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Simulation of Pension Reforms in The Netherlands

Arie Kapteyn and Klaas de Vos

8.1 Introduction

Broadly speaking, in The Netherlands all individuals aged 65 or over are entitled to the same Basic State Pension (Social Security—AOW in Dutch—abbreviated to SS throughout this chapter). Most other public benefits (e.g., disability insurance [DI], unemployment insurance [UI], welfare) expire when one turns 65. In addition, for those both above and below 65, next to the public entitlement programs guaranteed by law, a relatively large percentage of people who stop working are entitled to other private benefits, for example, occupational pensions supplementing SS for individuals over 65 and early-retirement (ER) benefits for individuals below 65.

Like most other developed countries, The Netherlands is faced with an increasing share of elderly in its total population. The share of the population over 65 has grown from 8 percent in 1950 to 14 percent in 2000 and is expected to rise to 24 percent by the year 2035. If nothing else changes, this will cause a considerable increase in SS expenditures. Faced with this prospect, the government has recently come up with policy measures to maintain its sustainability. Furthermore, recent developments in the stock market have caused concern about the sustainability of the fully funded occupational pensions supplementing SS, most of which are characterized by defined benefits.

An additional problem for the Dutch economy is the low labor force participation rate of individuals below 65 combined with the costs of the programs providing income to the individuals in this age group who have left the labor force. This concerns public programs, such as DI, but also private

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ER schemes. During the 1980s and 1990s these programs have induced almost all employees to retire before reaching the age of 65. All of this has led to highly increased costs, both for the public DI and UI programs and for the employer-financed ER schemes. In reaction, eligibility conditions for DI and UI benefits have been tightened, and, increasingly, ER schemes are replaced by flexible retirement programs offering less attractive and actuarially fair (or fairer) pensions. In addition, the earlier pressure on elderly employees to vacate one's job for a younger job seeker has decreased dramatically with the spectacular reduction in unemployment. It remains to be seen to what extent all these phenomena will actually contribute to a reversal of the trend of decreasing labor market participation of the elderly.

In this chapter, we use model specifications developed in our earlier work (de Vos and Kapteyn 2004) to simulate the effect of three policy reforms on retirement patterns and on the benefits and taxes individuals pay after the age of 50. Notably, these reforms have been chosen for the purpose of cross-country comparisons, and are not being proposed as desirable or politically feasible reforms in The Netherlands. The remainder of the chapter is structured as follows. In section 8.2 we sketch the institutional framework within which people retire in The Netherlands. Section 8.3 describes the data and the way in which we use them for our analysis. Section 8.4 is devoted to the construction of incentive measures that are used in the estimation of the retirement equations. These equations are specified according to a common model, which is by and large used for all countries represented in this study. Section 8.5 presents the estimation results for the common model. Section 8.6 describes the three reforms, section 8.7 gives results of the policy simulations based on the estimated common model, and section 8.8 concludes.

8.2 Institutional Background

Social security (SS) guarantees a sufficient income to virtually all individuals 65 or over. Basically, SS is a flat-rate benefit equal to half the statutory minimum wage (after tax) with supplements for single individuals and for individuals with a spouse aged younger than 65 with a low income. Social security is financed largely as pay-as-you-go by a payroll tax on taxable income of individuals aged below 65. The associated tax rate is currently 17.9 percent (as of 2003), levied on taxable income up to a maximum (of €28,850 per annum). In 2001, SS benefits amounted to more than €20 billion, or 5 percent of GDP. Currently, about one in every five households in The Netherlands receives SS. The entitlement to SS does not require retirement from the labor force.

8.2.1 Other Public Programs

A number of arrangements exist that enable individuals to stop working before turning 65. The main ones are: DI, UI, and various ER schemes.

Disability insurance (DI) covers all employees against loss of earnings due to long-term sickness and disability. Currently, DI guarantees employees who lost more than 80 percent of their earnings capacity a benefit equal to 70 percent (80 percent before 1985) of their daily wage (up to a maximum). The benefit falls to a lower level after a certain period (both the length of this period and the percentage depend on age), and terminates at age 65. Most employees have taken out an additional insurance to cover the risk of a DI benefit falling below 70 percent of their previous earnings.¹

In the 1980s, the DI program became a very popular arrangement, which employers could use to shed less productive elderly employees. Severe legal obstacles existed (and still exist) to lay off employees, while DI benefits were more generous than UI benefits. As a result, both employers and employees had a preference for the disability route to unemployment. The ensuing rise in costs of DI has induced the government to limit eligibility for it by tightening entry conditions and reducing benefit levels. Moreover, individuals receiving disability benefits are now subject to a more rigorous screening of their loss of earnings capacity.

The main reason why UI is less attractive than DI is that unemployment benefits are only paid for a limited period (depending on the number of years worked before unemployment). However, most people aged 60 or above who become unemployed can expect to receive unemployment benefits equal to 70 percent of their previous earnings up to age 65.²

All public benefits for individuals younger than 65 are paid only if an individual is not employed.³

8.2.2 Private Transfers

Next to SS, a majority of the population over 65 is entitled to a supplementary occupational pension. In general, if an employer offers a pension scheme, then participation in such a scheme is compulsory. Until recently, more than 99 percent of the pension schemes were of the defined-benefit type, most of them being defined on the basis of final pay. Typically, occupational pensions—(PP [private pensions])—supplement SS to 70 percent of final pay for individuals who have worked 40 years. After tax, the replacement rate is usually substantially higher.

Most large firms have their own pension fund; smaller firms usually participate in sector-wide pension funds. Usually, these private pension

1. It should be noted that for single earners who lost more than 80 percent of their earnings capacity, disability benefits are always at least as high as the relevant social assistance (welfare) level (ABW/RWW), which, for a couple, is approximately equal to the after-tax minimum wage. In contrast to the entitlement to social assistance, household wealth is not taken into account when determining eligibility.

2. Similar to the case for disability benefits, if necessary the unemployment benefit is supplemented by welfare benefits to reach the social assistance level without taking household wealth into account. Hence, for single earners with low wages, the replacement rate can be almost 100 percent.

3. For individuals in part-time employment, benefits may supplement their earnings.

arrangements require that people leave the job in which they accumulate pension rights at age 65 at the latest. There is no earnings test, however, and people may consider looking for secondary jobs once they retire.

Early retirement (ER) has become increasingly common during the 1980s, and was viewed as a means of reducing unemployment. Typically, the ER schemes guarantee an employee a benefit equal to 70 or 80 percent of previous earnings up to the age of 65. In after-tax terms, replacement rates are even higher. Furthermore, while being in ER, one often keeps accumulating pension rights, though possibly at a lower rate than when one would be working.

