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Early Retirement Behavior in the Netherlands: Evidence from a Policy Reform [1]

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Abstract

The Dutch labor force participation rate of elderly is among the lowest of Europe and early retirement schemes play an important role. Already in the early 1990s, unions and employer organizations recognized the adverse incentive effects of the generous and actuarially unfair PAYG schemes and decided to transform these to less generous and actuarially fair capital funded schemes. The starting dates of the transitional arrangements varied by sector. In this study, we exploit the variation in starting dates to estimate the impact of the policy reform on early retirement behavior. We use a large administrative dataset, the Dutch Income Panel of the National Tax Office, to estimate hazard rate models for early retirement. We conclude that the policy reform induces workers to postpone early retirement. Model simulations show that the transitional scheme has already led to average retirement postponement by 8 months, which will become almost a year once the transition is completed.

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1 Introduction

For some years now, retirement policy is high on the political agenda of many European countries. The financial consequences of population ageing and the high use of social security and welfare ask for a broad base of tax payers. Like in many other countries, the Dutch early retirement schemes are discussed extensively in the political debate. But already in the early 1990s, unions and employer organizations recognized the adverse incentive effects of the generous and actuarially unfair PAYG schemes and decided to transform them to less generous and actuarially fair capital funded schemes. The starting dates of the transitional arrangements varied by sector. In this study, we exploit the variation in starting dates to estimate the impact of the policy reform on early retirement behavior. We use a large administrative dataset, the Dutch Income Panel of the National Tax Office, to estimate hazard rate models for early retirement.

Although population ageing is less dramatic for the Netherlands than for many other countries, and the capital funding of the Dutch occupational pensions makes the Dutch economy less vulnerable to ageing altogether, the low participation rate before mandatory retirement age is important. The employment-to-population ratio for age 55 to 64 increased from 29.7 percent in 1990 to 41.8 percent in 2002 (OECD, 2003), but despite this increase the level is still below the average of the OECD countries. During the 1990s, some measures to improve labor force participation of elderly have been taken. For example, the Dutch governments decided to grant tax advantages to older workers. But most importantly for this study, the unions and employer organizations decided to transform the early retirement schemes. Section 2 discusses the old and the new early retirement schemes and their transitional arrangements in detail.

A major difference between the old and new early retirement schemes is the funding which changed from PAYG to capital funding. From the point of view of the individual worker the funding is however hardly relevant. The major interest of the worker is in the financial consequences of early retirement. Two aspects of the reform are important. First of all, the new schemes have lower 'early retirement wealth' than the old schemes, which may induce workers to postpone retirement. We define this as an 'income effect' or 'wealth effect'. Secondly, the new schemes are close to actuarially fair. The positive reward to postponement of early retirement, in terms of a higher benefit level, may also induce workers to postpone retirement. We define this as a 'price effect' or 'wage effect'. By using financial indicators for early retirement wealth and the reward to postponement we will try to disentangle the importance of these two effects.

Several studies on the labor force participation of elderly have demonstrated that financial incentives are important for individual retirement behavior. Gruber and Wise (1999, 2004) conclude this on the basis of international comparisons using an actuarially discounted measure for future social security and pension incomes. Within the project, Börsch-Supan reaches the conclusion using the German Socio-Economic Panel, Blundell *et al.* using the UK Retirement Survey, and Kapteyn and de Vos using the Dutch Socio-Economic Panel.[2] Using an alternative data source, the Dutch Retirement Survey (CERRA), Kerkhofs *et al.* (1999) conclude that financial incentives are important for early retirement and to a lesser extent for alternative early

[2] These references have all appeared in one of the two books edited by Gruber and Wise.

retirement routes like unemployment and disability insurance. On the other hand, on the basis of the same data Heyma (2001) concludes that the importance of financial incentives is limited for the different early retirement routes. In an overview article that is mostly based on US evidence, Lumsdaine and Mitchell (1999) conclude that the impact of financial incentives on early retirement is limited.

