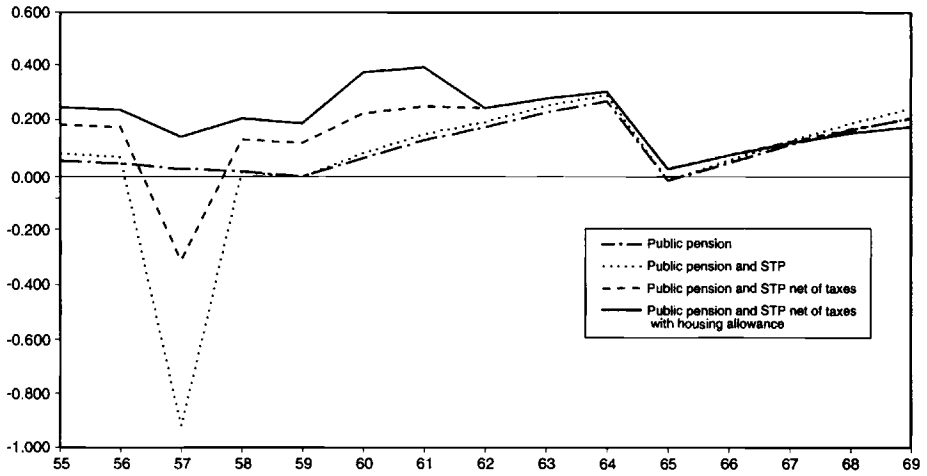

Fig. 9.20 Tax/subsidy rate, single worker

is generally higher, especially if the individual chooses to work one additional year between age fifty-seven and age sixty. This difference is due to the fact that one year of additional work at this age gives a higher survivor pension from both the ATP and the STP schemes. But additional work after age sixty will have no effect on the STP survivor pension and have very little effect on the ATP pension; this is why the difference between this case and the base

Table 9.12 **Incentive Calculations: Diminishing-Earnings Profile**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,164,845	...	...	...
55	...	1,135,751	−29,094	−.025	.221
56	...	1,106,538	−29,214	−.026	.219
57	...	1,096,397	−10,141	−.009	.074
58	...	1,074,918	−21,479	−.020	.155
59	.475	1,054,706	−20,212	−.019	.144
60	.498	1,002,527	−52,179	−.049	.368
61	.554	949,421	−53,107	−.053	.385
62	.628	905,100	−44,320	−.047	.341
63	.705	865,587	−39,513	−.044	.322
64	.870	824,399	−41,188	−.048	.351
65	.982	819,128	−5,271	−.006	.047
66	1.106	807,074	−12,054	−.015	.113
67	1.242	788,860	−18,213	−.023	.180
68	1.394	765,220	−23,641	−.030	.247
69	1.565	737,077	−28,142	−.037	.312

case diminishes with age. Had we selected a larger age difference between the representative worker and his wife in the *base-case* calculations, that is, had the wife 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 pension would have reduced the survivor pension within the ATP.

In tables 9.12 and 9.13 and figure 9.21, we evaluate the sensitivity to the imputation of incomes after age fifty in the synthetic earnings history in our *base-case* simulations by using the median earnings history after age fifty as well, that is, the *actual synthetic* earnings history. A comparison of the tax/subsidy rate for this case with that for the *base case* reveals two effects that work in different directions. Lower earnings between age fifty-five and age fifty-nine means (as pointed out in item *f* above) lower ATP and, more important for this particular phase in the work life, lower STP. But the contribution 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.

Tables 9.14 and 9.15 and figure 9.22 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 thirty-five, that is, meets the requirement for a full ATP pension of thirty years of contributions to this pension scheme at age sixty-four compared to the base case, where the worker meets the requirement at age fifty-nine. Thus, the only phase where we expect the incen-

Table 9.13 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	−.046	−.017	.126	.221
56	−.017	.010	.136	.219
57	−.036	−.979	−.401	.074
58	−.042	−.039	.060	.155
59	−.056	−.053	.048	.144
60	.072	.096	.216	.368
61	.173	.195	.244	.385
62	.221	.243	.285	.341
63	.275	.296	.322	.322
64	.329	.349	.351	.351
65	−.008	−.009	.047	.047
66	.081	.091	.113	.113
67	.170	.192	.180	.180
68	.260	.294	.247	.247
69	.352	.397	.312	.312