Early retirement may be organized via the pension funds, which also provide the occupational pensions, or via the employer. Moreover, in contrast to pensions, ER is mostly financed as pay-as-you-go. Early retirement usually requires ten years of employment with the same employer before the ER date, whereas old-age pension rights remain valid if the worker changes jobs. The receipt of ER pensions usually requires a complete withdrawal from the labor market.

In recent years, costs of ER have increased considerably, and many firms are currently trying to reduce these costs. In particular, as mentioned in the introduction, instead of the original arrangements, which provided incentives to retire as soon as one was eligible, more and more programs are being introduced that offer flexible ER pensions, of which the level depends on the retirement age.

Despite these developments, the general conclusion remains that an elaborate system of income-replacing transfers exists in The Netherlands, which can be expected to act as incentives to leave the labor force on one's 65th birthday at the latest. Moreover, it should be noted that whereas rather strict laws are in force that prevent employers from laying off younger employees, reaching age 65 is a legal reason for dismissal, and social insurance protecting against loss of earnings as a result of sickness, disability, or unemployment only cover employees younger than 65.

8.3 The Data

Most of the results presented in this chapter are obtained using The Netherlands Socio-Economic Panel (SEP). The SEP is a longitudinal survey administered by Statistics Netherlands (CBS), consisting of approximately 5,000 households. The survey is representative of the Dutch population, excluding those living in special institutions like nursing homes. The SEP was launched in April 1984. The same households were interviewed in October 1984 and then twice a year (in April and October) until 1989. Since 1990, the survey has been conducted once a year (in May). In order to address the problem of sample attrition, Statistics Netherlands regularly adds new households to the SEP. Information is collected at the respondent

level on socioeconomic characteristics, income, and labor market participation, and on a wide range of assets and liabilities at the household level. For this paper, data have been used for the period 1984 to 1996.

In the analysis, we include men and unmarried women aged 50 to 64 who had positive earnings in 1984. Individuals are added in later years (until 1994) as they turn 50, subject to positive earnings at age 50. For all individuals, we observe whether they retire during the next year, and if so, whether they receive (early) retirement pensions, disability or unemployment insurance benefits, or no benefits at all. In addition, we observe education level, labor market sector, number of hours worked, and so on. For the purpose of this analysis we restrict the sample to working males (with or without partner) and working females without a partner. Individuals are in our sample for all the years they are working plus the first year they enter retirement. Retirement is assumed to be absorbing, so after an individual enters retirement, he or she is no longer followed. All information available for the individual is also available for his or her partner. In addition, we have information on assets and income from capital received by the household. However, this information is fairly unreliable and is not used in our analyses. Table 8.1 presents the means of the most important variables used in estimation. The meaning of option value (OV) and peak value (PV) is explained in the following. Social security wealth (SSW) comprises the present value of both SS and other benefits one receives in retirement.

As we are trying to model the individual retirement decision, we are limited by a lack of information on the eligibility for the various exit routes out of the labor force. In particular, we don't know whether and at which age individuals can take ER. We also don't know whether they might be entitled to DI benefits—and we have insufficient health information to be used as a proxy (although health would not present the full picture of DI

Table 8.1 Sample statistics of the variables used in estimation

Variable	Mean	Standard deviation
Retired (%)	11.8	
Social security wealth	218,021	98,635
Option value	12,201	6,849
Peak value	35,228	26,488
After-tax earnings	20,724	10,499
After-tax earnings partner	2,704	9,078
Age	54.5	3.5
Two-earner family (%)	28.1	
Partner present (%)	82.7	
Female head (%)	10.9	

Note: Number of observations = 3,922; money amounts in 2001 euros.

eligibility anyway). Therefore, the incentives for the individual to retire have been approximated as a weighted average of the incentives provided by the various exit routes, where the weight for a particular exit route is determined by the proportion of individuals in the age group observed to ultimately retire taking the exit route in question. The incentive to retire through ER is calculated as a weighted average of the incentive to retire through ER, given eligibility at a certain age. For this eligibility age for ER we have used information based on one wave of an alternative panel, the CentERpanel,⁴ in which employed individuals were asked whether they were participating in an occupational pension plan, and at which age that would allow them to retire. The eligibility age distribution for ER is differentiated by sector of employment (see de Vos and Kapteyn 2004, table 5).

8.4 Construction of Incentive Measures

As SS is a flat-rate benefit, whereas ER, DI, and UI benefits and occupational pensions are (usually) based on final pay, information on earnings histories is not needed to determine social security wealth (the actuarially discounted sum of future benefits; the benefits include not only SS benefits but also ER, PP, DI, and UI benefits wherever appropriate). Only information on the number of years in pensionable employment, together with information on the final earnings, would be sufficient to determine the benefit level to which the individual is entitled. The number of years in pensionable employment is generally unknown, but in the Dutch system this number, although clearly affecting SSW, generally has only a marginal effect on most of the incentive variables to be included in the retirement decision (peak value and option value, defined later): the effect of working an additional year is by and large constant over a rather wide interval of years.

As the jump-off point for the forward projections we use actual earnings, assuming constant real earnings. We do not calculate three-year averages, because this would limit the number of observations that could be included in the analysis.

In our calculations we do not distinguish UI benefits from DI benefits (both are received until the age of 65), and assume that, like SS (received after age 65), benefits do not depend on the age of retirement. After becoming unemployed or disabled, the older worker can expect to keep the same level of benefits up to age 65. After age 65, SS is independent of work history. Hence, the only way in which an employee's future income (after the coming year) may be affected by retiring one year earlier is via his or her private pension. Retiring before the age of 65 may affect the level of private pension to be received after age 65 by reducing the number of years

4. The CentERpanel comprises about 2,000 households and is run by CentERdata, a survey research institute affiliated with Tilburg University.

counting toward pension benefits. Moreover, if an employee were to retire before his or her ER age he or she would no longer be eligible for ER benefits.

In this section we describe how SSW, option values, and peak values are calculated. As mentioned previously, SSW is calculated as the actuarially discounted sum of future benefits. In our incentive calculations we distinguish the following cases:

1. Eligibility for (early) retirement at a certain age between 55 and 65. Eligible individuals will receive a private pension in addition to SS once they turn 65.
2. Eligibility for disability/unemployment benefit upon retirement before age 65, receipt of a private pension in addition to SS as of age 65.
3. Eligibility for SS only (as of age 65).

For all entitlements, we assume zero growth in real terms after 1995.⁵ For survival probabilities we use sex- and/or age-specific survival tables of Statistics Netherlands (1992). We assume independence between the mortality rates of the worker and his or her spouse. We use a real discount rate of 3 percent. To compute net benefit and pension levels we subtract payroll and income taxes. For the years after 1995 we use the tax schedule for 1995, keeping tax rates and brackets fixed in real terms. For individuals with working spouses, we assume that the spouse will stop working at age 65. In our calculations, we take into account that if an individual retires before age 65 and is not entitled to any benefit or pension, his or her spouse (if older than 65) may be entitled to a supplement to his or her SS benefit.