In this paper we provide evidence for the Netherlands using a new dataset: the Dutch Income Panel ('*Inkomens Panel Onderzoek*', IPO) 1989-2000. One particular advantage of the data is its accuracy as the administrative dataset is based on registers of the National Tax Office. A second advantage is the long time period over which we are able to follow individuals. And a third advantage is that the data contain sector of industry codes (SBI74, SBI93), allowing us to merge information from collective labor agreements between unions and employer organizations (CAO's). The agreements include early retirement arrangements and therefore contain information on regular early retirement ages and gross replacement rates. The advantages make the dataset attractive for studying early retirement behavior. We find that the policy reform induces workers to postpone early retirement. The results with financial measures for early retirement wealth are inconclusive on whether the income effect (because of lower generosity) or the price effect (because of actuarial fairness) dominates.

In section 2 we discuss the early retirement schemes in the Netherlands, as far as they are relevant at present. In section 3 some theoretical issues which are of importance when describing the early retirement behavior of individuals are addressed. The data and the construction of financial indicators are discussed in section 4, and the model is discussed in section 5. The estimation results, together with micro-simulations based on our best performing model, are presented in section 6. Section 7 concludes.

2 Early retirement in the Netherlands

The Dutch pension system consists of both old age pension provisions and early retirement schemes. The statutory old age pension age is 65. From that age on all Dutch inhabitants are entitled to a state pension. In addition most employees are entitled to a supplementary occupational pension.[3] Before age 65 early retirement schemes apply.

Early retirement schemes have started since the mid-seventies of the past century. The first schemes, the so-called VUT schemes[4], operated as PAYG systems where the working population pays for the retirement of early retirees. The schemes were favorable for older workers, while eligibility conditions were rather mild. In the nineties of the past century concerns grew about adverse incentive effects and the long run financial sustainability of the prevailing VUT schemes. A general agreement was reached between government and the *social partners* (trade unions and employer organizations) to reform the system. The PAYG-based VUT schemes were gradually replaced by capital funded pre-pension (PP) schemes. These schemes imply lower early retirement wealth and the introduction of actuarial adjustments across different retirement ages.

[3] See Bovenberg and Meijdam (1999) for a detailed description of the Dutch old age pension system.
[4] VUT is the Dutch acronym for *early retirement*

This section subsequently describes the old VUT early retirement schemes, the new PP schemes and the currently active transitional arrangements between VUT en PP.

VUT early retirement schemes

The VUT schemes were introduced in the mid-seventies of the past century. At that time, the Ministry of Social Affairs and Employment started an experiment that provided employees in the building industry and the education sector the possibility to retire at age 63 or 64 instead of the statutory retirement age of 65. The most important reason for introducing this scheme was to create job openings for the then large number of younger unemployed. A second reason was the promotion of welfare among elderly in the Netherlands (Ministry of Social Affairs, 1990).

From the late seventies on, VUT early retirement schemes were agreed upon in many collective agreements and consequently installed in many sectors. The schemes were a shared responsibility of the social partners, and were facilitated by the government through a favorable tax treatment: pension premiums are deductible while the withdrawals are being taxed, and pension assets are exempt from capital taxation. For the new PP schemes, this fiscal facility implies a subsidy of on average 25% (Kooiman et al., 2003).

The financial conditions of the schemes were favorable for older workers: gross benefits equal up to 80% of the last earned gross wage and the old age pension entitlements continue growing as if they kept on working. To qualify for a VUT early retirement, a worker needed to reach the eligibility age and needed to be working in a sector or firm for at least 10 years. The schemes did not contain any actuarial adjustments: the benefit level was not adjusted in case a worker decided to postpone retirement. And in case a worker decided to retire before eligibility age the worker did not receive an early retirement benefit at all. This clearly gave a great incentive to retire at exactly the eligibility age. This is well documented in Gruber and Wise (1999), Kapteyn and de Vos (1999) and Lindeboom (1999).

