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Health, Disability Insurance, and Labor Force Exit of Older Workers in the Netherlands

Adriaan Kalwij, Klaas de Vos, and Arie Kapteyn

5.1 Introduction

During the last two decades, social security programs and pension schemes in many developed countries have been redesigned to create stronger incentives for continued work at older ages (Gruber and Wise 2004; Wise 2012). In the Netherlands, the country investigated in this chapter, such reforms are likely to have contributed to the increase in the labor force participation (LFP) of the age fifty-five to sixty-four population from less than 30 percent in the mid-1990s to 45 percent in 2007 (Euwals, de Mooij, and van Vuuren 2009; Kapteyn and de Vos 1999; Van Oorschot 2007). In a previous chapter for the International Social Security project (de Vos, Kapteyn, and Kalwij 2012), we found that disability insurance (DI) receipt appears unrelated to the general health of the population and that over the last two decades rela-

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tively fewer older workers have exited the labor market through DI. Furthermore, we concluded that this reduction could in part be attributed to stricter DI eligibility rules. In this chapter, we take a closer look at this conclusion and use Dutch individual-level data to examine whether, conditional on health status, the exit probability from the labor force can be explained by the provisions of the DI program. In particular, and this has not been done in previous papers, we disentangle the effects of DI eligibility from DI generosity on the exit probability from the labor force. Disentangling these two effects is of major importance for policymakers; if their aim is to reduce the number of DI recipients, the former refers to stricter medical screening of individuals who apply for DI, while the latter refers to reducing DI benefits for those who qualify for DI.

Our main findings are (a) the probability of exiting the labor force appears to be affected by health shocks and not much by baseline health, (b) disability benefits (or generosity) have no discernible impact on the exit from employment, and (c) restricting access to the disability insurance scheme does affect labor force exit.

The chapter proceeds as follows. Section 5.2 describes the main trends in employment and DI participation and summarizes the main reforms in the DI program during the past four decades. Furthermore, it introduces the Dutch branch of the Survey of Health, Ageing and Retirement in Europe (SHARE)—to be called SHARE-NL from now on—and presents DI participation rates by year, gender, level of education, and health quintile. Section 5.3 describes the pathways to retirement and outlines the empirical framework for analyzing the impact of health, the inclusive option value of continued work, and socioeconomic variables on the probability of exiting the labor force. Section 5.4 presents the estimation results and section 5.5 discusses these results and their implications. Section 5.6 concludes.

5.2 Background

5.2.1 Overall Trends in DI Participation and Program Reforms

In our earlier paper (de Vos, Kapteyn, and Kalwij 2012) we discussed in detail the historical trends in DI participation and the successive attempts to reform the legislation with the aim of reversing the trend of continuously increasing numbers of DI beneficiaries. A series of reforms in the DI legislation started in the early 1980s, aimed both at decreasing DI generosity by lowering the replacement rate and at limiting the access to the program by imposing stricter criteria for entry and stricter reevaluation rules. However, only the most recent overhaul of the DI legislation culminating in the introduction of a new DI program replacing the old program in 2006 appears to have succeeded in reversing the upward trend in the DI participation rates

Fig. 5.1 DI recipients as percent of population ages fifteen to sixty-five
Source: Statistics Netherlands (CBS; statline:cbs:nl).

(figure 5.1). In fact by 2009, as shown by Burkhauser and Daly (2011), the number of DI beneficiaries per worker in the Netherlands, which for a long time was among the highest in the developing world, decreased below the comparable figure for the United States.

The main differences between the system in place until the early 1990s and the current system can be summarized as follows. Earlier, entry into DI happened virtually automatically after one year of illness, during which one received up to 100 percent of the last wage as a sickness benefit. When partially disabled, access to DI was equally easy. Once on DI, one was likely to stay on until the retirement age of sixty-five. Currently, entry into DI happens only after strict screening after two years of illness. During this illness period one receives 70 percent of the last wage, paid for by the employer, and there is an elaborate reintegration program to stimulate the return to work. Access to DI (at a replacement rate of 75 percent, which is slightly higher than the previous 70 percent) until the pension age is only granted to persons who are deemed fully and permanently disabled. For the partially and temporary disabled different rules apply, with incentives that maximize the probability of reentry into the labor force.

The trend emerging from figure 5.1 may be related to figure 5.2 showing the employment rates of males and females in two age groups from 1970 onward. It is particularly striking that employment of both women and men age fifty-five to sixty-five has increased substantially since the mid-nineties.

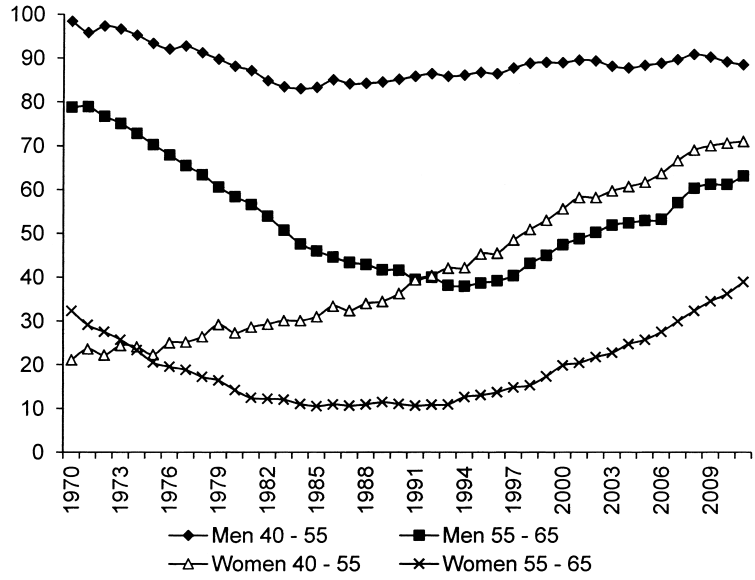

Fig. 5.2 Employment by age and gender (1970–2011)
Source: Statistics Netherlands (CBS; statline:cbs:nl).

The increasing trend for women age forty to fifty-five is likely to largely reflect a cohort effect, as female labor force participation has grown dramatically since the 1970s.

During the last decade, the increase in the employment rates of the older age groups is accompanied by a decrease in the DI participation.[1] The trend is strongest among men, as shown in figures 5.3 and 5.4. Among women, showing large increases in LFP, the decrease in DI recipiency is less noticeable (figures 5.5 and 5.6).

5.2.2 Disability Insurance (DI) Participation by Level of Education and Gender

Our individual-level data are drawn from the first, second, and fourth waves of the Survey of Health, Ageing and Retirement in Europe (SHARE), a harmonized, multidisciplinary and representative cross-national panel survey covering the population age fifty and older in twenty European countries. We use the Dutch branch of SHARE (SHARE-NL). The Dutch waves were conducted in 2004, 2007, and 2011. The SHARE survey includes information on socioeconomic status (e.g., employment, income, and education), health (e.g., self-reported subjective health and doctor diagnosed conditions,

1. More detailed employment rates by age and gender are added in figures 5A.1 and 5A.2 in the appendix.

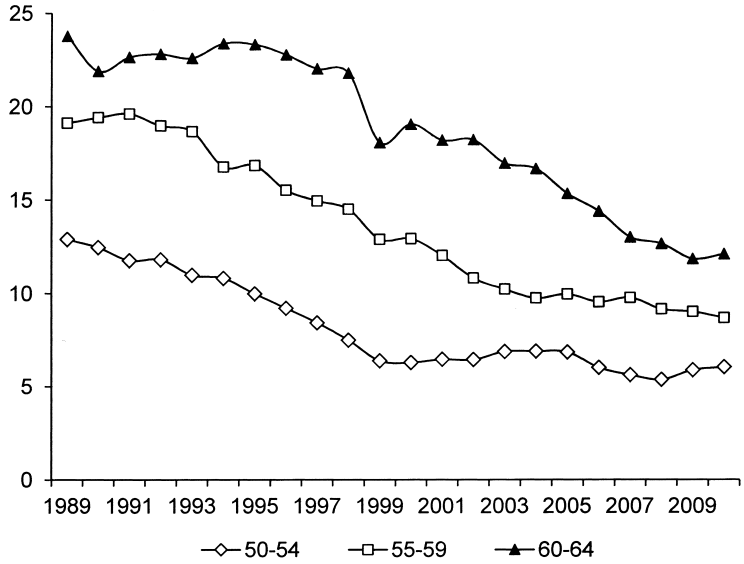

Fig. 5.3 DI recipients as percent of total population by age (men)
Source: Statistics Netherlands, Income Panel Survey (IPO).

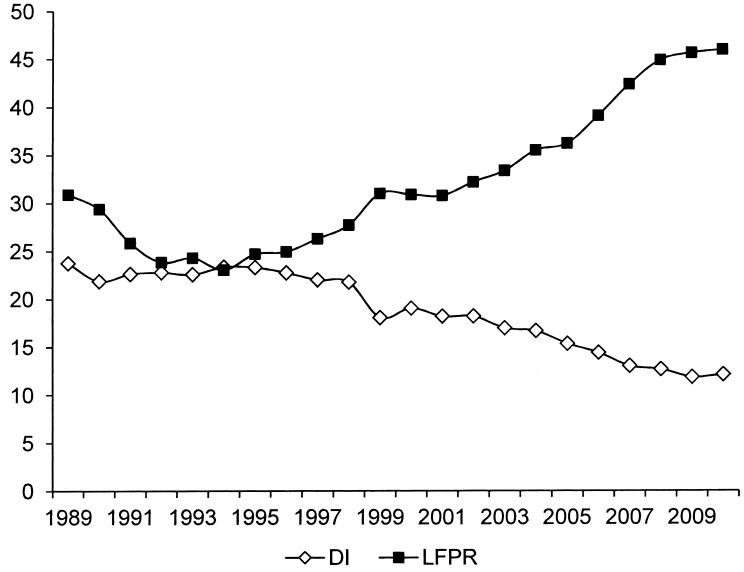

Fig. 5.4 Disability and labor force participation among men ages sixty to sixty-four
Source: Statistics Netherlands, Income Panel Survey (IPO).

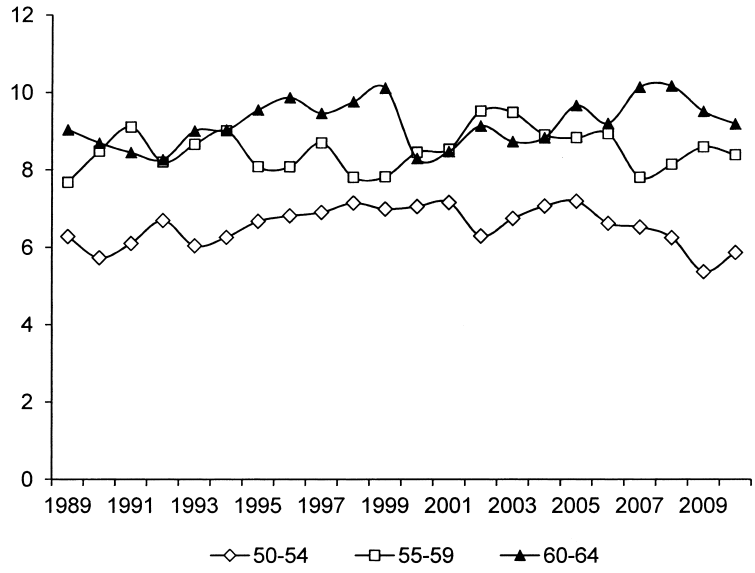

Fig. 5.5 DI recipients as percent of total population by age (women)
Source: Statistics Netherlands, Income Panel Survey (IPO).