The option value of postponing retirement (Stock and Wise 1990) is approximated as

$$(1) \quad G_t(r^*) = V_t(r^*) - V_t(t),$$

where $V_t(t)$ represents the utility of retiring now and $V_t(r^*)$ represents the highest feasible utility (obtained by retiring at age r^*). $V_t(r)$ is calculated as

$$(2) \quad V_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} Y_s^\gamma + \sum_{s=r}^S \beta^{s-t} [k B_s(r)]^\gamma,$$

where Y_s represents earnings in the years before retirement and $B_s(r)$ represents benefits received in the years after retirement at age r . We use $k = 1.5$, $\beta = 0.97$, and $\gamma = 0.75$.

The peak value, as proposed by Coile and Gruber (2000), is defined as the difference between the highest possible SSW when retiring at some point in the future and SSW when retiring now.

As mentioned earlier, the incentive measures used in the estimations in

5. For disability, SS, and unemployment benefits, this is more or less in line with current government policy.

the next section are weighted averages of the incentives for the various exit routes (DI, ER, SS only), where the weights are determined by the proportions of persons ultimately retiring in the various programs, differentiated by age. Notably, in these calculations, the fact that persons may become eligible for ER at different ages is taken into account by using the probabilities for eligibility by age based on results of the CentERpanel, as described earlier, multiplied by the empirical take-up rate of ER. In this way, the weighted SSW-measure of individuals aged 60, for example, is calculated as:

$$(3) \quad SSW_{60} = p_{DI,60} SSW_{DI,60} + p_{exit,60} SSW_{SSonly,60} + p_{ER,60} (p_{ER,60} SSW_{ER,60} + p_{ER,61} SSW_{ER,61} + p_{ER,62} SSW_{ER,62} + p_{ER,63} SSW_{ER,63} + p_{ER,64} SSW_{ER,64} + p_{ER,65} SSW_{ER,65}),$$

where $p_{ER,60}$, $p_{DI,60}$ and $p_{exit,60}$ are empirical proportions of persons ultimately retiring on the various programs, and $p_{ER,60}, \dots, p_{ER,65}$ represent sector-specific eligibility probabilities (for ER at age 60 through 65, given eligibility for private pension and having reached age 60, respectively), based on the CentERpanel data. The same weighting scheme is used for the calculation of option and peak values. Notably, this weighting scheme differs from the one used in the previous volume.

8.5 Estimation Results for Two Model Versions

Table 8.2 presents the estimation results of the retirement probits for four variants. Two variants use peak value as an incentive variable (columns [1] and [3]) and either represent age by means of separate dummies or a quadratic in age. The two remaining variants are similar, but with peak value replaced by option value as an incentive variable.

We observe that in columns (1) and (3), peak value is insignificant. In the other columns, option value is highly significant. Social security wealth has a significant positive influence on the probability of exit out of the labor force. The presence of a partner, whether one lives in a two-earner family, and being female all have a negative effect on the probability of exit, although the coefficients of these variables generally are not significant. Age has a positive effect on the likelihood of labor-force exit. The age dummies exhibit peaks at ages 59, 60, and 64. Ages 59 or 60 are, in most cases, the early retirement age. The normal retirement age is 65.

8.6 Description of Reforms

We consider three incentive changes and their effects on retirement probabilities. The reforms and their implications for retirement are discussed consecutively.

Table 8.2 Estimation results of probit equations

Variable	Variant 1 Peak value, age dummies	Variant 2 Option value, age dummies	Variant 3 Peak value, quadratic age	Variant 4 Option value, quadratic age
Social security wealth	3.76e-07 (2.89)***	2.90e-07 (2.82)***	2.59e-07 (2.08)**	2.87e-07 (2.77)***
Peak value	-6.16e-07 (1.53)		2.95e-08 (0.08)	
Option value		-0.0000101 (4.66)**		-9.49e-06 (4.46)***
Net income	-2.19e-06 (2.00)**	2.24e-06 (1.56)	-2.56e-06 (2.32)**	2.15e-06 (1.50)
Net income squared	-2.50e-12 (0.20)	-1.73e-11 (1.34)	-1.28e-12 (0.11)	-2.07e-11 (1.59)
Include partner	3.83e-06 (0.90)	4.25e-06 (1.02)	3.96e-06 (1.03)	4.41e-06 (1.08)
Include partner squares	-1.30e-10 (0.78)	-1.35e-10 (0.82)	-1.02e-10 (0.71)	-1.25e-10 (0.78)
Age				
51	-0.025 (1.09)	-0.028 (1.29)		
52	-0.009 (0.37)	-0.017 (0.79)		
53	0.016 (0.64)	-0.002 (0.07)		
54	0.101 (3.57)***	0.061 (2.40)**		
55	0.067 (2.45)**	0.023 (0.96)		
56	0.188 (5.85)***	0.110 (3.82)***		
57	0.175 (5.30)***	0.079 (2.67)***		
58	0.293 (7.85)***	0.155 (4.44)***		
59	0.437 (10.31)***	0.255 (5.97)***		
60	0.453 (9.11)***	0.234 (4.69)***		
61	0.302 (5.58)***	0.111 (2.37)**		
62	0.132 (2.47)**	-0.003 (0.07)		
63	0.229 (3.85)***	0.035 (0.78)		
64	0.637 (8.29)***	0.332 (4.19)***		
Two earners	-0.023 (1.08)	-0.021 (1.01)	-0.028 (1.34)	-0.024 (1.15)

(continued)

Table 8.2 (continued)

Variable	Variant 1 Peak value, age dummies	Variant 2 Option value, age dummies	Variant 3 Peak value, quadratic age	Variant 4 Option value, quadratic age
Partner	-0.019 (0.92)	-0.009 (0.48)	-0.008 (0.38)	-0.009 (0.47)
Female	-0.025 (1.50)	-0.022 (1.37)	-0.020 (1.14)	-0.020 (1.20)
Age			0.010 (2.57)**	0.136 (4.01)***
Age ²			-0.001 (1.99)**	-0.001 (3.59)***
No. of observations	3,922	3,922	3,922	3,922

Note: Absolute value of *z* statistics in parentheses.