For employers, the incentives resulting from the scheme were strong as well. Wages in the Netherlands are for an important part based on seniority, often implying that after a certain age wages become higher than productivity. The schemes offered an opportunity to become rid of older workers without any cost for the individual employer. The schemes were introduced at a larger scale at a time when the Netherlands went through a major economic depression, so that the participation rate of elderly dropped seriously in these years. This is the reason why concerns grew about the long run financial sustainability of the prevailing VUT schemes.

Pre-pension schemes

From the mid-nineties on, the VUT early retirement schemes were replaced by pre-pension (PP) schemes. The capital funded PP schemes are collective (mandatory) savings arrangements in which workers need to save for their own early retirement. This subsection discusses the pure PP schemes as will be relevant for the early retirement of the currently young workers, while the next subsection will discuss the transitional arrangements that are relevant for the older workers during the 1990s.

A major difference between the VUT and the PP schemes is the funding which changed from PAYG to capital funding. From the point of view of the individual worker, the funding is however irrelevant (except for the fact that the worker may care about the long-run financial sustainability of the government). The worker is interested in the financial consequences of the choices he is able to make. Contrary to VUT schemes, the PP schemes contain actuarial adjustments: an extra year of work leads to a higher benefit level.

A worker receives the maximum benefit only if he contributed to a PP scheme for 35 or 40 years, depending on the exact regulations of the pension scheme. If the employee has a shorter employment history, then the benefit will be lower. This holds for the old-age pension benefit as well. This last point is another difference to the VUT scheme where contributions for the old age pension continued. The PP schemes differ from the VUT schemes in other respects as well. The standard retirement age increased according to many collective labor agreements. In a sample of 105 collective labor agreements, the Labor Inspectorate (2004) finds that about one-third of the collective labor agreements maintained the standard retirement age of the VUT. About one-third of the agreements increased the standard retirement age by one year, while the other agreements increased retirement age by two or more years. Another major change is the decrease in benefit level: while under the VUT scheme the replacement rate was 76 to 80% for 38 out of 52 investigated collective labor agreement (covering 82% of employees), the replacement rate is 70% for 30 out of 52 agreements under the PP scheme (covering 65% of employees).

Transitional arrangements

All transitional arrangements imply relatively smooth transitions from VUT to PP. This means that most older workers face early retirement arrangements that are close to the old VUT schemes. The arrangements vary however in several aspects, and this variation is exactly what we will use to identify the impact of early retirement arrangements on early retirement behavior. First of all, the social partners for the different collective labor agreements had to decide on a starting time of the transitional arrangement. The first pension fund to start the transition was the ABP, the pension fund of civil servants, which started on April 1, 1997. Furthermore, the social partners had to decide on the length of the transitional period. This aspect is however less relevant for our study.

Civil servants who retired after April 1, 1997 and who are born before April 1, 1942 face a replacement rate of 59% at age 60, while those born after that date receive 55% (Table 2.1). Note that the replacement rates have decreased rather substantially: those who reached the age of 60 before April 1, 1997 received a replacement rate of 80%. After age of 61 there are no actuarial adjustments anymore for the generations that we consider in the table. For later generations (which are not included in the table) this will be the case. Another aspect of the PP scheme is that it allows early retirement before the traditional VUT eligibility age. This aspect may imply that the PP schemes may for some individuals lead to earlier retirement than under the old VUT schemes. As was noted in section 2.1 only working individuals qualify for VUT benefits, so that there existed an incentive to continue working until the VUT eligibility age.