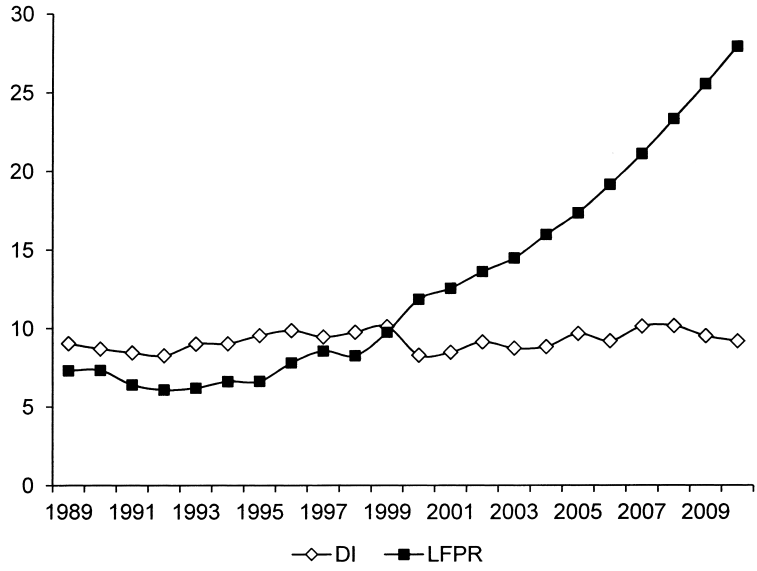

Fig. 5.6 Disability and labor force participation among women ages sixty to sixty-four
Source: Statistics Netherlands, Income Panel Survey (IPO).

Table 5.1 **Number of observations, level of education, and labor market status by age and gender**

	Men				Women			
	2004	2007	2011	All years	2004	2007	2011	All years
Age category No. obs.								
50–54	249	199	132	580	300	274	215	789
55–59	279	238	184	701	337	296	250	883
60–64	241	214	263	718	241	241	316	798
50–64	769	651	579	1,999	878	811	781	2,470
Level of education (%)								
ISCED 1–2	42	37	37	37	58	51	41	49
ISCED 3	29	29	29	30	21	24	30	25
ISCED 4–5	29	34	34	33	21	25	29	25
All	100	100	100	100	100	100	100	100
Labor force status (%)								
Retired	19	25	19	21	47	42	34	41
Employed	64	63	67	65	40	46	53	47
Unemployed	4	2	4	4	3	2	3	2
Disabled	13	10	10	11	10	10	10	10
All	100	100	100	100	100	100	100	100

Notes: No. obs. = number of observations. The percentages are based on weighted frequencies.

physical and cognitive functioning, and behavioral risks), and psychological conditions (e.g., mental health, well-being, and life satisfaction).

For our analysis we select individuals age fifty to sixty-four and, after removing observations with missing information on key variables (about 25 percent), our final sample consists of 1,263 men (1,999 year observations) and 1,509 women (2,470 year observations). Although SHARE-NL aims to be a representative sample for the age fifty and older Dutch population, table 5.1 shows that it includes, for instance, relatively few individuals age fifty to fifty-four. A comparison with official statistics (Statistics Netherlands; statline.cbs.nl) reveals that this group is indeed relatively underrepresented in our sample and in particular in 2011. For instance, the share of men age fifty to fifty-four (as a percentage of men age fifty to sixty-four) in 2011 is about 35 percent in the population and only 23 percent in our sample (details are in table 5A.1 of the appendix). This underrepresentation is mainly due to a relatively low response among individuals who turned fifty in between survey years and who, having reached the SHARE-eligibility age, have been invited to participate in the survey for the first time. This lack of representativeness appears to be mainly age related. To obtain population estimates we have constructed weights based on the population age-gender distribution provided by Statistics Netherlands (appendix table 5A.1). All descriptive tables are based on weighted frequencies.

The level of education is defined according to the 1997 International Stan-

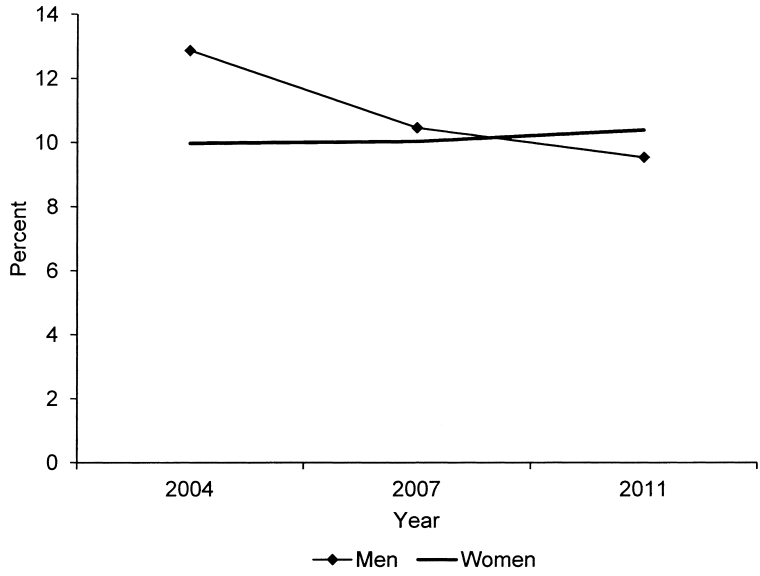

Fig. 5.7 DI participation by year and gender

dard Classification of Education ([ISCED]; MEA 2011). The ISCED 1–2 will be referred to as a low level of education, ISCED 3 as medium level of education, and ISCED 4–5 as a high level of education. Labor force status is self-assessed by the respondents and we distinguish the states "retired" (including nonparticipation), "employed" (including self-employed), "unemployed," and "long-term sick or disabled." We refer to this latter state as DI (disability insurance) participation.

We have constructed a health index based on self-assessed health limitations that will be explained in more detail in the next section. Important here is that based on this health index we determine if an individual is in poor health (lowest health quintile), in excellent health (highest health quintile), or in between.

Table 5.1 shows some stylized facts about the Netherlands, such as higher levels of education for men than for women, although women in the younger cohorts are closing this gap. The table shows relatively minor differences between the respective waves in labor force participation of men. The steep decrease in the percentage of retired women reflects a cohort effect and is paralleled by increasing labor force participation. For men, we observe a slight decrease in DI participation over the years (see also figure 5.7) which, arguably, may be due to the DI reforms in recent years. For women, no appreciable change in DI-participation is observed, which may in part be due to the strong increase in female employment. This may have resulted in an increase in DI participation in absolute numbers that has offset the rela-

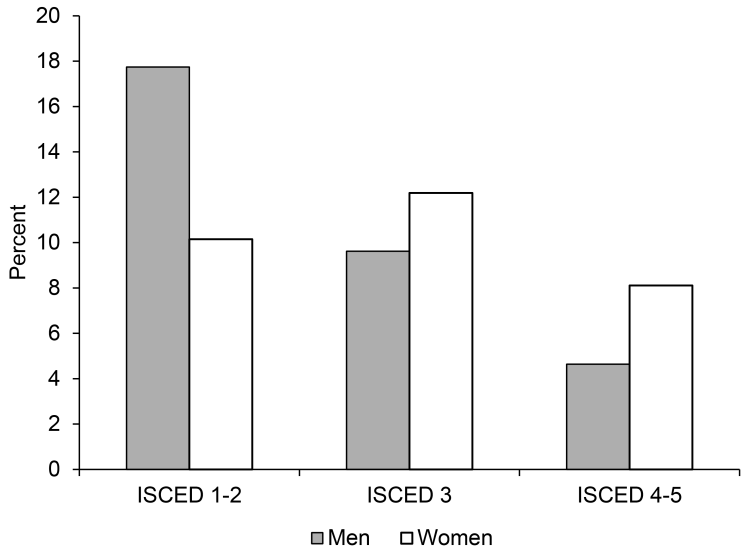

Fig. 5.8 DI participation by level of education and gender (all waves)

tive reduction (among labor force participants) in DI-recipiency due to DI reforms. Figure 5.8 shows a strong educational gradient in DI-participation for men, but less so for women. Figures 5.9 and 5.10 basically show the same patterns by year.

Tables 5.2 and 5.3 show employment rates for, respectively, men and women by year, age, education, and health quintile. Table 5.2, for men, shows an increasing employment rate with level of education and with health quintile for virtually all age categories and years. In line with figure 5.2, the employment rates of men age sixty to sixty-four have increased over time and for all levels of education. Moreover, the table shows that there has been a strong increase in the employment rate among the lowest health quintile for men, which may be due to stricter screening for DI eligibility. Indeed, the gradient in employment by health quintile (as summarized by the ratio of employment rates of the highest and lowest health quintiles) has fallen quite substantially between 2004 and 2011 for all age groups. For women (table 5.3) very similar patterns are observed, albeit at lower levels of employment.

5.2.3 Disability Insurance (DI) Participation by Health Status

As mentioned above, we have constructed a health index of which details will be explained in the next section. Table 5.4 and figures 5.11 and 5.12 show that DI participation is highest among individuals in bad health. This holds for both men and women (43 percent and 32 percent, respectively). Conversely, for those in excellent health, DI participation is only 1 percent. Within a health category, except for the highest, DI participation is higher