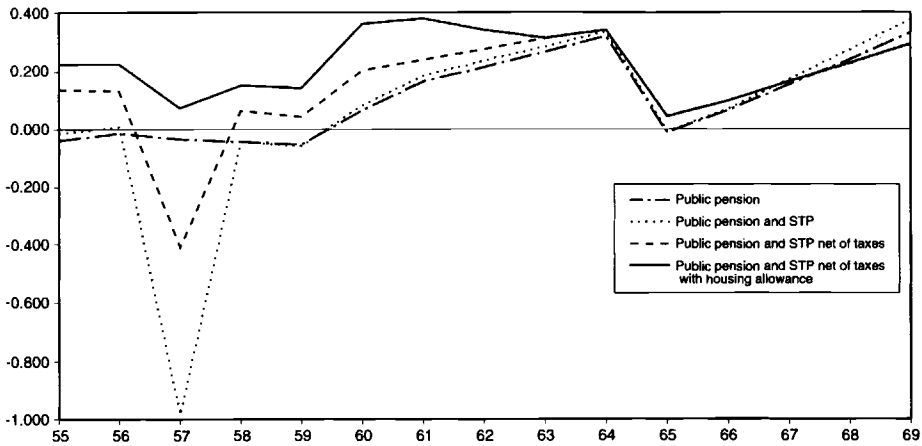

Fig. 9.21 Tax/subsidy rate, diminishing-earnings profile

tives of the social security system to differ between this case and the *base case* is between age sixty and age sixty-four. This is also exactly what we see if we compare tables 9.3 and 9.5 above and tables 9.14 and 9.15. The implicit tax rate on additional years of work is substantially higher between age sixty and age sixty-four. For the rest of the period, it is more or less the same.

Table 9.14 **Incentive Calculations: Incomplete Earnings History**

Last Age of Work	Replacement Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	...	1,126,679	...	...	...
55	...	1,095,855	−30,824	−.027	.232
56	...	1,065,278	−30,577	−.028	.221
57	...	1,047,490	−17,788	−.017	.125
58	...	1,019,839	−27,652	−.026	.196
59	.422	992,748	−27,090	−.027	.185
60	.449	954,794	−37,954	−.038	.257
61	.503	912,882	−41,911	−.044	.294
62	.546	872,770	−40,113	−.044	.276
63	.606	853,506	−19,264	−.022	.135
64	.729	829,879	−23,627	−.028	.164
65	.785	824,727	−5,152	−.006	.036
66	.841	812,515	−12,212	−.015	.085
67	.897	794,014	−18,501	−.023	.128
68	.953	769,662	−24,353	−.031	.169
69	1.011	741,892	−27,769	−.036	.193

Table 9.15 **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	−.003	.025	.149	.232
56	−.012	.015	.138	.221
57	−.028	−.977	−.349	.125
58	−.038	−.038	.101	.196
59	−.057	−.054	.089	.185
60	−.166	−.142	−.050	.257
61	−.116	−.093	.074	.294
62	−.076	−.054	.072	.276
63	−.024	−.003	.110	.135
64	.026	.046	.140	.164
65	−.006	−.007	.036	.036
66	.062	.070	.085	.085
67	.123	.139	.128	.128
68	.178	.202	.169	.169
69	.227	.257	.193	.193

9.4 Conclusions

The simulations of how social security wealth is affected when a representative worker decides to retire carried out in section 9.3 above reveal huge differences in the economic incentives for leaving the labor force provided by dis-