[INSERT TABLE 2.1 ABOUT HERE]

For many pension funds, the transitional arrangements are quite similar to the VUT scheme. So if a worker retires before eligibility age, the worker receives nothing and if he retires later, he does not receive a higher benefit level.[5] The replacement rates of some pension funds have not changed during the period of investigation. For employees covered by the pension funds of the TPG and KPN the VUT was already abolished in 1996. The transitional arrangement however guaranteed every elderly employee the same replacement rates as the VUT scheme. For employees covered by BPSG the VUT scheme was abolished after 31 December 2000.

None of the pension funds of Table 2.1 has a transitional arrangement which is actuarially neutral. The financial incentives to retire before the standard retirement age are negative (e.g. PGGM) up to neutral (e.g. ABP). Working until the age of 65 is being discouraged in all transitional schemes under consideration.

[INSERT TABLE 2.2 ABOUT HERE]

Workers build up a complete old age pension by contributing 35 or 40 years to a pension fund. Under the old VUT schemes, workers continued contributing to a pension fund so that workers were still able to reach the maximum old age pension level. Under the PP schemes, the contributions to the pension fund stop. For this reason, early retirees are often not able to build up a complete old age pension. Table 2.2 reports old-age pension replacement rates for a worker that would receive a complete old age pension in case he works until age 65. The pension fund ABP guarantees a replacement rate of 53% in case of early retirement at age 55. Under the old VUT scheme workers received the maximum replacement rate in case of retirement at the official VUT retirement age, while under the PP scheme this is not the case. Early retirement therefore has an effect on the level of the old age pension. The old-age pension replacement rates will be used when constructing financial indicators for early retirement in section 4.

3 Theoretical considerations

Income effect and private savings

Early retirement schemes are meant to generate an income effect: the wealth which becomes available through the early retirement plan is in fact used for the purchase of leisure time. However, income effects found in the literature are often insignificant and always of relatively low magnitude. A possible explanation for this might be that the early retirement wealth (ER wealth) available to the individual is less than what the individual would have saved on a voluntary basis.[6] In that case, the total wealth that would have been accumulated by the individual if savings were not mandatory will at least be as high as the ER wealth. This implies that a change in ER wealth will not result in an income effect, as the lower wealth will be substituted by private savings. Thus, in these cases the income effect of lower pension wealth will be equal to zero. Of course, this argument will not hold for all individuals in the population. In fact, many studies have found that substitution between mandatory savings and private savings is limited. (PM)

[5] This latter property is no problem if the benefit would always be paid out, even if the participant does not retire. This method to stimulate the participation rate is used by PGGM, but only since 2001, which is outside our period of investigation. An internal evaluation of PGGM suggests that this policy is quite successful. In 2002, 2362 of the 27 thousand individuals that were entitled to an early retirement benefit continued to work. Together they filled 931 full-time jobs. A further increase to 3000 individuals (1150 jobs) was expected (PGGM, 2002).

[6] The ER wealth effect is mostly identified through measures such as Social Security Wealth or Pension Wealth; see section 4.2.

Implicit taxes

Contrary to the income effect just discussed, the literature mostly finds relatively high price effects. That is, if additional ER wealth is obtained through an extension of the working career, then this has a considerable impact on one's decision to participate in the labor market.

[INSERT FIGURE 3.1 ABOUT HERE]

The theoretical effects of the transition from VUT to PP schemes are shown in Figure 3.1. To facilitate the discussion of this figure, assume for the moment that standard retirement ages for both the VUT and PP scheme are equal. The reference case, represented by the dashed curve, shows the retirement hazard for an actuarially fair scheme, say the PP scheme. It is smooth, as there are no implicit taxes shifting the preferences for particular ages. For ease of exposition it is assumed here that the hazard increases with age, but this needs not be the case. The solid curve shows the theoretical effects of an actuarially unfair scheme, such as the VUT scheme. The first effect, called "*VUT not eligible*", shows that individuals younger than the VUT standard retirement age have a lower propensity to withdraw from the labor market, as they receive high implicit tax subsidies. Another argument which may lead to a higher propensity to withdraw from the labor market for this age category is that the possibility to start receiving PP benefits at these ages may generate an income effect for those employees who are liquidity constrained. The second effect shown in the figure, called "*VUT eligible*", shows that individuals older than the VUT standard retirement age have a higher propensity to withdraw from the labor market than under the fair PP scheme. These individuals face two incentives to terminate their working careers. In the first place, the implicit taxes on continued working make this option less attractive.[7] Apart from this price effect, the VUT scheme also generates an income effect, as replacement rates are generally higher and the standard retirement age is generally lower than under the old VUT scheme.