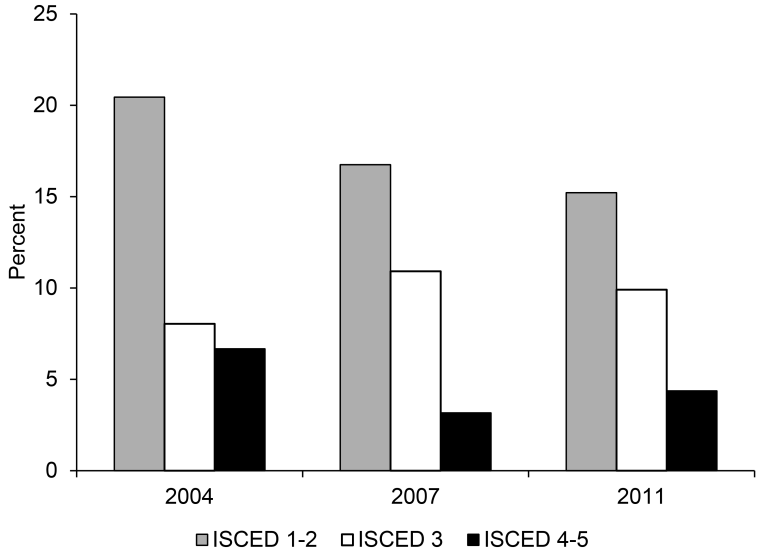

Fig. 5.9 Male DI participation by level of education and year

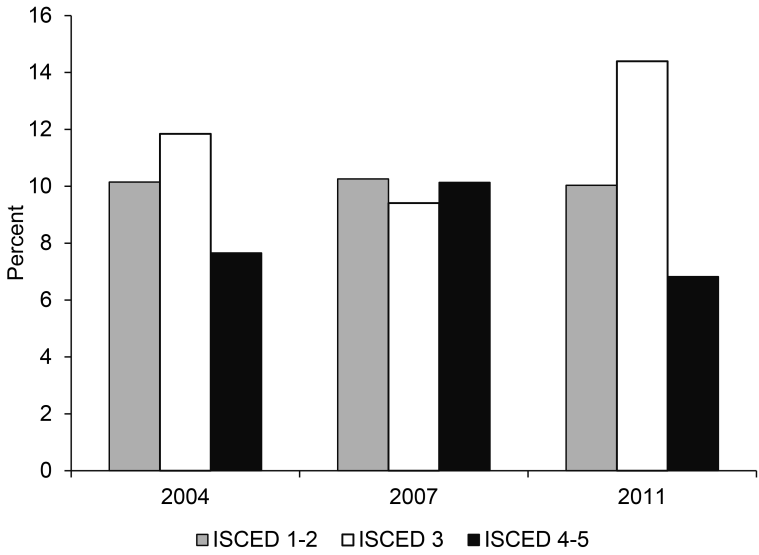

Fig. 5.10 Female DI participation by level of education and year

Table 5.2 **Male employment rate by year, age, education, and health quintile**

	2004	2007	2011		2004	2007	2011
				Age 50–54			
ISCED 1–2	0.76	0.76	0.84	Health quint 1 (lowest)	0.48	0.46	0.75
ISCED 3	0.86	0.87	0.88	Health quint 2	0.86	0.85	0.88
ISCED 4–5	0.92	0.96	0.92	Health quint 3	0.79	0.91	0.96
				Health quint 4	0.95	0.98	0.85
				Health quint 5 (highest)	0.95	0.94	0.92
				Age 55–59			
ISCED 1–2	0.63	0.63	0.72	Health quint 1 (lowest)	0.32	0.47	0.45
ISCED 3	0.81	0.75	0.72	Health quint 2	0.71	0.53	0.75
ISCED 4–5	0.86	0.78	0.89	Health quint 3	0.78	0.72	0.85
				Health quint 4	0.87	0.82	0.86
				Health quint 5 (highest)	0.85	0.87	0.91
				Age 60–64			
ISCED 1–2	0.18	0.18	0.27	Health quint 1 (lowest)	0.12	0.14	0.21
ISCED 3	0.28	0.30	0.39	Health quint 2	0.22	0.25	0.39
ISCED 4–5	0.35	0.29	0.45	Health quint 3	0.24	0.20	0.46
				Health quint 4	0.30	0.33	0.36
				Health quint 5 (highest)	0.31	0.29	0.40

Table 5.3 **Female employment rate by year, age, education, and health quintile**

	2004	2007	2011		2004	2007	2011
				Age 50–54			
ISCED 1–2	0.43	0.58	0.64	Health quint 1 (lowest)	0.26	0.41	0.47
ISCED 3	0.56	0.74	0.71	Health quint 2	0.60	0.66	0.67
ISCED 4–5	0.80	0.83	0.83	Health quint 3	0.57	0.68	0.85
				Health quint 4	0.65	0.83	0.76
				Health quint 5 (highest)	0.67	0.83	0.93
				Age 55–59			
ISCED 1–2	0.31	0.32	0.47	Health quint 1 (lowest)	0.20	0.15	0.34
ISCED 3	0.49	0.46	0.63	Health quint 2	0.45	0.32	0.63
ISCED 4–5	0.69	0.65	0.77	Health quint 3	0.57	0.53	0.83
				Health quint 4	0.50	0.63	0.74
				Health quint 5 (highest)	0.58	0.60	0.61
				Age 60–64			
ISCED 1–2	0.10	0.13	0.16	Health quint 1 (lowest)	0.06	0.08	0.16
ISCED 3	0.14	0.26	0.28	Health quint 2	0.22	0.26	0.23
ISCED 4–5	0.28	0.19	0.21	Health quint 3	0.09	0.11	0.17
				Health quint 4	0.09	0.25	0.26
				Health quint 5 (highest)	0.23	0.17	0.19

Table 5.4 DI participation by level of education and health quintile

	Health quintile					
Cells: (%)	(lowest) 1	2	3	4	(highest) 5	All
Men						
ISCED 1–2	45	18	14	6	1	18
ISCED 3	46	10	7	2	1	10
ISCED 4–5	28	10	4	0	1	5
All levels	43	14	9	3	1	11
Women						
ISCED 1–2	29	7	3	3	1	10
ISCED 3	41	4	3	2	1	12
ISCED 4–5	27	11	5	2	1	8
All levels	32	7	3	2	1	10

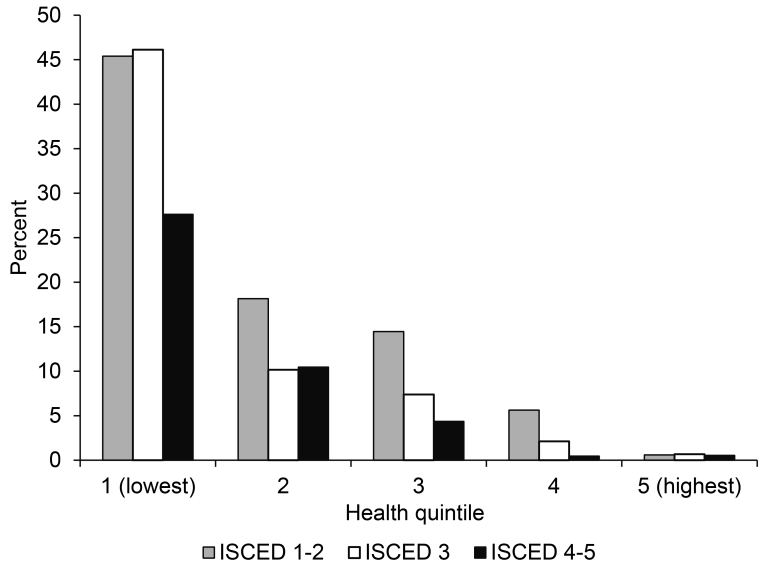

Fig. 5.11 Male DI participation by level of education and health quintile

among low-educated than high-educated men. For women, this gradient is less apparent and this may in part be explained by differences in female employment rates across education groups and types of occupations.

5.3 Empirical Approach

As discussed in the introduction, we are interested in whether, conditional on health status, there are differences in labor force exit rates that can be

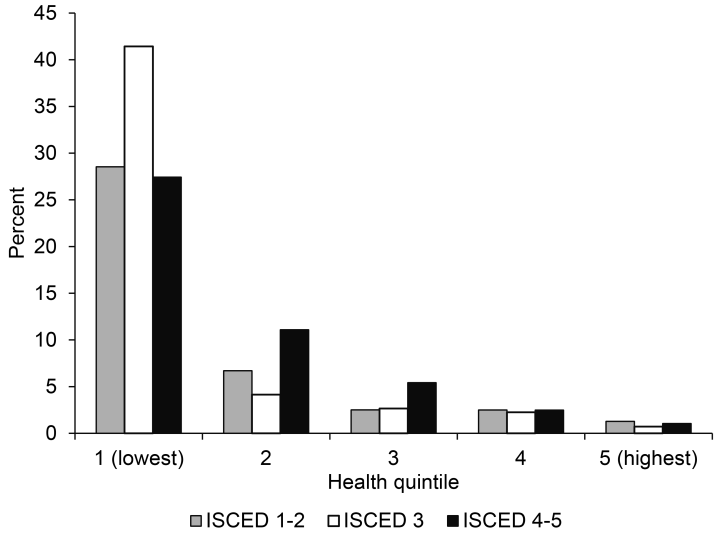

Fig. 5.12 Female DI participation by level of education and health quintile

explained by the provisions of the disability insurance (DI) program. Moreover, we wish to disentangle the effects of DI eligibility from DI generosity on exit from the labor force. For this purpose we estimate a transition model in which the probability of exiting the labor force depends, among other factors, on their health and the option value of continued work. An exit from the labor force can be into retirement, into unemployment, or into DI. We do not observe whether a worker is eligible for each of these exit states but use information that enables us to calculate the probability that a worker is eligible for a certain exit route. If a worker is eligible for a specific exit route, the option value of continued work will affect a worker's choice to actually take this exit route or another exit route, and withdraw from the labor force. In short, the three main ingredients of the empirical model are (a) the eligibility probabilities of the exit routes, (b) the health status of the worker, and (c) the option values of the different exit routes. These ingredients are, in the same order, discussed in the following subsections. Before doing so, we first discuss the pathways to retirement.

5.3.1 Pathways to Retirement

The Netherlands has a statutory retirement age of sixty-five, at which most labor contracts are terminated and unemployment, disability, and assistance benefits are terminated as well.[2] After age sixty-five all individuals receive

2. Starting in 2013, the statutory retirement is to be increased gradually. The legislation underlying this increase was introduced rather suddenly in 2012. It is not taken into account in the calculation of the option values in section 5.3.4.

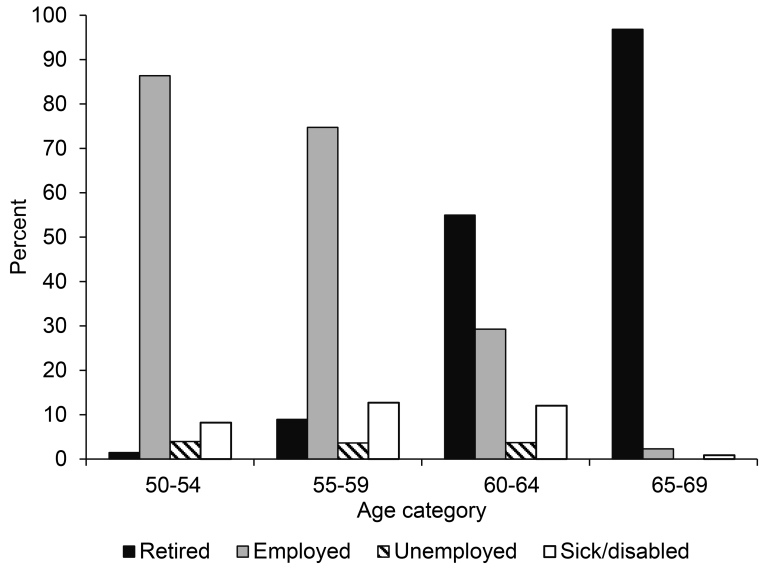

Fig. 5.13 Male labor force status by age category

a public pension benefit (independent of past earnings) and, in most cases, an occupational pension that depends on earnings history. Individuals can be (self-) employed after age sixty-four, next to receiving a pension income. Labor force participation after age sixty-five is still very low, as illustrated by figures 5.13 and 5.14, which show labor force status by age and gender. After age sixty-five, about 97 percent of individuals are retired.

The dominant feature of the figures is that for both men and women there is a steep decline in the employment rate and a concomitant increase in the retirement rate with age. The DI participation increases from about 8 percent among men age fifty to fifty-four to 12 percent among men age sixty to sixty-four. Women show similar increases, but at somewhat later ages. As also discussed in the previous section, figures 5.15 and 5.16 show that there has been a decrease in DI participation for men over the survey years and that for women the dominant feature is an increase in employment and, consequently, a decrease in the share of women in retirement (which includes nonparticipation).