***Significant at 1 percent.

**Significant at 5 percent.

8.6.1 Reform 1. A Three-Year Increment in Eligibility Ages (the Three-Year Reform)

Since eligibility is not directly observed and the computation of incentives is based on actual retirement behavior, there are different ways in which one can implement such a reform in the context of the model as presented so far. We choose a particularly straightforward approach by calculating for every individual in the sample (and his or her partner, if any) the incentive variables as if this individual were three years younger. That is, we assign the weights as well as the amounts of benefits to be received (but not mortality rates) as if the individual is three years younger and then recalculate the incentive variables. However, for ages 51 to 53, we assume that the weights for ER and DI are zero. The working spouse is assumed to retire at the original retirement age of 65. We present two different sets of simulation results. The first simulation (S1) simply uses the retirement equations with age and age-squared and replaces the incentive variables by the new ones, based on delayed eligibility. Regarding the model with age dummies, the S3 simulation shifts the age dummies backward by three years. That is, for ages 51, 52, and 53, the age dummies are set equal to zero. The new age dummy for age 54 is set equal to the estimated age dummy for age 51, the new age dummy for age 55 is set equal to the estimated age dummy for age 52, and so on.

8.6.2 Reform 2. The Common Reform

The Common Reform involves the possibility of early retirement at age 60 and normal retirement at age 65. The replacement rates depend on age. The (before-tax) replacement rate at age 65 is equal to 60 percent of aver-

age lifetime earnings during the 40 best years (assumed to be 75 percent of current earnings). At other ages, an actuarial adjustment of 6 percent is applied.⁶ That is, when retiring at age 60 an individual receives 70 percent of the pension receivable upon retirement at age 65, when retiring at age 61 the individual receives 76 percent, and so on. This also applies to retirement ages higher than 65. For instance, when retiring at age 70, an individual receives 130 percent. Widows receive the maximum of their own pension and the pension of the spouse. Again, two sets of simulation results are presented: S1, using the retirement equation with age and age-squared and replacing the incentive variables with the ones calculated for the Common Reform, and S3, using the retirement equation with age dummies, where the same incentive variables are used, and where the dummies for ages above 64 are assumed to be similar to the age dummy for age 64.

8.6.3 Reform 3. Actuarial Reform

In this reform we stay as close as possible to the current benefit system, but adjust benefits such that these change with the age of retirement in an approximately actuarially fair way. In particular, ER and DI benefits are assumed to depend on the age of retirement. Moreover, recipients of these benefits keep receiving the same level of benefits upon reaching age 65, rather than shifting to SS + PP. The (full) ER replacement rate is assumed to be equal to the PP replacement rate of 70 percent, but recipients of DI and ER no longer pay SS payroll taxes. In keeping with the current system, all persons who did not retire earlier are assumed to retire at age 65. As was the case previously, we present the results of simulations S1 and S3, obtained by replacing the incentive variables by the ones implied by the reform.

8.6.4 Simulation Cohort

The fiscal effects in terms of costs (pension benefits) and benefits (payroll taxes, occupational pension contributions, income taxes, and VAT) for the base case and the three pension reforms have been simulated for a cohort of age-50 workers, on the basis of the retirement probabilities estimated earlier. In order to increase the number of observations, this cohort has been augmented by including workers aged 51 to 55 who have been de-aged to age 50, and by pooling these observations from the years 1990 to 1994. In the de-aging process, the age of the spouse has been adapted accordingly, but all other variables are assumed to remain the same. The following reported monetary values are always present discounted values of annual money flows discounted back to age 50.

6. In contrast to the earlier volume, persons retiring before age 60 are assumed to receive a pension when reaching age 60. Average lifetime earnings are corrected to take into account the number of years not worked between the retirement age and 60.

8.7 Results

We will first discuss a selection of the simulation results by means of a number of graphs. After that, we consider the quantitative effects on taxes and benefits by means of a number of tables. For the graphs we consider only the OV models.

8.7.1 Results by Age

Figures 8.1 and 8.2 present the distributions of retirement ages under four regimes for the models, with and without age dummies. We should note that for each scenario, the hazard of leaving the labor force has been set equal to 1 in the final year of the simulation. This explains the spikes that one observes in these final years: observations with very low predicted hazards during the simulation period, by construction have a very high likelihood of exiting the labor force in the final year. Clearly, the reforms induce later labor force exits. The Three-Year Reform scenario tends to draw out the distribution of labor force exits toward later ages. Compared to the Three-Year Reform, the Common Reform has its greatest effect in the age range below 60, and around the early and normal retirement age, as one would expect. The effects of the Actuarial Reform are somewhat more modest than those of the other two reforms. Effects in the model with age dummies tend to be more dramatic, due to the shift in dummies, than in the model with quadratic age. Regarding figure 8.2, we should note that for the Common Reform the density of retiring at ages 69 and 70 is not zero; values of less than 1 percent have been rounded off to zero.

Figure 8.3 presents the distribution of social security benefits by age of retirement for the model with age dummies. As elsewhere, the social security benefits represent present discounted values (discounted back to age 50) of benefits to be collected as of the date of retirement. Thus, for each age in the figure, we calculate the SSW of each individual in the sample if he or she were to retire at that age. We next weight that individual's SSW with the probability that the individual will retire at that age.

Figure 8.3 reveals an artifact of the simulations at the final age for each reform. As mentioned, under each scenario, the hazard of leaving the labor force has been set equal to 1 in the final year of the simulation. It turns out that there are four observations for which the value of the explanatory variables is such that the hazard of leaving the labor force predicted by the model is essentially zero. In particular, the partner's income turns out to be very high. These four observations have a high SSW. Since by construction their probability of exiting in the final year is very high, these four observations get a very high weight in the final year relative to the other observations. This then inflates the average SSW of people exiting in this year. One should note that when looking at total effects across all ages, these observations become less influential, so that the calculation of total effects is not unduly influenced.

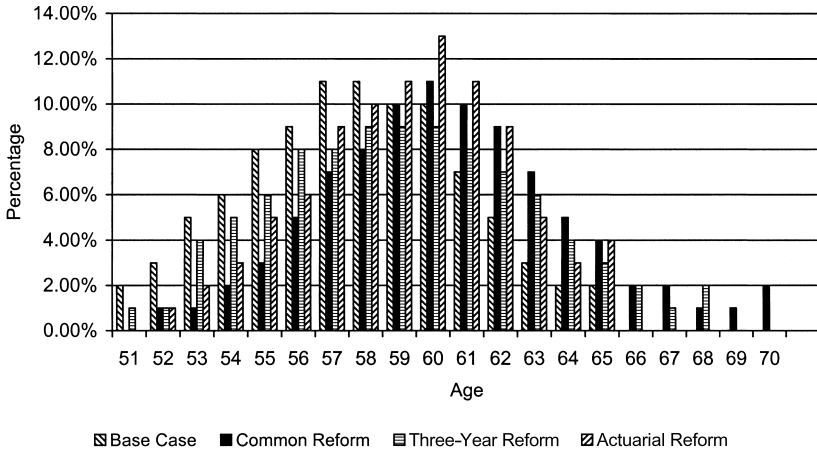


Fig. 8.1 Distribution of retirement age (OV-S1 Model)