Finally note that our assumption on the equality of standard retirement ages for VUT and PP is not essential, as it is equivalent with a decline in the replacement rate at some given age. More generally, the concept of 'standard retirement age' is not useful in the context of actuarially adjusted replacement rates.

Habit formation

Practically all studies on the early retirement behavior of individual employees were unable to explain the age spikes from financial incentives of the concerning early retirement scheme exclusively. A possible explanation for this is that it could be a matter of the financial indicators used in the econometric analyses. The 'rational' indicators formulated by economists and econometricians may well deviate from the more 'emotional' indicators applied by individuals in daily life. This would require a more psychological approach in order to explain individual behavior with respect to early retirement. Such an approach would require the use of perceived financial incentives instead of objective measures. Also, perceived survival probabilities should be used instead of standard life table figures, etc. A second explanation is that there are other factors influencing the retirement behavior of individuals. Social and cultural developments may have caused an intrinsic preference of individuals

[7] Note that employees with a higher discount rate than the pension fund still have to 'pay' implicit taxes if they continue to work. For the moment, we will however abstract from this consideration and assume that 'actuarially neutral' in the view of the pension fund is equivalent to 'actuarially neutral' in the view of the worker.

for certain retirement ages. Third, there may exist interactions between the financial incentives and social and cultural determinants. (PM)

4 Data

The IPO dataset

The data for this study are drawn from the Dutch Income Panel (IPO) 1989-2000, which is a large sample of income histories of individuals during the 11-year period. The IPO is drawn from register data made available by the National Tax Office and is administrated by Statistics Netherlands (CBS). The sample contains individuals that are included in the Dutch municipal registers except for those living in institutions. Attrition occurs only because of immigration or death, or because an individual moves to an institution. To compensate the loss in numbers of observations because of attrition new individuals are added to the sample every year. The sample contains about 75 thousand individuals per year. For our study we select individuals who are employed and not partly living on welfare, disability insurance or unemployment insurance for at ages 55.

The dataset has a panel format, and we reorganize the data to an event-history format by defining spells of employment starting at age 55. The duration of spells vary from several days up to many years. Each spell-record contains a personal identifier and a starting and ending date. Further variables include individual characteristics such as gender, year of birth, marital status and the number of children. In addition each spell-record includes information on income, including for instance gross wage and gross income of the partner. Replacement rates for unemployment insurance, disability insurance and early retirement are not directly observed. But the dataset contains sector of industry codes (SBI74, SBI93). So by using information from corresponding collective labor agreements between unions and employer organizations we are able to merge replacement rates and regular early retirement ages to the dataset.

From the event-history dataset we select those individuals who participate in one of the pension funds of Table 2.1. The resulting dataset contains 2937 individuals. Of these individuals, 1973 are participating in the ABP, 445 in the PGGM, and 519 in one of the smaller pension funds.

Construction of financial variables

On the basis of the available financial information in the IPO dataset we construct financial variables for early retirement wealth and the reward to postponement of early retirement. *ER Pension Wealth* is defined as the discounted sum of all expected future pension income:

$$(4.1)\quad PW(t) = \sum_{s=t}^{\infty} u_s \delta^s .$$

The factor δ is including the individual's death rate, and u_s is the benefit stream at time s. The ER retirement wealth given retirement age T is given by

(4.2) $PW(t \mid T) = \sum_{s=T}^{\infty} u_s \delta^s - \sum_{s=t}^{\infty} p_s \delta^s$,

Now the *Peak Value* is defined as the maximum amount of additional ER Pension Wealth that can be gained if retirement is postponed:

(4.3) $PV(t) = PW(t \mid t+k) - PW(t)$,

(4.4) $k = \arg\max_{j:j>0} PW(t \mid t+j)$.