To gain a better understanding of the observed patterns in figures 5.13–5.16, we turn our attention to pathways to retirement. We select a subsample consisting of workers and examine their labor force status in the next wave. Thus we restrict the sample to employed individuals (including self-employed) in 2004 and 2007 and report on their labor force status in, respectively, 2007 and 2011. This subsample contains 468 observations for

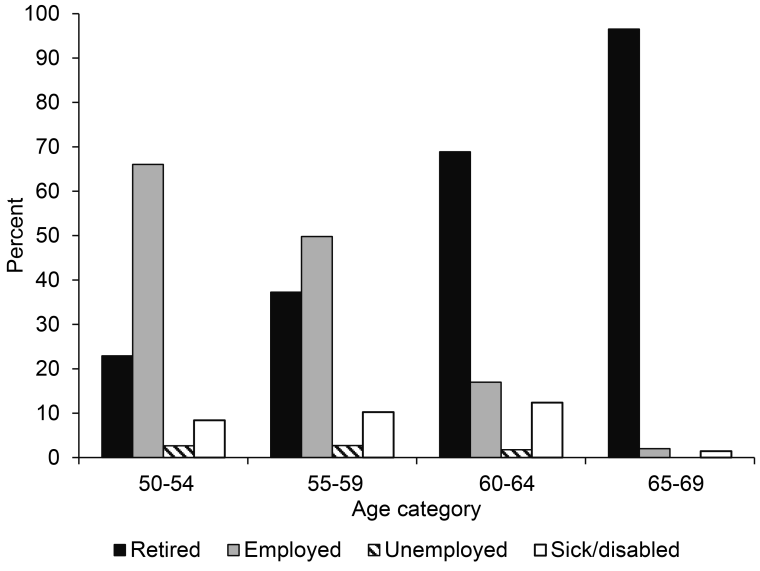

Fig. 5.14 Female labor force status by age category

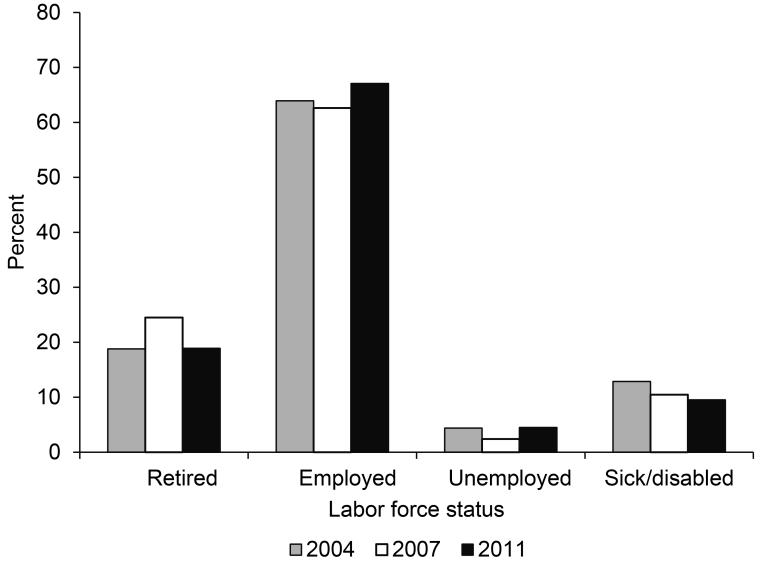

Fig. 5.15 Male labor force status over time (ages fifty to sixty-four)

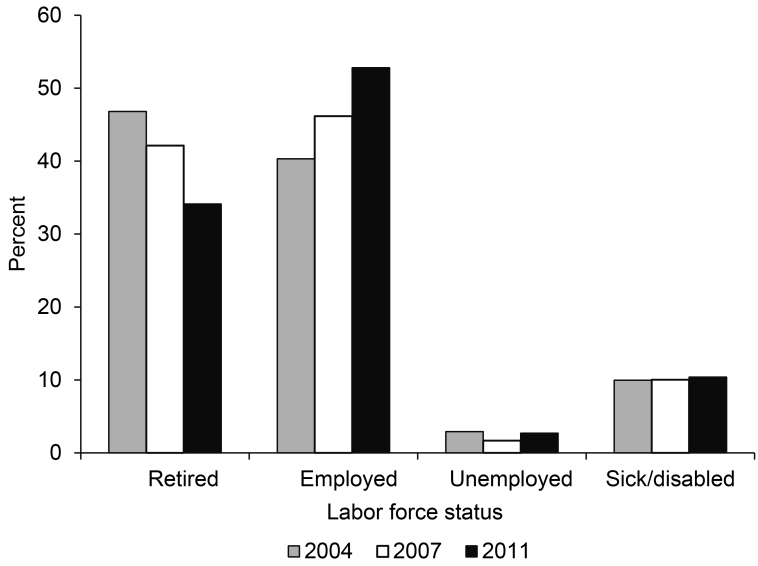

Fig. 5.16 Female labor force status over time (ages fifty to sixty-four)

men and 398 for women. The number of observations falls sharply with age: we observe eighty-seven workers (men and women combined) who are fifty years old and only nine workers who are sixty-four years old. Figures 5.17 and 5.18 show different pathways out of employment. One observes that the retirement route gains in prominence with age. Between two waves, about 2 percent of working men experience a transition into unemployment. For women, this is 4 percent. About 2 percent of working men and 3 percent of working women are on DI benefits in the next wave.

5.3.2 The Likelihood of Different Pathways

The eligibility probabilities of the exit routes are determined using a stock estimator based on labor force states disaggregated by year, gender, and level of education. As will be explained in section 5.3.4, these probabilities are needed to construct the inclusive option value of remaining in employment (see introduction, this volume). Table 5.5 reports these estimated probabilities that add up to 1 across the three different exit routes. For instance, a woman with a medium level of education (ISCED 3) in 2007 is assumed to have a probability of 0.895 to be eligible for the retirement route, a probability of 0.011 to be eligible for the unemployment route, and a probability of 0.094 to be eligible for disability insurance. Loosely interpreted, in this case she believes that, if she would want to exit the labor force, it is least likely she will be eligible for unemployment benefits (1.1 percent), slightly more

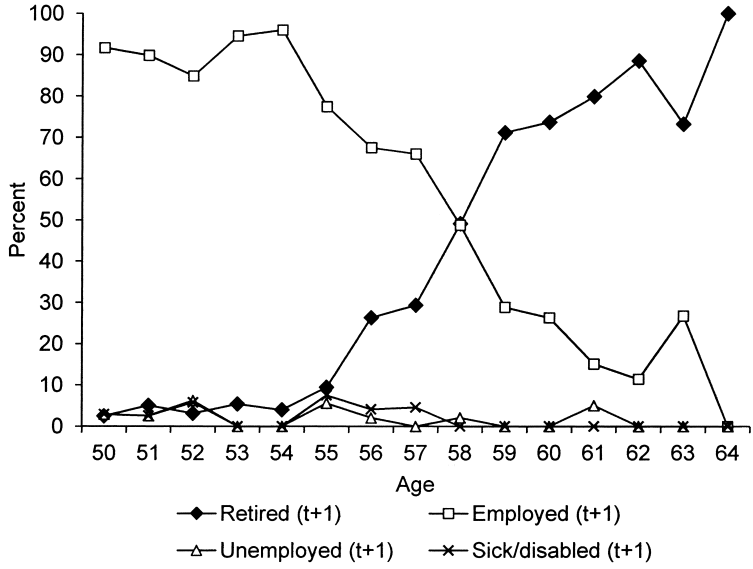

Fig. 5.17 Pathways out of the labor force for men (the percentages of male workers at a given age who are retired, employed, unemployed, or sick/disabled in the next wave)

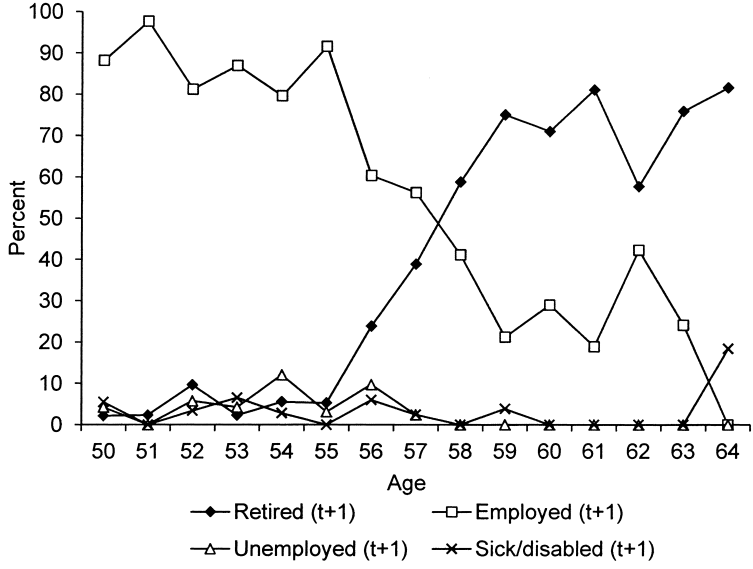

Fig. 5.18 Pathways out of the labor force for women (the percentages of female workers at a given age who are retired, employed, unemployed, or sick/disabled in the next wave)

Table 5.5 Estimated exit route probabilities by gender, year, and level of education

	Men			Women		
	ISCED 1–2	ISCED 3	ISCED 4–5	ISCED 1–2	ISCED 3	ISCED 4–5
Retirement						
2004	0.738	0.873	0.911	0.873	0.848	0.890
2007	0.792	0.865	0.964	0.877	0.895	0.884
2011	0.797	0.857	0.915	0.877	0.830	0.898
Unemployment						
2004	0.058	0.046	0.022	0.026	0.034	0.034
2007	0.041	0.026	0.004	0.021	0.011	0.014
2011	0.050	0.044	0.041	0.022	0.026	0.034
Disability benefits						
2004	0.204	0.080	0.067	0.101	0.118	0.077
2007	0.167	0.109	0.032	0.103	0.094	0.101
2011	0.152	0.099	0.044	0.100	0.144	0.068

likely she is eligible for disability insurance benefits (9.4 percent), and most likely she is eligible for retirement (89.5 percent).

5.3.3 Health Index and Health Quintiles

The SHARE-NL contains many health measures such as self-assessed limitations of activities of daily living, self-reported health status, and objectively measured grip strength. Health has many dimensions and we construct a measure of general health using a principal components analysis. The weights corresponding to the first principal component are presented in table 5.6. Based on these weights we construct a health index and next transform it into percentiles, where 0 is worst health and 100 is best health. Figures 5.19 and 5.20 show some stylized facts that may provide face validity for the thus constructed general health measure. First, overall, health declines with age. Second, the health of women is, on average, worse than that of men. And third, the health of low-educated individuals is worse than that of highly educated individuals of the same age, although there appears to be some convergence with age.

5.3.4 Option Value Calculations

Option values can only be calculated for respondents who are working. The starting point is the data set described in section 5.3.1 of a subsample of 824 workers; there are 450 observations for men and 374 for women.[3] The option value (Stock and Wise 1990) compares the value of continued

3. We have trimmed the data set by excluding forty-two observations corresponding to the top and bottom 2.5 percent of the option value distribution, to avoid our results being affected by extreme values.

Table 5.6 **The first principal component from a principal component analysis of health-related variables**

Explanatory variables	1st component
Difficulties walking several blocks	0.2764
Difficulties to lift or carry something	0.3030
Difficulties to push or pull something	0.2917
Difficulties with an ADL (activity of daily living)	0.2986
Difficulties climbing stairs	0.3105
Difficulties to stoop, kneel, or crouch	0.3093
Difficulties getting up from chair	0.2852
Self-reported health(1 = fair/poor)	0.2862
Difficulties to reach/extend arms up	0.2120
Ever experienced arthritis	0.1693
Difficulties sitting two hours	0.2085
Difficulties picking up a coin	0.1470
Back problems	0.1871
Ever experienced heart problems	0.1341
Hospital stay	0.1336
Home care	0.1276
Doctor visit	0.1063
Ever experienced psychological problems	0.0627
Ever experienced stroke	0.1161
Ever experienced high blood pressure	0.0853
Ever experienced lung disease	0.0959
Ever experienced diabetes	0.0911
BMI	0.0949
Nursing home stay	0.1077
Ever experienced cancer	0.0483

working to the value of exiting the labor market. The value function at time 0 (the current age) of exiting the labor market at a particular future age, R, via route i is:

$$(1) \qquad V_i(R) = \sum_{t=0}^{R} \frac{1}{(1+d)^t} \pi_t (wage_t)^{\gamma} + \sum_{t=R+1}^{T} \frac{1}{(1+d)^t} \pi_t (k \times ben_{it}(R))^{\gamma},$$

where d is the discount rate, π_t is the probability of surviving until age t,[4] $wage_t$ is the wage when working in year t and $ben_{it}(R)$ is the benefit received in year t when retiring at age R via route i. We choose the common parameter values $d = 0.03$, $\gamma = 0.75$ and $k = 1.5$. Furthermore, we restrict retirement ages to between fifty and sixty-nine, assume future real earnings to be constant, and ignore spouse and survival benefits. Because detailed information on pension accumulation and entitlements is not available, the calculations are based on stylized parameters approximating the average of the entitle-

4. Note that age is defined here in years from the present; for instance, if someone is currently fifty-five, then $t = 3$ refers to age fifty-eight.