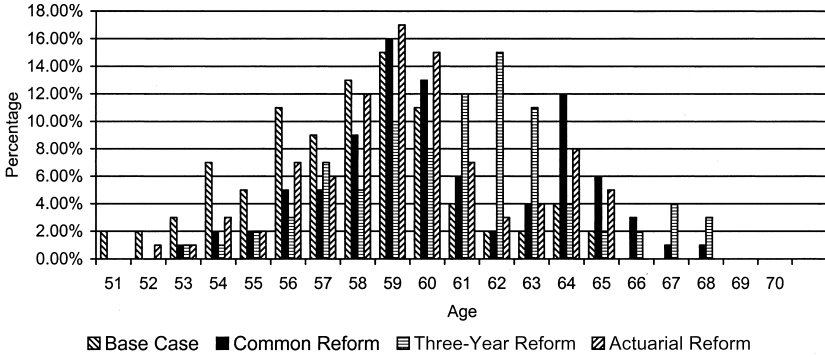


Fig. 8.2 Distribution of retirement age (OV-S3 Model)

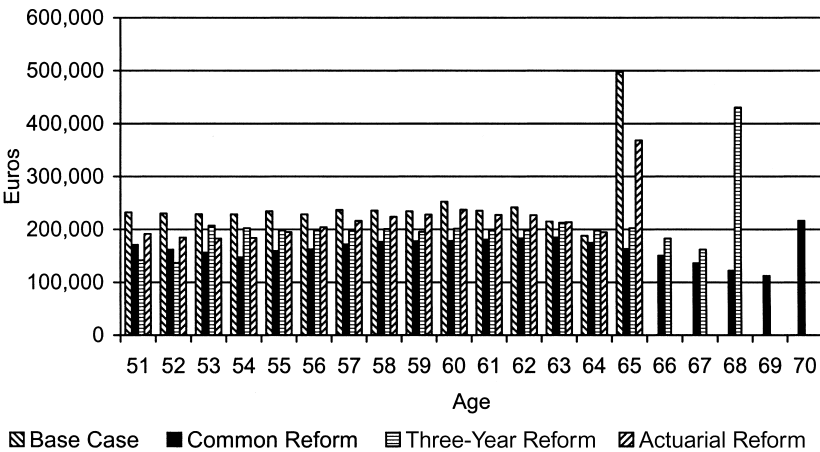


Fig. 8.3 Social security benefits by age of retirement (OV-S3 Model)

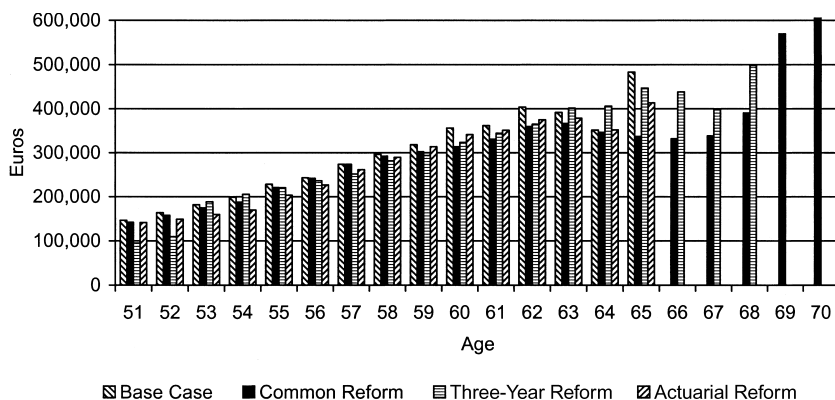


Fig. 8.4 Taxes by age of retirement (OV-S3 Model)

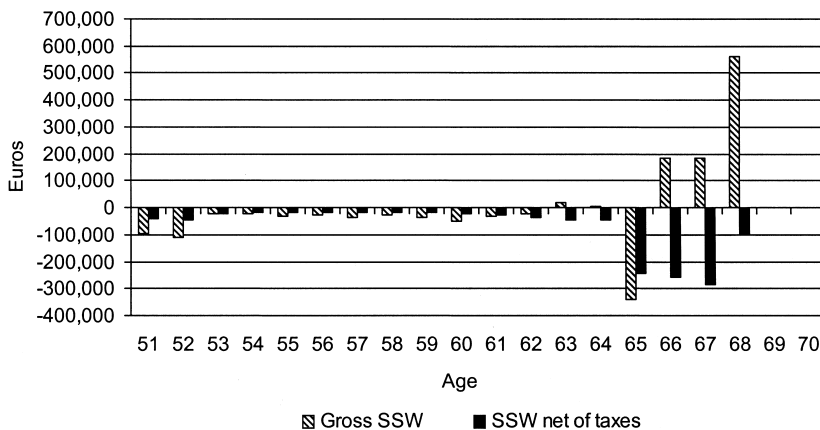


Fig. 8.5 Total effect by age of retirement (Three-Year Reform, OV-S1 Model)

Figure 8.3 illustrates that the reforms make it less attractive from a benefit point of view to retire early. Particularly at younger ages, benefits are substantially lower if one were to retire under the reforms than under the current system.

Figure 8.4 shows the flip side of figure 8.3 in that it presents the total taxes paid by individuals by age of retirement. We observe that the Three-Year Reform scenario shifts the taxes to later ages of exit.

Figures 8.5 and 8.6 show total effects for the Three-Year Reform. We show both the change in total benefits if one moves from the base case to the Three-Year Reform and the change in benefits net of taxes. Both models produce fairly similar pictures. Gross benefits fall before age 65, but after age 65 benefits increase, for the simple reason that under the base case scenario there are no people retiring after age 65, so that benefits are zero

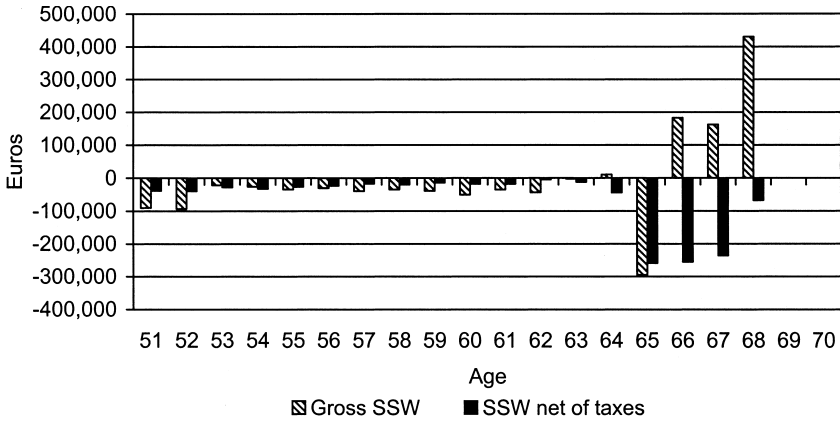


Fig. 8.6 Total effect by age of retirement (Three-Year Reform, OV-S3 Model)