5 Model

Hazard model

In our analysis we define the duration T of an individual as the time that elapses between his 55th birthday and the moment of (early) retirement. Since retirement is mandatory at the age of 65, this implies that T will not exceed the value of ten. Retirement is supposed to be an absorbing state: an individual that is retired will not start working again.[8] We assume that the hazard function for individual i has the form:

(5.1) $\lambda_i(t) = \lambda_0(t) \cdot \exp(x_i(t)'\beta + v)$.

In this equation $\lambda_0(t)$ is the baseline hazard, and v is a random term representing unobserved heterogeneity between individuals. Following Meyer (1990), who describes an extension of the estimation method of Prentice and Gloeckler (1979), we will estimate the baseline hazard nonparametrically. Parametric estimation is preferred if the distribution of the baseline hazard is known, because it is more efficient than nonparametric estimation. However, we do not know the exact distribution and assuming some distribution will result in inconsistent estimates of β if the distribution is incorrectly specified. Moreover, Meyer (1995) shows that the loss in efficiency due to nonparametric estimation is small. We specify the baseline hazard as a nonnegative piecewise constant function. Because the explanatory variables are available on a yearly basis, we assume that the baseline hazard is constant within a year:

(5.2) $\lambda_0(t) = \exp(\mu_{\lfloor t \rfloor})$,

where $\lfloor \cdot \rfloor$ denotes the floor function and $\mu_0, \ldots, \mu_{10}$ are parameters, one for each age. From now on we will, like Meyer (1990), only consider discrete time points $t = 0, \ldots, 10$, although we allow the underlying retirement process to be continuous. In fact, our model can be seen as an incompletely observed (i.e. discretised) continuous time hazard model. We assume a nonparametric distribution of unobserved heterogeneity with two mass points:

[8] This is however not a heavy constraint in our analysis. First, practice shows that the early retirement event is indeed absorbing in the overwhelming majority of cases. Second, even if it would not be absorbing, then we could simply redefine the duration to be equal to the moment of *first* (early) retirement.

(5.3) $\Pr\{v = \gamma\} = \alpha$,

while the second mass point is chosen such that E[v]=0.

Three different specifications

In the following we will estimate three different specifications based on the hazard model that was just postulated. In the first specification separate baselines are estimated for the case where the old VUT arrangements apply, and for the case where the new PP scheme applies. Thus, this specification assesses whether preferences for specific retirement ages have changed since the introduction of the PP early retirement scheme. A possible change in preferences can then be interpreted as being a result of the reform in early retirement schemes. This is however a crude approximation, as one single baseline pattern is postulated for all individuals falling under the old VUT scheme without further adjustments for (sector-specific) financial incentives. In the second specification we will therefore make a more precise distinction between different schemes by introducing two dummy variables indicating whether the individual is entitled to one of the two schemes under consideration. We distinguish between three different states for an individual of given age who falls under the transitional scheme:

AGE 55-59	would not have been eligible under the VUT scheme, but is eligible now
AGE 60	would have been eligible under the VUT scheme, is eligible now, and benefits are actuarially adjusted
AGE 61-64	would have been eligible under the VUT scheme, and is eligible now, and benefits are still not actuarially adjusted

We expect participation effects for the two first cases, and try to capture these by introducing two dummy variables into our model. First, individuals aged 55 to 59 are likely to retire earlier than under the VUT scheme, as immediate retirement would not anymore result in a loss of their ER pension wealth. Second, individuals aged 60 face actuarially adjusted ER benefits if they decide to postpone ER with one year.