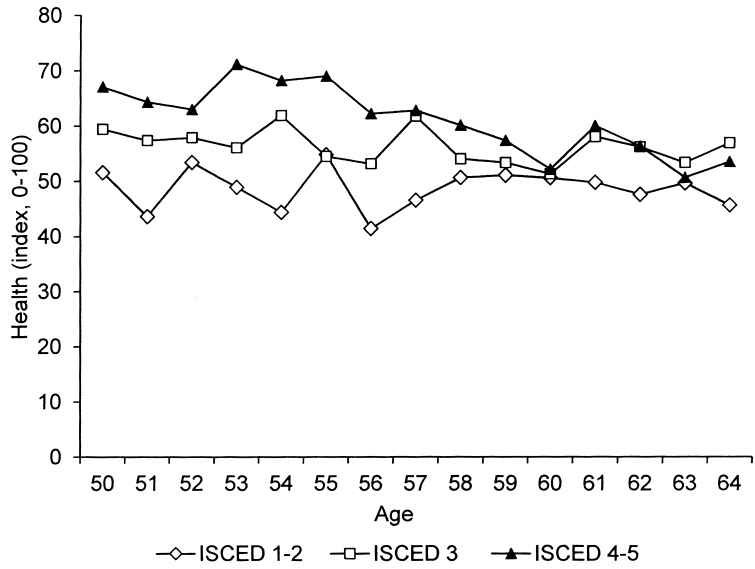

Fig. 5.19 Men's health by age and level of education

ments in the most common pension funds. Benefits by retirement exit route are calculated assuming that occupational pensions are based on final earnings, with an actuarially fair accrual for late take-up.[5] Moreover, we assume that persons born before 1950 may benefit from a more generous (early) retirement plan than later cohorts.

The option values (OVs) at any given age are defined as the value of continued work (until the age when the maximum value is reached, that is, the value of R that maximizes [1]) minus the value of exiting the labor market now into a particular state and staying in that state until age sixty-five and being retired afterward. The higher the OV value, the higher is the payoff of remaining employed and not exiting the labor force. The OVs for the exit states (early) retirement, unemployment, and disability insurance are shown in figure 5.21. The OV inclusive is an average of the OVs corresponding to each of the exit routes, weighted with the exit route probabilities obtained from the stock estimator as shown in table 5.5. Thus, the OVs of each exit state are weighted with the eligibility probability for that state.

This figure shows, first, that it is always beneficial to continue working (all OVs are positive). All exits (before the maximum age of seventy) result in loss

5. Although nowadays most pension funds use average lifetime earnings as the basis for pension benefits calculations, most SHARE-NL respondents have built up their pension in a final earnings system.

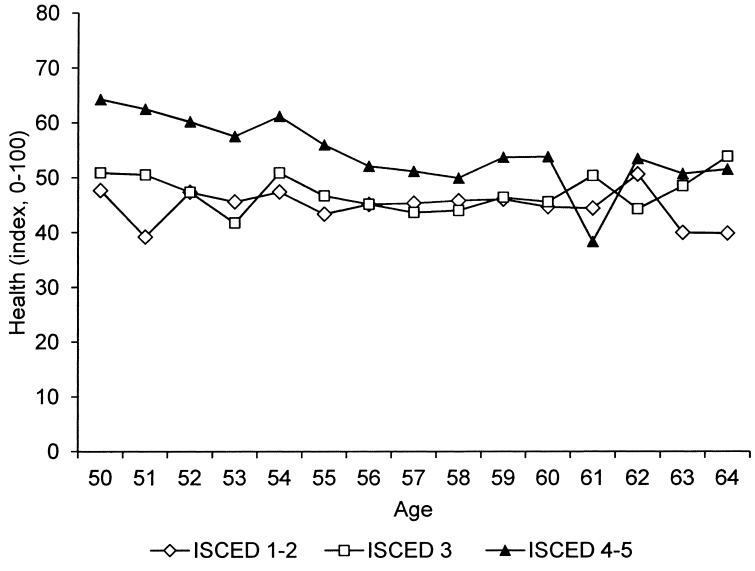

Fig. 5.20 Women's health by age and level of education

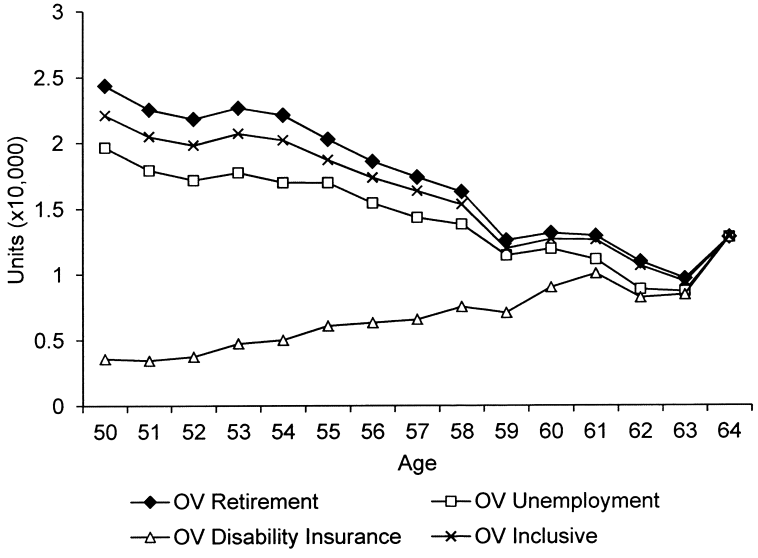

Fig. 5.21 Average option values for continuing employment for each exit route by age

of labor income, which is not compensated fully by the receipt of benefits. A second result from the figure is that DI is the most attractive outside option (the option value of continued work is lowest), while retirement is the least attractive outside option. This is mainly caused by the fact that under DI, a replacement benefit is received while pension accumulation continues as if one continued working, while retirement results in the receipt of an actuarially fair pension benefit without further accumulation of pension rights. Third, the OV of continued work in comparison to DI increases over time, while the OVs of working in comparison with retirement and unemployment decrease with age. This is because the number of years of receiving DI decreases, as does the number of years during which no further pension accumulation occurs under the retirement and unemployment options. Fourth, the OVs converge when age approaches sixty-five because, essentially, the closer one is to retirement, the more equal the benefits received via the various exit routes will be. When exiting at age sixty-five or later, all exit routes are the same.

In addition to using OV inclusive (i.e., the absolute gain from delaying retirement), we also use in our analysis the relative gain from delaying retirement as measured by the OV inclusive divided by the utility of exiting at the current age (variable relative gain in OV).

5.4 Results

The impact of health, the inclusive option value, and socioeconomic variables on the probability of exiting the labor force is analyzed using a probit model. The empirical specification includes all ingredients discussed in section 5.3. The data used in this analysis consist of the 824 men and women (see previous section) and table 5.7 reports summary statistics for all variables used in the analysis.

The regression results of eight different specifications in table 5.8 show that the inclusive option value (OV inclusive) has a negative and statistically significant effect on the exit from employment. An increase of 10,000 units decreases the probability of retirement by about 12 percentage points in specification (8). Current health has no significant effect on the exit probability from employment. Interestingly, marital status has a large and significant effect. Compared to a single person, a married individual has about a 14 percent higher probability of exiting employment. This may suggest that joint leisure time plays an important role in the retirement decision, for instance, for traveling together or spending time with (grand) children.

These findings are quite robust to the choice of specification-age dummies versus linear age, including health quintiles versus a continuous health index, including or excluding other covariates.

Looking at the effect of OV inclusive by health quintile (table 5.9), the effect of OV inclusive is only consistently significant across specifications for those in good health. The fourth specification also shows a significant effect

Table 5.7 **Summary statistics**

Variable (N = 824)	Mean	Standard deviation
Not employed next wave	0.307	0.462
Observed in wave 1 (2004)	0.563	0.496
Observed in wave 2 (2007)	0.437	0.496
Inclusive option value (OV)/10,000	1.801	0.868
Relative gain in OV	0.868	0.436
Health index (0–1)	0.590	0.254
Age (in years)	55.074	3.415
Gender (1 = male, 2 = female)	1.454	0.498
Married (1 = married or cohabitating, 0 otherwise)	0.864	0.343
LN(household income)	10.757	0.657
LN(earnings)	10.227	0.674
Low level of education (ISCED 1–2)	0.328	0.470
Medium level of education (ISCED 3)	0.284	0.451
High level of education (ISCED 4–5)	0.388	0.488

for individuals with worst health, but obviously this effect is not robust with respect to the different specifications. That OV is most important for those in good health is intuitive, as it implies that financial incentives have the largest effect for those in better health. Although financial incentives are likely to also matter for individuals in less than good health, these individuals may have less opportunity to continue work if their health limits the kind or amount of work they can do.

Instead of OV inclusive (i.e., the absolute gain from delaying retirement), table 5.10 presents specifications that include the relative gain from delaying retirement as measured by the OV inclusive divided by the utility of exiting at the current age. The table shows that without controlling for covariates the coefficients are again highly significant, but they are not robust to controlling for covariates.

To further examine the explanation that OV matters more when health is better, we include an interaction effect between OV and health using specifications (5)–(8), that is, with the continuous health index. The main results of this exercise are in table 5.11 and do not show significant interaction effects. Comparing this to the results in table 5.9, therefore, suggests that the interaction between OV and health is mainly concentrated at the group with the very best health.

When examining the effect of OV inclusive on the exit probability by levels of education, the largest effect is found for highly educated individuals (table 5.12). However, this finding may not be robust as it only holds for specifications (1)–(3) and not for specification (4), which includes age dummies and all covariates.

Finally, the results in tables 5.13 and 5.14 are based on the relative gain measure and yield the same conclusions as when using the OV inclusive

Table 5.8 **Estimation results for eight specifications**

Specification	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Variables	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.	m. e.	s. e.
OV																
Inclusive/10,000	–0.089	0.023	–0.082	0.023	–0.147	0.047	–0.119	0.049	–0.089	0.023	–0.081	0.023	–0.148	0.047	–0.119	0.049
A std. dev. change in OV	–0.068		–0.063		–0.113		–0.091		–0.068		–0.062		–0.114		–0.091	
Health quint 2 (2nd lowest)	0.046	0.073	0.066	0.076	0.053	0.074	0.072	0.078								
Health quint 3	0.008	0.067	0.046	0.072	0.015	0.068	0.052	0.073								
Health quint 4	0.026	0.067	0.042	0.069	0.023	0.067	0.035	0.069								
Health quint 5 (highest)	0.045	0.069	0.081	0.072	0.053	0.069	0.088	0.073								
Health index (range 0–1)									0.021	0.067	0.045	0.068	–0.148	0.047	0.043	0.069
Age	0.067	0.006			0.060	0.008			0.067	0.006			0.021	0.068		
Age dummies			Included				Included				Included				Included	
Female					0.041	0.040	0.039	0.040					0.042	0.040	0.041	0.040
Married					0.134	0.042	0.145	0.041					0.132	0.042	0.141	0.042
LN(household income)					–0.047	0.029	–0.054	0.029					–0.046	0.029	–0.051	0.029
LN(earnings)					0.110	0.055	0.086	0.056					0.112	0.055	0.088	0.056
ISCED level 3					–0.079	0.041	–0.084	0.041					–0.077	0.041	–0.083	0.041
ISCED level 4 or 5					–0.014	0.045	–0.013	0.046					–0.015	0.045	–0.018	0.046
n	824		824		824		824		824		824		824		824	
Joint significance health quintiles (*p*-values)	0.916		0.808		0.873		0.707									

Note: Marginal effects (m.e.) from probit models for the probability of leaving employment.