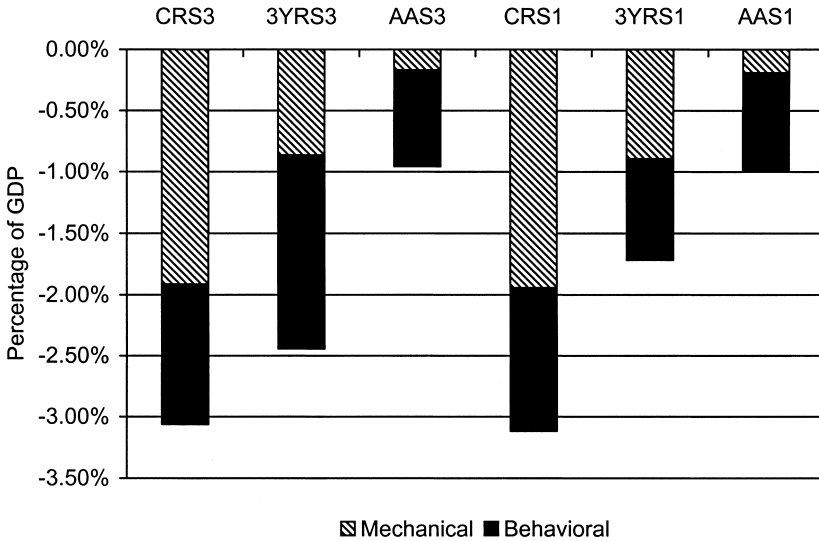


Fig. 8.7 Fiscal implications of reforms as a percentage of GDP

for these age categories. When looking at benefits net of taxes, we see that these fall across all ages, but particularly after age 65.

8.7.2 Fiscal Effects

Figure 8.7 decomposes the total effects (total benefits net of taxes) into a mechanical effect and a behavioral effect for all three reforms (Common Reform [CR], Three-Year Reform [3YR], and Actuarial Reform [AA]) and for the models with dummies (S3) and for the models with quadratic age effects (S1). The mechanical effect assumes that there are no behavioral

responses to the change in benefits. The behavioral response is the difference between the total effect and the mechanical response. We observe that the total effects are biggest for the Common Reform scenarios (more than 3 percent of GDP) and smallest for the Actuarial Reform (less than 1 percent of GDP). However, the behavioral effects are biggest in the three-year increment scenarios, particularly for the model with dummies (S3). As a percentage of the total effect, the behavioral effects are biggest in the actuarial scenarios.

Table 8.3 provides more detail about the total effects on taxes and benefits for various models and scenarios. We concentrate our discussion of the table on the columns with percentages, as these are relatively easiest to interpret. We note that the outcomes for benefits are quite similar for the peak value models and the option value models. For taxes, however, we observe that the peak value models indicate a slight reduction for the Common Reform, whereas the option value models indicate an increase; the same is true for the Actuarial Reform. For the Three-Year Reform scenarios, the peak and option value models produce outcomes that are more similar. Qualitatively, all models show a reduction in benefits as a result of the reforms. The reduction is on the order of 30 percent for the Common Reform, 15 percent for the Three-Year Reform, and 7 percent for the Actuarial Reform. In all cases, we observe that pension payments increase substantially. This is, of course, not surprising, given that the reforms induce people to work longer. Income taxes mostly increase, due to the progressivity of the tax system. The high earners, in particular, work longer and hence pay more income taxes. Obviously, all these results depend crucially on the assumption that tax rates as well as pension contribution rates remain the same after the reforms.

Table 8.4 presents a decomposition of the fiscal effects in a mechanical component and a behavioral component. We see once again that for the option value model the behavioral component is relatively more important in the Three-Year Reform scenario than under the Common Reform. The peak value model mimics this pattern for the model with age dummies, but less so for the model with quadratic age. The effects under the Actuarial Reform are relatively more modest.

8.7.3 Distributional Effects

For the option value model with quadratic age, table 8.5 presents fiscal effects by income quintile. Income here is total after-tax household earnings at age 55. In percentage terms, the distributional effects appear to be minor. For instance, under the Common Reform the reduction in benefits net of taxes as a percentage of base benefits is 48 percent for the lowest quintile and 41 percent for the highest quintile. For the Three-Year Reform scenario, the reduction is 16 percent for the lowest quintile and 27 percent for the highest quintile. For the Actuarial Reform, the reduction ranges from 9 percent to 16 percent. Table 8.6 presents the same analysis for the

Table 8.3 Total fiscal effect of reform

Cost or revenue item	Present discounted value			Total change relative to base (%)			
	Base	Three-Year Reform	Actuarial Reform	Common Reform	Three-Year Reform	Actuarial Reform	Common Reform
Benefits	240,379	209,125	223,640	164,580	-13.0	-7.0	-31.5
Taxes: Payroll	136,691	140,542	130,428	126,996	2.8	-4.6	-7.1
Taxes: Income	87,601	86,877	86,309	84,720	-0.8	-1.5	-3.3
Pension payments	28,133	29,654	28,534	38,199	5.4	1.4	35.8
Taxes: VAT	33,477	32,174	32,969	29,360	-3.9	-1.5	-12.3
Taxes: Total	285,902	289,247	278,240	279,275	1.2	-2.7	-2.3
Benefits	239,639	202,383	224,659	166,198	-15.5	-6.3	-30.6
Taxes: Payroll	137,384	156,424	132,943	129,602	13.9	-3.2	-5.7
Taxes: Income	88,300	99,980	87,330	84,969	13.2	-1.1	-3.8
Pension payments	28,620	34,371	29,238	38,602	20.1	2.2	34.9
Taxes: VAT	33,612	34,849	33,345	29,772	3.7	-0.8	-11.4
Taxes: Total	287,915	325,623	282,857	282,945	13.1	-1.8	-1.7
Benefits	240,807	208,567	224,647	171,754	-13.4	-6.7	-28.7
Taxes: Payroll	136,640	148,409	142,401	146,583	8.6	4.2	7.3
Taxes: Income	88,747	95,207	94,350	94,135	7.3	6.3	6.1
Pension payments	28,274	32,153	30,968	43,698	13.7	9.5	54.6
Taxes: VAT	33,541	33,629	34,911	32,528	0.3	4.1	-3.0
Taxes: Total	287,202	309,398	302,630	316,944	7.7	5.4	10.4
Benefits	239,844	203,667	224,832	172,319	-15.1	-6.3	-28.2
Taxes: Payroll	137,570	158,454	143,565	147,655	15.2	4.4	7.3
Taxes: Income	89,113	101,798	94,499	94,378	14.2	6.0	5.9
Pension payments	28,730	34,904	31,329	43,901	21.5	9.0	52.8
Taxes: VAT	33,686	35,235	35,025	32,699	4.6	4.0	-2.9
Taxes: Total	289,099	330,391	304,418	318,632	14.3	5.3	10.2

Notes: The first four columns show the PDV of benefits and taxes under the base plan and under each of the three illustrative reforms. The last three columns show the change relative to the base, for benefits and for taxes.