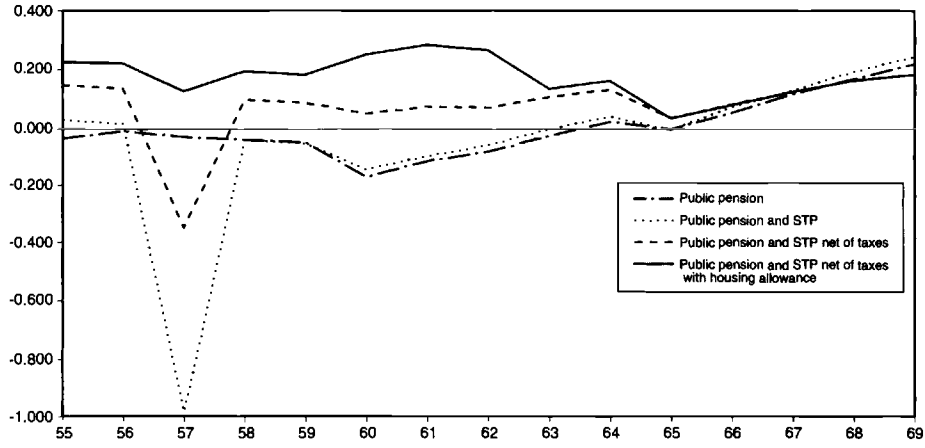

Fig. 9.22 Tax/subsidy rate, incomplete earnings history

ability insurance and the old age pension: the implicit tax on additional work generated by disability insurance is above 100 percent of the representative worker's net income. Still, the overview of the rates of labor force participation in section 9.1 shows that, despite these economic incentives, labor force participation is very high until about age fifty-eight and the hazard rate out of the labor force is moderate before this age. This observation supports the findings obtained in previous research (see Hedström 1987; and Wadensjö 1996) that the rate of people receiving disability insurance is determined by access to this insurance, that is, by the strictness in the law determining 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 resolve this issue.

On the other hand, the economic incentives generated by the old age pension scheme seem to have an effect on retirement behavior. A striking observation that can be made from section 9.1 above is that labor force participation in the age group fifty-five to fifty-nine is very high compared to that in the age groups sixty to sixty-four and sixty-five and over. 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 that in the age group sixty to sixty-four. 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 presented in section 9.3 above indicate that the pension system, especially the occupational pension scheme for blue-collar workers, provides stronger economic incentives not to leave the labor force up to age fifty-seven than after this age. The explanations for the very low labor force participation of persons aged sixty-five and older are dominated by the rules for mandatory retirement at age sixty-five.

Another interesting observation that can be made on the basis of the simulations presented in section 9.3 is the importance of income taxes and housing allowances. When we consider only 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. The economic incentives provided by the STP occupational pension scheme are also largely counteracted. The political objective of the highly progressive income taxes, in particular for old age pensioners, and housing allowances is to provide an equal income distribution among old age pensioners. Obviously, this objective of equity in the distribution of economic outcome conflicts with the objective of equity inherent in the actuarial fairness of the pension system.

Appendix A
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 conducted four times every year, and the sample size was twelve thousand individuals (i.e., forty-eight thousand each year). Since 1970, the sample size is about twenty thousand, and the survey is conducted every month. We used annual averages in the figures, except for the age group sixty-five to seventy-four between 1986 and 1995, for which we used the average for the last three months of every year because this age group is only included in the population of these surveys. The rate of nonresponse is about 10 percent 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 actively searching for a job or 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 thirty-five 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 consist of three parts; information from (1) interviews about, for example, employment, housing, and household composition, (2) tax returns

from household members on different components of household income, and (3) administrative records on taxes and transfers from the government. The rate of nonresponse is about 11 percent. The sample size of this survey is about ten thousand 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 9.11–9.13 above are based on very few observations.

Appendix B
Review of Previous Empirical Studies on Social Security and Retirement

The effect of the Swedish social security system on labor force participation was analyzed in a few empirical studies. The most general is Hansson-Brusewitz (1992), which estimates a life-cycle and an atemporal labor supply model on cross-sectional data for men aged between fifty-five and seventy. 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 with a pension benefit that is equal to 60 percent 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 sixty; (2) retire with disability insurance at age sixty; (3) partially retire at age sixty; and (4) do not retire at all before age sixty-five. Sundén estimates this model using 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 resulted in a small decrease in the number of individuals receiving benefits from 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 governing the receipt of benefits from disability insurance and the social security system for different pathways to early retirement, Kruse and Söderström (1989) find that, primarily, disability insurance and the partial retirement scheme provide large subsidies for early retirement and part-time work among the elderly. They suggest that the decreased labor supply among the 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 disability insurance works in practice. Wadensjö 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). He describes a common pathway to early retirement from the Swedish labor market. A company wants to reduce its personnel. In general, the older workers are best protected by seniority rules in Swedish legislation. But the company wants to retain at least some of its young workers. A standard procedure is then to investigate whether any of the older workers are eligible to receive a disability pension. The necessary medical examination is often conducted by the company doctor. Including extra severance payments, the compensation level for the dismissed older workers, who are eligible for disability pension, could be more than 100 percent of forgone earnings. The local unions are then often willing to deviate from the seniority rule. The implementation of new, stricter rules governing eligibility for a disability pension has made it more difficult for firms to use this option for reducing personnel. But a market for insurance (guarantee pensions), offered by private insurance companies, that retains the same early labor market exit option for older workers has been introduced.