Table 5.9 **Estimation results for four specifications; option value interacted with health**

Specification	*n*	Mean exit rate	Mean OV	Std. dev. OV	m. e. (1)	m. e. (2)	m. e. (3)	m. e. (4)
OV: 1st quintile (worst health)	73	0.274	1.475	0.760	–0.148 (0.084) [–0.112]	–0.174 (0.104) [–0.132]	–0.333 (0.193) [–0.253]	–0.545 (0.264) [–0.414]
OV: 2nd quintile	138	0.370	1.521	0.793	–0.122 (0.068) [–0.097]	–0.151 (0.087) [–0.120]	–0.095 (0.145) [–0.076]	–0.018 (0.222) [–0.014]
OV: 3rd quintile	183	0.279	1.829	0.802	–0.027 (0.045) [–0.021]	0.002 (0.050) [0.002]	–0.072 (0.098) [–0.058]	–0.091 (0.109) [–0.073]
OV: 4th quintile	223	0.309	1.881	0.833	–0.020 (0.047) [–0.017]	0.009 (0.058) [0.008]	–0.068 (0.090) [–0.056]	–0.039 (0.111) [–0.033]
OV: 5th quintile (best health)	207	0.300	1.993	0.969	–0.150 (0.039) [–0.146]	–0.149 (0.040) [–0.145]	–0.237 (0.088) [–0.230]	–0.216 (0.089) [–0.209]

Note: Standard errors are in parentheses and the marginal effects for a one standard deviation change in the inclusive option value (OV) are in brackets. The models estimated include as explanatory variables age, gender, marital status, education, income, and earnings (as in table 5.8).

Table 5.10 **Estimation results for four specifications, OV specified as a relative gain (OV inclusive divided by the utility of exiting now)**

Specification Variables	m. e. (1)	m. e. (2)	m. e. (3)	m. e. (4)
Relative gain in OV	–0.148 (0.055)	–0.140 (0.055)	–0.071 (0.071)	–0.060 (0.072)
Linear age	X		X	
Age dummies		X		X
Health quintiles	X	X	X	X
Other covariates			X	X
No. of observations	824	824	824	824
Mean exit rate	0.307	0.307	0.307	0.307
Mean gain in OV	0.868	0.868	0.868	0.868
Std. dev. gain in OV	0.436	0.436	0.436	0.436

Note: Standard errors are in parentheses.

Table 5.11 **Estimation results; OV specified as a relative gain interacted with health**

Specification	*n*	Mean exit rate	Mean gain	Std. dev. gain	m. e. (1)	m. e. (2)	m. e. (3)	m. e. (4)
Relative gain in OV:	73	0.274	0.728	0.370	–0.419	–0.640	–0.439	–0.957
1st quintile (worst health)					(0.220)	(0.289)	(0.284)	(0.435)
Relative gain in OV:	138	0.370	0.747	0.425	–0.314	–0.439	–0.220	–0.292
2nd quintile					(0.149)	(0.196)	(0.187)	(0.274)
Relative gain in OV:	183	0.279	0.857	0.380	0.210	0.223	0.282	0.234
3rd quintile					(0.132)	(0.147)	(0.163)	(0.180)
Relative gain in OV:	223	0.309	0.920	0.448	0.031	0.104	0.051	0.124
4th quintile					(0.109)	(0.129)	(0.132)	(0.156)
Relative gain in OV:	207	0.300	0.951	0.472	–0.317	–0.298	–0.226	–0.174
5th quintile (best health)					(0.093)	(0.095)	(0.139)	(0.140)

Note: Standard errors are in parentheses. The models estimated include as explanatory variables age, gender, marital status, education, income, and earnings (as in table 5.8).

Table 5.12 **Estimation results; OV inclusive interacted with continuous health index**

Specification	m. e. (5)	m. e. (6)	m. e. (7)	m. e. (8)
OV inclusive	–0.088	–0.080	–0.147	–0.118
	(0.023)	(0.023)	(0.047)	(0.049)
	[–0.077]	[–0.070]	[–0.128]	[–0.102]
OV inclusive*health index	–0.024	–0.028	–0.016	–0.017
	(0.086)	(0.086)	(0.088)	(0.087)
Health index	0.015	0.038	0.017	0.039
	(0.071)	(0.071)	(0.072)	(0.072)
Linear age	X		X	
Age dummies		X		X
Other covariates			X	X
Number of observations	824	824	824	824
Mean exit rate	0.307	0.307	0.307	0.307
Mean OV inclusive	1.801	1.801	1.801	1.801
Std. dev. OV inclusive	0.868	0.868	0.868	0.868

Note: Standard errors are in parentheses and the marginal effects for a one standard deviation change in the inclusive option value (OV) are in brackets.

Table 5.13 **Estimation results; OV interacted with education**

Specification	*n*	Mean exit rate	Mean OV	Std. dev. OV	m. e. (1)	(2)	(3)	(4)
OV inclusive: ISCED 1–2	253	0.352	1.338	0.633	–0.075	–0.073	–0.129	–0.135
					(0.055)	(0.056)	(0.124)	(0.128)
					[–0.047]	[–0.046]	[–0.081]	[–0.085]
OV inclusive: ISCED 3	227	0.248	1.813	0.795	–0.045	–0.045	–0.165	–0.122
					(0.040)	(0.049)	(0.093)	(0.112)
					[–0.036]	[–0.036]	[–0.131]	[–0.097]
OV inclusive: ISCED 4–5	299	0.313	2.184	0.903	–0.114	–0.132	–0.145	–0.101
					(0.036)	(0.047)	(0.063)	(0.080)
					[–0.103]	[–0.119]	[–0.131]	[–0.091]

Note: Standard errors are in parentheses and the marginal effects for a one standard deviation change in the inclusive option value (OV) are in brackets. The models estimated include as explanatory variables age, gender, marital status, education, income, and earnings (as in table 5.8).

Table 5.14 **Estimation results; relative gain interacted with education**

Specification	*n*	Mean exit rate	Mean gain	Std. dev. gain	m. e. (1)	(2)	(3)	(4)
Relative gain in OV: ISCED 1–2	270	0.352	0.705	0.336	–0.216	–0.230	–0.280	–0.329
					(0.121)	(0.124)	(0.189)	(0.195)
Relative gain in OV: ISCED 3	234	0.248	0.919	0.422	0.012	0.005	0.031	0.021
					(0.097)	(0.115)	(0.142)	(0.163)
Relative gain in OV: ISCED 4–5	320	0.313	0.967	0.482	–0.147	–0.127	–0.067	–0.025
					(0.089)	(0.109)	(0.097)	(0.118)

Note: Standard errors are in parentheses. The models estimated include as explanatory variables age, gender, marital status, education, income, and earnings (as in table 5.8).

measure: when using specification (4) they show the strongest impact of the relative gain of continued working among individuals in the lowest health quintile and among low-educated individuals.

5.5 Understanding the Results and their Implications

5.5.1 The Model Fit

To asses model fit we use specification (4), which is most flexible as it includes age dummies and allows for a nonlinear relation between health and the exit probability. We have converted the exit rates to yearly exit rates. Figures 5.22 and 5.23 show that the observed and predicted exit rates from employment within one year by age and gender are fairly close, which is not surprising as age dummies are included in the model.

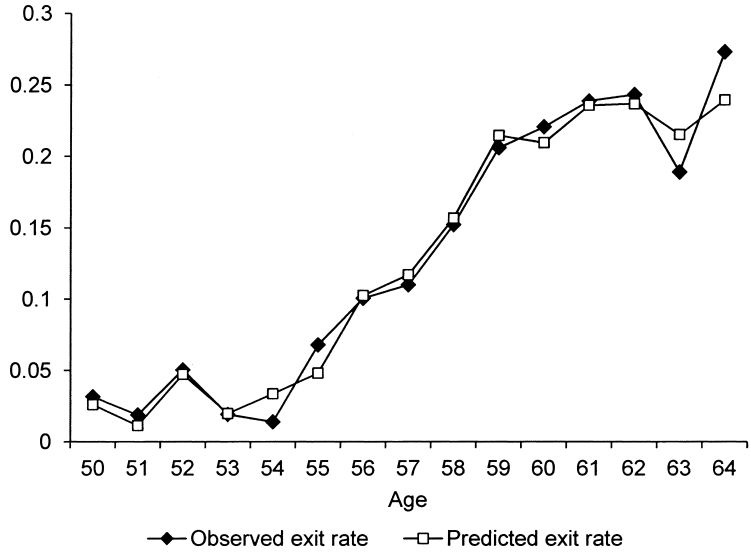

Fig. 5.22 Model fit for men by age (exit rates from employment within one year)

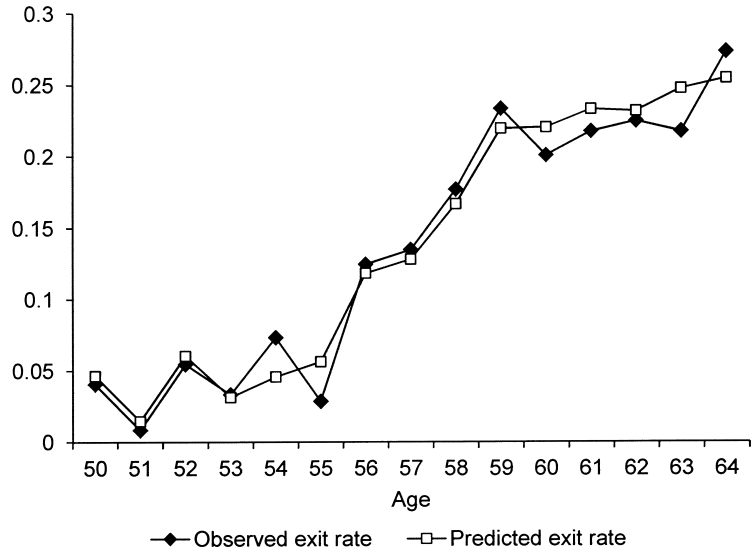

Fig. 5.23 Model fit for women by age (exit rates from employment within one year)

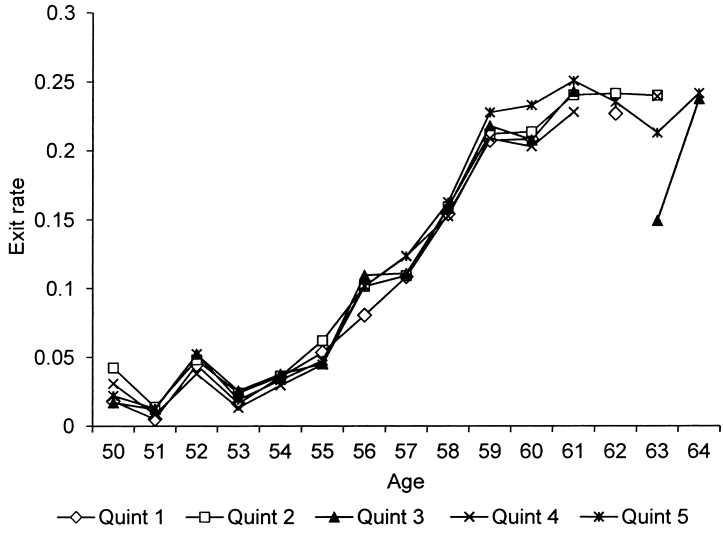

Fig. 5.24 Predicted exit rate from employment within one year by health quintile (men)