Table 8.4 Decomposition of total effect of reform, change in present discounted value

	Three-Year Reform			Actuarial Reform			Common Reform		
	Mechanical	Behavioral	Total	Mechanical	Behavioral	Total	Mechanical	Behavioral	Total
Benefits	-35,647	4,393	-31,254	<i>Peak value—Quadratic age (PV-S1)</i>			-76,549	750	-75,799
Total taxes	-7,411	10,757	3,346	-17,128	389	-16,739	-15,139	8,513	-6,626
Net change	-28,237	-6,364	-34,601	-11,112	3,451	-9,078	-61,410	-7,763	-69,173
Change as % of base benefits	-11.7	-2.6	-14.4	-2.5	-1.3	-3.8	-25.5	-3.2	-28.8
Benefits	-33,722	-3,534	-37,256	<i>Peak value—Age dummies (PV-S3)</i>			-75,288	1,847	-73,441
Total taxes	-6,287	43,995	37,708	-15,663	683	-14,980	-14,633	9,662	-4,971
Net change	-27,436	-47,528	-74,964	-10,288	5,230	-9,922	-60,655	-7,815	-68,470
Change as % of base benefits	-11.4	-19.8	-31.3	-2.2	-1.9	-4.1	-25.3	-3.3	-28.6
Benefits	-34,869	2,630	-32,239	<i>Option value—Quadratic age (OV-S1)</i>			-76,575	7,522	-69,053
Total taxes	-6,588	28,785	22,197	-17,163	1,003	-16,160	-15,061	44,803	29,742
Net change	-28,280	-26,156	-54,436	-11,145	26,573	-31,589	-61,514	-37,282	-98,796
Change as % of base benefits	-11.7	-10.9	-22.6	-2.5	-10.6	-13.1	-25.5	-15.5	-41.0
Benefits	-33,076	-3,102	-36,178	<i>Option value—Age dummies (OV-S3)</i>			-75,062	7,537	-67,525
Total taxes	-5,714	47,006	41,292	-15,564	552	-15,012	-14,457	43,991	29,534
Net change	-27,362	-50,108	-77,470	-10,236	25,555	-30,331	-60,605	-36,454	-97,059
Change as % of base benefits	-11.4	-20.9	-32.3	-2.2	-10.4	-12.6	-25.3	-15.2	-40.5

Notes: The table shows the total effect of the reform (shown in table 8.3) decomposed into mechanical and behavioral components. The first rows show the change in benefits. The second rows show the change in all taxes. The third rows show the net change (the change in benefits minus the change in taxes). The fourth rows show the net change as percent of base benefits (shown in table 8.3).

Table 8.5 **Distributional analysis: Option value—Quadratic age (OV-SI)**

Cost or revenue item	Present discounted value			Total change relative to base			
	Base	Three-Year Reform	Actuarial Reform	Common Reform	Three-Year Reform	Actuarial Reform	Common Reform
Benefits	396,097	339,113	375,157	289,331	-56,984	-20,940	-106,766
After-tax income	675,227	686,338	694,977	666,818	11,111	19,750	-8,409
Taxes: Payroll	202,673	220,778	206,435	214,514	18,105	3,762	11,841
Taxes: Income	263,296	283,300	275,239	277,973	20,004	11,943	14,677
Pension payments	78,625	87,944	82,614	109,409	9,319	3,989	30,784
Taxes: VAT	56,719	57,652	58,378	56,013	933	1,659	-706
Taxes: Total	601,313	649,674	622,666	657,909	48,361	21,353	56,596
Net change					-105,345	-42,293	-163,362
Change as % of base benefits					-26.6	-10.7	-41.2
Benefits	252,067	217,602	232,480	201,119	-34,465	-19,587	-50,948
After-tax income	432,229	433,924	453,769	437,951	1,695	21,540	5,722
Taxes: Payroll	160,302	174,450	167,046	176,954	14,148	6,744	16,652
Taxes: Income	88,993	96,102	97,138	97,807	7,109	8,145	8,814
Pension payments	27,507	32,071	31,200	47,633	4,564	3,693	20,126
Taxes: VAT	36,307	36,450	38,117	36,788	142	1,809	481
Taxes: Total	313,109	339,073	333,501	359,182	25,963	20,391	46,073
Net change					-60,428	-39,978	-97,021
Change as % of base benefits					-24.0	-15.9	-38.5
Benefits	213,253	185,704	196,466	161,185	-27,549	-16,787	-52,068
After-tax income	360,647	360,693	379,686	355,228	46	19,039	-5,419

(continued)

Table 8.5 (continued)

Cost or revenue item	Present discounted value			Total change relative to base			
	Base	Three-Year Reform	Actuarial Reform	Common Reform	Three-Year Reform	Actuarial Reform	Common Reform
Taxes: Payroll	140,442	152,773	148,337	152,587	12,331	7,895	12,145
Taxes: Income	51,812	55,626	57,172	56,656	3,814	5,360	4,844
Pension payments	18,204	21,167	21,165	32,279	2,963	2,961	14,075
Taxes: VAT	30,294	30,298	31,894	29,839	4	1,599	-455
Taxes: Total	240,752	259,864	258,568	271,361	19,112	17,815	30,609
Net change					-46,661	-34,602	-82,677
Change as % of base benefits					-21.9	-16.2	-38.8
Benefits	189,524	166,380	174,963	126,942	-23,144	-14,561	-62,582
After-tax income	306,204	303,799	321,071	287,150	-2,405	14,867	-19,054
Taxes: Payroll	114,998	124,281	122,555	121,636	9,283	7,557	6,638
Taxes: Income	27,694	28,704	29,875	28,724	1,010	2,181	1,030
Pension payments	12,181	14,002	14,258	20,274	1,821	2,077	8,093
Taxes: VAT	25,721	25,519	26,970	24,121	-202	1,249	-1,601
Taxes: Total	180,594	192,506	193,658	194,755	11,912	13,064	14,160
Net change					-35,056	-27,625	-76,742
Change as % of base benefits					-18.5	-14.6	-40.5
Benefits	152,197	133,290	143,311	79,402	-18,907	-8,886	-72,795
After-tax income	221,654	215,735	226,965	187,260	-5,919	5,311	-34,394
Taxes: Payroll	64,326	69,258	67,183	66,718	4,932	2,857	2,392
Taxes: Income	13,841	13,805	14,283	10,812	-36	442	-3,029
Pension payments	4,583	5,277	5,321	8,511	694	738	3,928
Taxes: VAT	18,619	18,122	19,065	15,730	-497	446	-2,889
Taxes: Total	101,369	106,462	105,852	101,771	5,093	4,483	402
Net change					-24,000	-13,369	-73,197
Change as % of base benefits					-15.8	-8.8	-48.1