Eriksen and Palmer (1997) 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 factors other than health, concluding that labor market factors are predominantly responsible for the trend.

Appendix C
Imputations of Income

For the tenth percentile income earners, we had to impute incomes for ages thirty to forty-seven. For ages forty-eight to fifty-nine, the observed difference between true income and income measured by pension points is about 10 percent on average. We assumed that the corresponding difference decreases from

20 percent at age thirty to 10 percent at age forty-seven, which reflects a larger share of earners with income below the BA at lower ages. For the ninetieth percentile income earner, we can observe true income only in ages under thirty-six and above forty-seven because income is above the social security ceiling between these ages. We assumed that income increases linearly between age thirty-five and age forty-eight.

Appendix D
The Formula for Computing Social Security Wealth (SSW)

a_0 = the worker's age at evaluation of social security wealth (set to fifty-five in the base-case calculations);
r = the worker's age at retirement;
maxage = maximum potential age;
$p(a|a_0)$ = probability of survival of the worker at age a conditional on survival at age a_0;
$q(a|a_0)$ = probability of survival of the spouse at the worker's age a conditional on survival of the spouse at the worker's age a_0.
$\mathrm{BM}(a, r)$ = amount of the worker's pension benefit at age a if he retires at age r and is married at age a;
$\mathrm{BS}(a, r)$ = amount of the worker's pension benefit at age a if he retires at age r and is not married at age a;
$S(a, r)$ = amount of survivor 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 social security at age a; and
ρ = discount rate (set to 3 percent in the base-case calculations).

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

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

$$\mathrm{SSW}(a_0, r) = \mathrm{PB}(a_0, r) - \mathrm{SSC}(a_0, r).$$

References

Aronsson, Thomas, and James R. Walker. 1997. The effects of Sweden's welfare state on labor supply incentives. In *The welfare State in transition,* ed. R. B. Freeman, B. Swedenborg, and R. Topel. Chicago: University of Chicago Press.

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

Eriksen, Tor, and Edward Palmer. 1997. The concept of work capacity. In *Social policy and the labour market,* ed. P. R. De Jong and T. R. Marmor. Andershot: Ashgate.

Hansson-Brusewitz, Urban. 1992. Labor supply of elderly men: Do taxes and transfers matter? Ph.D. diss., Department of Economics, University of Uppsala.

Hedström, Peter. 1987. Disability pension: Welfare or misfortune? In *Welfare states and welfare research,* ed. Robert Erikson et al. New York: Sharp.

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 *Redefining the process of retirement,* ed. W. Schmähl. Berlin: Springer.

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

———. 1996. Nybeviljade Förtidspensioner 1971–1995. Statistikinformation Is-I 1996:1. Stockholm.

Palme, Joakim. 1990. Pension rights in welfare capitalism: The development of the old-age pension in 18 OECD countries, 1930–1985. Ph.D. diss., Department of Sociology, Stockholm University.

Palmer, Edward, and Mårten Palme. 1989. A macroeconomic analysis of employer-contribution financed social security. In *The political economy of social security,* ed. B. A. Gustafsson and N. A. Klevmarken. Amsterdam: North-Holland.

Sundén, Annika. 1994. Early retirement in the Swedish pension system. Ph.D. diss., Department of Economics, Cornell University.

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.* Washington, D.C.: Bureau of Labor Statistics.

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.

———. 1989. Varför har vi normal pensionsålder? In *Vingarnas trygghet: Arbetsmarknad, ekonomi och politik,* ed. Eskil Wadensjö, Åke Dahlberg, and Bertil Holmlund. Lund: Dialogos.

———. 1996. Early exit from the Swedish labour market. In *The Nordic labour markets in the 1990's,* ed. E. Wadensjö. Amsterdam: Elsevier Science.