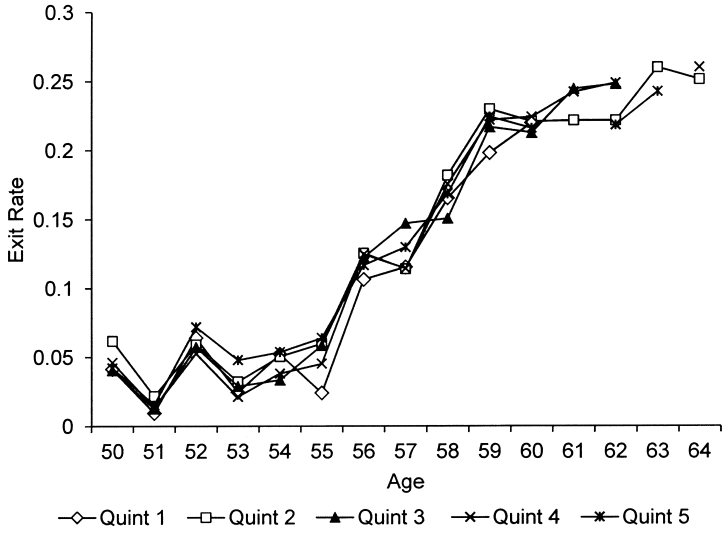

Fig. 5.25 Predicted exit rate from employment within one year by health quintile (women)

5.5.2 Implications of the Results: Graphical Description of Results

The predicted (yearly) exit rates, based on specification (4) (table 5.8), by health quintile in figures 5.24 and 5.25 show that the exit rates vary little by health quintile, as one would expect in light of the estimation results. Differences by level of education reveal that exit rates from employment are

relatively high among the low-educated individuals, in particular at younger ages (figures 5.26 and 5.27).

5.5.3 Implications of the Results: Counterfactual Simulations

We perform counterfactual simulations to assess the impact of health, education, DI eligibility rules, and DI generosity on the exit probability (keeping other explanatory variables unchanged). For this we use the estimation results of specification (4), table 5.8. Figure 5.28 shows that there are no noteworthy effects of health on the exit probability and figure 5.29 shows that having a medium level of education reduces the exit rate from employment. In figures 5.30 and 5.31 we simulate the effect of a change in the disability benefits. These figures show that even large changes in the disability benefits have virtually no impact on labor force exit.

Figures 5.32 and 5.33 show, respectively, the exit probability from and the survival probability in employment under the assumption that all individuals are entitled to the benefits of only one particular exit route. This means that we assume in the OV-DI scenario that all individuals are eligible for DI benefits (and not for any other benefits), in the OV-retirement scenario that all individuals are only entitled to (early) retirement benefits, and in the OV-unemployment benefits scenario that all individuals are entitled to only unemployment benefits (and not to DI or retirement benefits).[6] As these figures show, the OV-DI scenario yields the largest exit probability and the lowest survival probability, which means that if all individuals would be entitled to DI, that is, that there is no medical screening, more people would exit employment before age sixty-five. Conversely, if no individual would be entitled to DI benefits, more people would remain employed until the age of sixty-five.

We can quantify this effect by calculating the expected number of years of work until age sixty-five. The expected number of years of work in the OV-DI scenario is equal to 7.40, in the OV-retirement scenario it is equal to 9.47, and in the OV-unemployment scenario it is equal to 9.02 years. This implies 1.62 additional years of work if everyone faced the retirement option compared to if everyone faced the DI option.

Next we consider this latter difference only for those who left employment for DI. There are only twenty-three such individuals in our sample. For these individuals the difference is only slightly higher: 1.92 years (expected number of years of work equal to 7.02 when only having the DI option and 8.94 years when only having the retirement option). Finally, we examine the effect of restricting access to DI in a more gradual way. Again we consider only those

6. Some individuals, for example the self-employed, may not have contributed to an occupational pension scheme and, therefore, have no early retirement benefits and their income after retirement is assumed to consist of the state pension only (starting at age sixty-five). Likewise, persons who did contribute to an occupational pension scheme but choose to retire before the relevant early retirement age are assumed to receive no pension until age sixty-five.

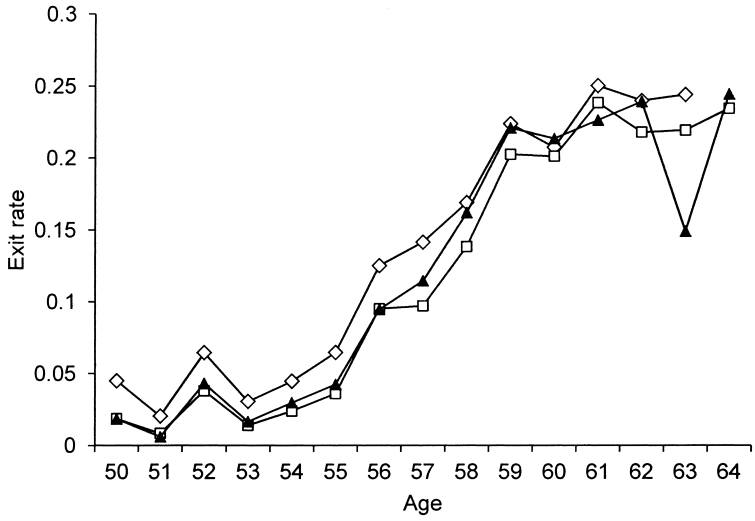

Fig. 5.26 Predicted exit rate from employment within one year by level of education (men)

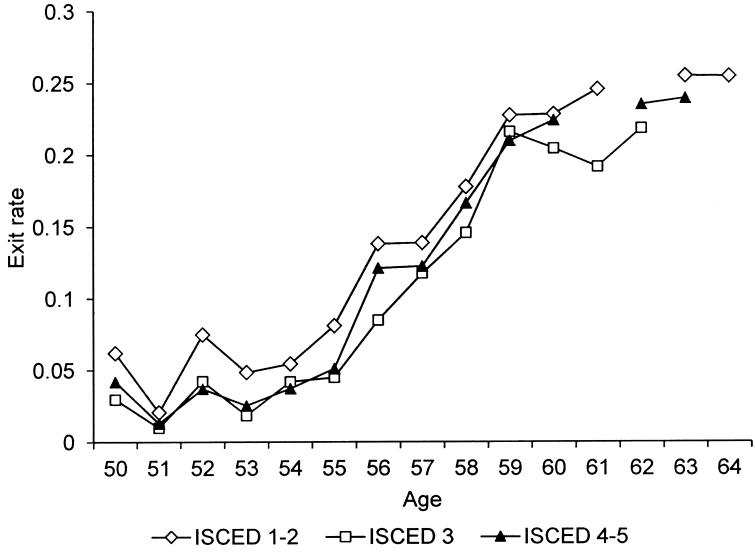

Fig. 5.27 Predicted exit rate from employment within one year by level of education (women)

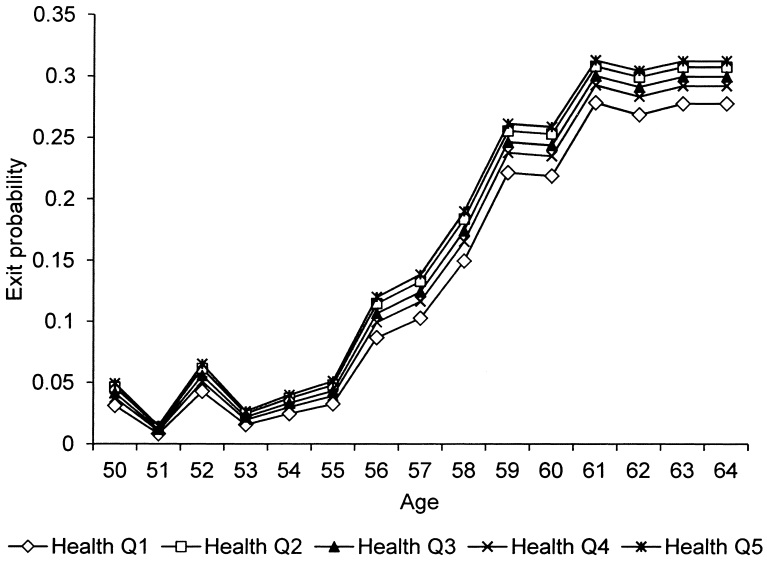

Fig. 5.28 Simulated effect of health on the exit probability from employment within one year

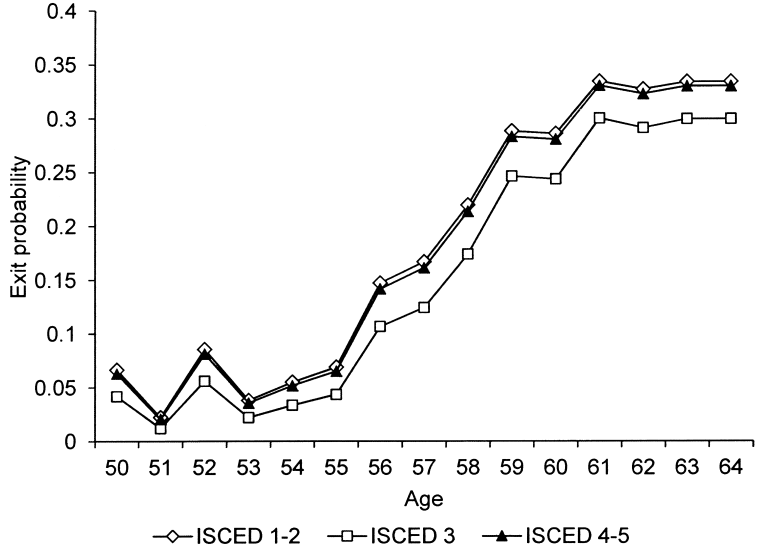

Fig. 5.29 Simulated effect of education on the exit probability from employment within one year

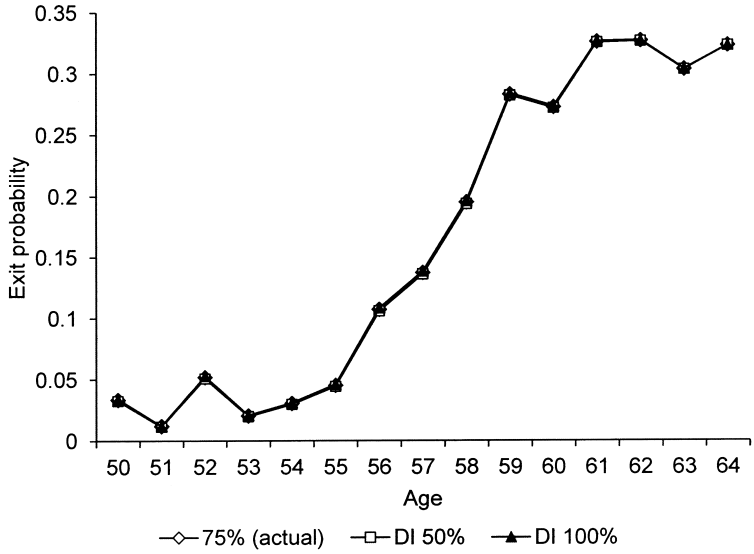

Fig. 5.30 Simulated effect of DI benefits on the exit probability from employment within one year