Quintile 4

Quintile 5 (lowest)

Table 8.6 **Distributional analysis: Option value—Age dummies (OV-S3)**

Cost or revenue item	Present discounted value			Total change relative to base			
	Base	Three-Year Reform	Actuarial Reform	Common Reform	Three-Year Reform	Actuarial Reform	Common Reform
			<i>Quintile 1 (highest)</i>				
Benefits	395,150	334,607	375,683	290,051	-60,543	-19,467	-105,099
After-tax income	676,678	709,289	695,389	668,383	32,611	18,711	-8,295
Taxes: Payroll	203,415	229,752	207,133	215,490	26,337	3,718	12,075
Taxes: Income	263,370	298,548	274,525	277,666	35,178	11,155	14,296
Pension payments	79,237	92,162	82,933	109,423	12,925	3,696	30,186
Taxes: VAT	56,841	59,580	58,413	56,144	2,739	1,572	-697
Taxes: Total	602,863	680,042	623,004	658,723	77,179	20,141	55,860
Net change					-137,722	-39,608	-160,959
Change as % of base benefits					-34.9	-10.0	-40.7
			<i>Quintile 2</i>				
Benefits	250,984	211,963	232,958	201,781	-39,021	-18,026	-49,203
After-tax income	434,490	456,214	455,282	440,952	21,724	20,792	6,462
Taxes: Payroll	161,365	185,836	168,303	178,285	24,471	6,938	16,920
Taxes: Income	89,882	105,352	97,730	98,578	15,470	7,848	8,696
Pension payments	28,194	35,856	31,764	48,072	7,662	3,570	19,878
Taxes: VAT	36,497	38,322	38,244	37,040	1,825	1,747	543
Taxes: Total	315,938	365,366	336,041	361,975	49,428	20,103	46,037
Net change					-88,449	-38,129	-95,240
Change as % of base benefits					-35.2	-15.2	-37.9
			<i>Quintile 3</i>				
Benefits	212,134	180,128	196,550	161,765	-32,006	-15,584	-50,369
After-tax income	362,622	380,418	381,229	357,453	17,796	18,607	-5,169
Taxes: Payroll	141,566	164,629	149,855	153,947	23,063	8,289	12,381
Taxes: Income	52,330	60,934	57,674	57,099	8,604	5,344	4,769
Pension payments	18,700	23,983	21,613	32,571	5,283	2,913	13,871

(continued)

Table 8.6 (continued)

Cost or revenue item	Present discounted value			Total change relative to base			
	Base	Three-Year Reform	Actuarial Reform	Common Reform	Three-Year Reform	Actuarial Reform	Common Reform
Taxes: VAT	30,460	31,955	32,023	30,026	1,495	1,563	-434
Taxes: Total	243,056	281,501	261,165	273,643	38,445	18,109	30,587
Net change					-70,451	-33,693	-80,956
Change as % of base benefits					-33.2	-15.9	-38.2
Benefits			<i>Quintile 4</i>				
After-tax income	188,531	160,993	174,893	127,437	-27,538	-13,638	-61,094
Taxes: Payroll	307,843	321,084	322,726	289,212	13,241	14,883	-18,631
Taxes: Income	116,051	135,475	124,004	122,773	19,424	7,953	6,722
Pension payments	27,941	31,030	30,118	27,360	3,089	2,177	-581
Taxes: VAT	12,522	16,062	14,588	20,473	3,540	2,066	7,951
Taxes: Total	25,859	26,971	27,109	24,294	1,112	1,250	-1,565
Net change	182,373	209,538	195,819	194,900	27,165	13,446	12,527
Change as % of base benefits					-54,703	-27,084	-73,621
					-29.0	-14.4	-39.0
Benefits			<i>Quintile 5 (lowest)</i>				
After-tax income	151,527	129,893	143,216	79,769	-21,634	-8,311	-71,758
Taxes: Payroll	222,941	228,807	228,547	188,616	5,866	5,606	-34,325
Taxes: Income	64,996	76,075	68,086	67,271	11,079	3,090	2,275
Pension payments	13,938	14,676	14,392	10,892	738	454	-3,046
Taxes: VAT	4,726	6,140	5,464	8,582	1,414	738	3,856
Taxes: Total	18,727	19,220	19,198	15,844	493	471	-2,883
Net change	102,387	116,111	107,140	102,589	13,724	4,753	202
Change as % of base benefits					-35,358	-13,064	-71,960
					-23.3	-8.6	-47.5

model with age dummies. For the Common Reform and the Actuarial Reform, the effects in table 8.6 are quite similar to the effects reported in table 8.5. For the Three-Year Reform, the model with dummies yields bigger reductions in benefits than the model with quadratic age: the reduction varies from 23 percent in the lowest quintile to 35 percent in the highest quintiles.

8.8 Conclusions

The Netherlands has a relatively generous system of pensions, social security benefits, early retirement arrangements, and unemployment and disability benefits, which for most people provide incentives to retire from the labor market well before the age of 65. In view of the increasing proportion of elderly, the sustainability of this system is a problem, and sooner or later, reforms will be unavoidable. In this paper, we compare the budget effects of three possible reforms, having modeled transitions into retirement on the basis of microdata from The Netherlands Socio-Economic Panel (SEP). Notably, these reforms have been devised for the purpose of cross-country comparisons, and are not being proposed as desirable or politically feasible reforms in The Netherlands. Furthermore, it should be noted that the simulations have been performed on a particular cohort of individuals, and results need not be the same for other cohorts. Bearing these limitations in mind, we find that the reforms would have considerable (favorable) budget effects. In general, the Common Reform has the strongest effects, a major part of which would be mechanical rather than behavioral. The effects of the second reform, which delay eligibility for three years, depend largely on the retirement model chosen. The Actuarial Reform has the smallest effects.

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