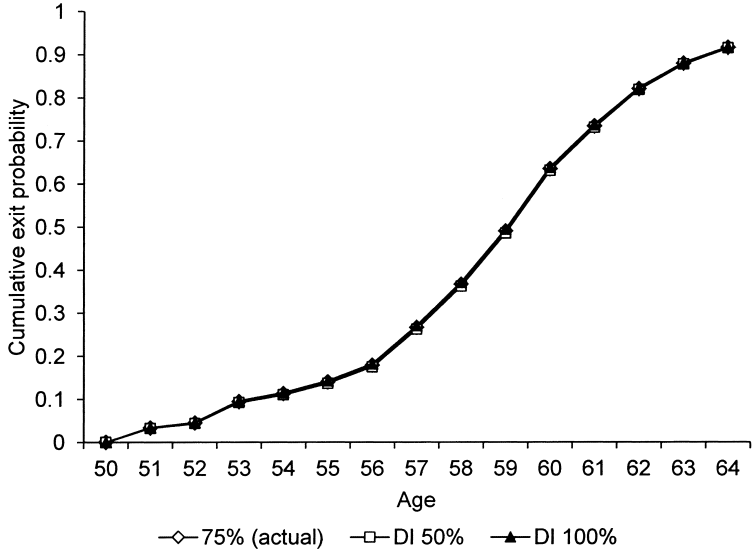

Fig. 5.31 Simulated effect of DI benefits on the probability of having exited from employment

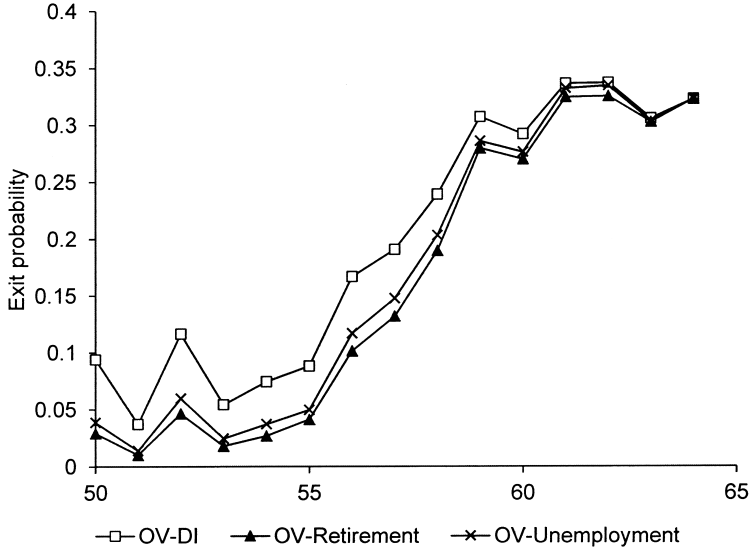

Fig. 5.32 The simulated exit probability from employment within one year when assuming all individuals are entitled to either DI (disability insurance), retirement, or unemployment benefits

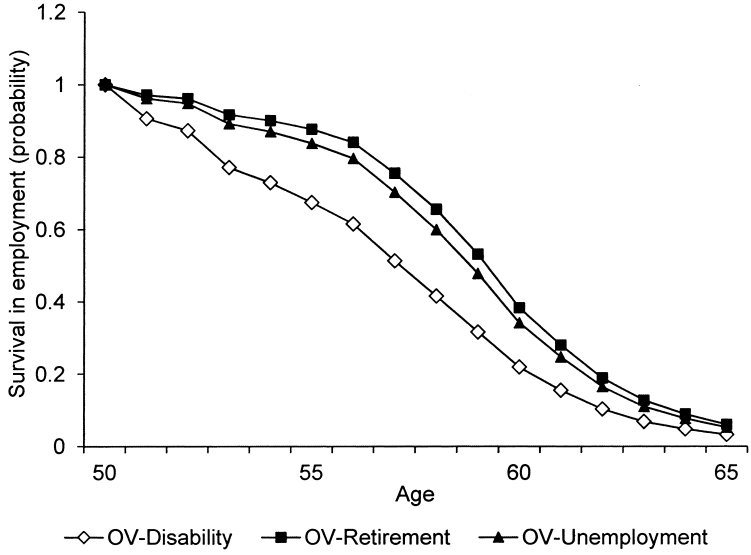

Fig. 5.33 The simulated survival probability in employment when assuming all individuals are entitled to either disability, retirement, or unemployment benefits

Table 5.15 Estimation results including health shock

	m. e.			
Specification	(5)	(6)	(7)	(8)
OV inclusive	–0.086	–0.078	–0.148	–0.118
	(0.023)	(0.023)	(0.047)	(0.049)
Health index	–0.049	–0.020	–0.049	–0.021
	(0.076)	(0.078)	(0.077)	(0.079)
(Adverse) health shock	0.136	0.122	0.134	0.120
	(0.070)	(0.071)	(0.071)	(0.072)
Linear age	X		X	
Age dummies		X		X
Other covariates			X	X
Number of observations	824	824	824	824
Mean exit rate	0.307	0.307	0.307	0.307
Mean OV inclusive	1.801	1.801	1.801	1.801
Std. dev. OV inclusive	0.868	0.868	0.868	0.868
Mean health index (0–1)	0.590	0.590	0.590	0.590
Std. dev. health index	0.254	0.254	0.254	0.254
Mean health shock (–1,1)	0.029	0.029	0.029	0.029
Std. dev. health shock	0.268	0.268	0.268	0.268

Note: Standard errors are in parentheses.

who left for DI and examine what would have happened if only two-thirds, one-third, or nobody was eligible for DI but instead had only the (early) retirement option. In the actual situation all are eligible for DI. Similar to the above, based on the exit probabilities we can calculate the expected years of work for these four scenarios. The expected number of years of work is equal to 7.02, 7.56, 8.52, and 8.94 years when randomly assigning, respectively, 100 percent to be DI eligible, 66.7 percent being DI eligible (and the remaining 33.3 percent eligible for retirement), 33.3 percent being DI eligible, and 0 percent being DI eligible. In line with the previous results, this shows that restricting access to DI increases the expected years of work.

5.5.4 Health Shocks

The finding that exit routes are unaffected by current health may appear puzzling, as health is likely to play a role in the labor force exit decision as has been found, for instance, by Schuring et al. (2013) for the Netherlands. To examine this further we define a health shock as the difference between the health index in the current wave and the health index in the next wave. If the health shock is positive it means a deterioration of health (an adverse health shock). Table 5.15 shows the results in which we added an adverse health shock variable to the models (5)–(8). The results show

that an adverse health shock results in a higher probability of exiting the labor force.[7]

One might, of course, suspect that health shocks are endogenous, in the sense that retirement would negatively affect health rather than the other way around. The literature on the relation between health and retirement is ambiguous, with several papers finding that retirement has no adverse health effects (e.g., Kalwij, Knoef, and Alessie 2013; Neuman 2008) or even a positive effect on health (e.g., Charles 2004; Hemingway et al. 2003; Coe and Zamarro 2011; Bloemen, Hochguertel, and Zweerink 2013). Other papers, however, conclude that retirement may have a negative impact (e.g., Kuhn, Wuellrich, and Zweimueller 2010; Behncke 2012; Dave, Rashad, and Spasojevic 2008). If it is the case that retirement is good for health, then the effects of health on retirement in table 5.15 could actually be an underestimation of the effect of health shocks. However, given the inconclusive state of the literature, the estimates in table 5.15 have to be interpreted with care.

5.6 Conclusion

In this chapter we examined to what extent the exit probability from the labor force can be explained by the provisions of the DI program. In particular we disentangled the effects of DI eligibility from DI generosity on this exit probability. For this we mainly used data from the Dutch branch of the Survey of Health, Ageing and Retirement in Europe, which was conducted in 2004, 2007, and 2011.

Concerning the relation between health and labor force exit, we find that the effect of a health shock on the probability of exiting the labor force is marginally significant (at the 10 percent level).

We find no discernible impact of disability benefits on the exit from employment, but restricting access to the disability insurance scheme does affect labor force exit and increases, on average, the years people remain in employment until the age of sixty-five. These findings suggest that if policymakers aim to reduce the number of DI recipients they may choose stricter medical screening of individuals who apply for DI rather than reducing DI benefits for those who qualify for DI.

7. All estimates are significant at the 5 percent level according to a one-sided *t*-test.

Appendix

Additional Table and Figures

Table 5A.1 **The age distribution by gender and year in SHARE (the Netherlands) and in the Dutch population**

	Men			Women		
	2004 (%)	2007 (%)	2011 (%)	2004 (%)	2007 (%)	2011 (%)
SHARE-NL						
50–54	32	31	23	34	34	28
55–59	36	37	32	39	37	32
60–64	31	33	45	27	29	40
50–64	100	100	100	100	100	100
Population						
50–54	37	36	35	37	36	35
55–59	36	35	32	36	35	32
60–64	26	29	33	27	29	33
50–64	100	100	100	100	100	100

Source: For population, Statistics Netherlands (CBS; statline.cbs.nl).

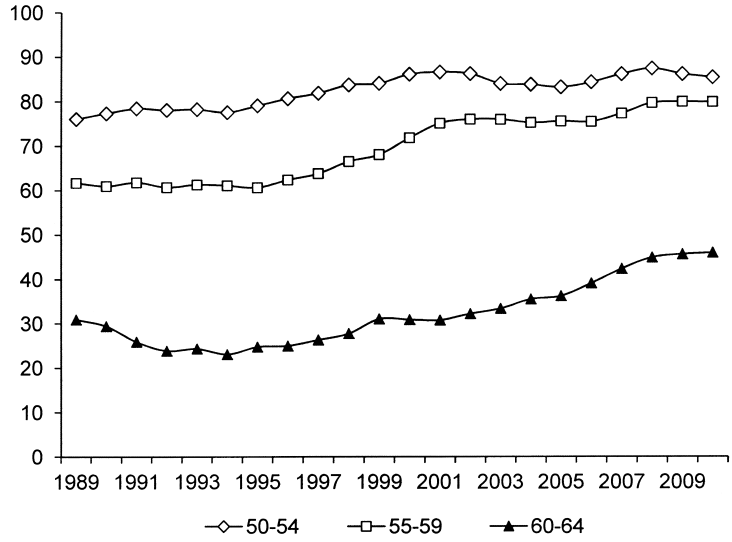

Fig. 5A.1 **Employment rates of older men by age group**
Source: Statistics Netherlands, Income Panel Survey (IPO).

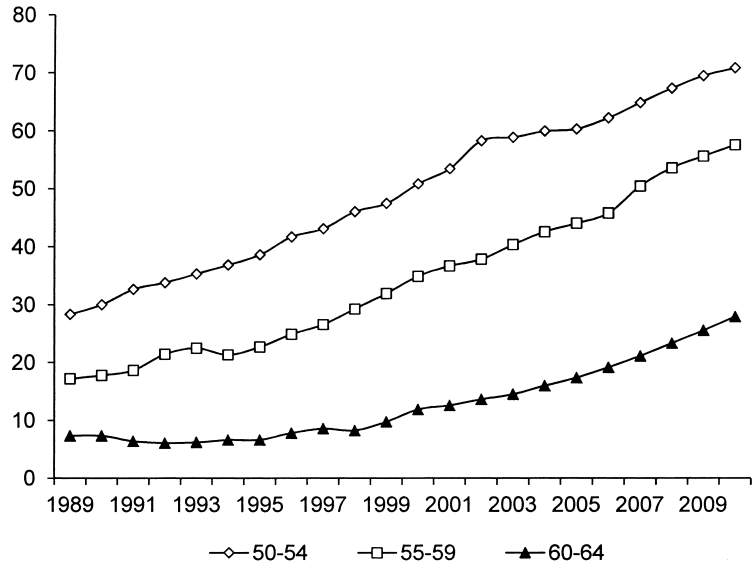

Fig. 5A.2 Employment rates of older women by age group
Source: Statistics Netherlands, Income Panel Survey (IPO).

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