Finally, in the third specification we try to capture the impact of financial incentives more precisely by making use of measures for both price and income effects. An advantage over the previous specification is that we can now make use of different sources of variation in order to separately identify the income and price effects. These variations are exploited in order to arrive at more precise estimates. Thus, in theory, this last specification should give the best results. On the other hand, there exist a number of measurement problems with the indicators used.

6 Results

Double baseline specification

As discussed in the previous section, our first specification estimates two different baselines for the both cases of the scheme without actuarial adjustments (VUT) and the scheme with some actuarial adjustments and lower ER pension wealth (transitional scheme). The estimation results with respect to this model are reported in table 6.1. It can be seen that the baseline hazard is upward sloping until age 61 and downward sloping after that age. Due to numerical problems it was not possible to obtain an estimate of the baseline parameter for the age of 64 (a probable reason is that there are too few observations for this age). Therefore, this parameter was assumed to be equal to that for the age of 63. The null hypothesis that the baseline hazard is constant is strongly rejected by a likelihood ratio test (LR test) or a Wald test, which confirms the presence of time dependence, and thus the preference individuals have for specific retirement ages.

[INSERT TABLE 6.1 ABOUT HERE]

The dummies that represent the changes in the baseline hazard due to the introduction of the PP are precisely as expected: at age 60 the hazard of ER decreases, while at age 61 it increases as a result of the introduction of the transitional scheme. The dummy variables for the pension funds indicate that some differences in retirement behavior exist between the sectors. The participants of BPL, TPG and KPN[9] retire significantly earlier than the participants of PGGM, who are defined as the reference group. For ABP, BPSG and PHC we do not find a significant coefficient.

Specification with indicator variables

Table 6.2 shows the estimation results of our second model, which was discussed in section 5.2. In this specification we have included two dummy variables in order to distinguish from the reference case, which is the transitory ABP scheme. The first dummy variable "ABP * VUT * age 60" is defined as

falls under the old VUT scheme, is eligible for ER pension benefits, but would not have been eligible under the transition scheme

while the second dummy variable "ABP * VUT * age 55..59" is defined as

falls under the old VUT scheme, and is not yet eligible for ER pension benefits

These two dummy variables measure precisely the effects which were displayed in Figure 3.1. The estimate of the first dummy variable is positive, and significantly greater than zero. Thus, the old VUT scheme indeed results in a higher propensity to withdraw from the labor market than the new PP scheme. On the other hand, the second dummy variable has the theoretically incorrect sign. It is however not significantly different from zero, which in terms of Figure 3.1 means that no difference is found between both hazards on the left hand side of the

[9] Because we cannot distinguish TPG employees from KPN employees before 1993, both groups are covered by one combined dummy variable.

graph. The log-likelihood of the current specification is importantly higher than that of the previous model, while it contains less parameters. This can be attributed to the more precise measurement of the different schemes in the current specification: the dummy variables just discussed show variation over the different pension funds.[10]

[INSERT TABLE 6.2 ABOUT HERE]

Specification with financial variables

In the third specification we make an attempt to explain the early retirement behavior of employees from financial indicators instead of dummy variables or different baseline hazards. A discussion of several indicators was given in section 4.2. We make use of Pension Wealth in order to estimate the income effect resulting from the early retirement scheme, and Peak Value or Option Value in order to estimate the effect of the implicit taxes (or subsidies) implied by some early retirement schemes. In table 6.3 only the estimates with the Peak Value are presented as those with the Option Value showed no essential difference. Remarkably, this model performs worse in terms of the log-likelihood than the models discussed in the previous subsections. A possible explanation may be that we have insufficient information to adequately compute pension revenues from age 65 on and changes therein as a result of retirement postponement. As expected the wealth variable has a positive effect on the propensity to retire, whereas the price incentive measured by the Peak Value has a negative effect. The latter is however only significantly different from zero at a 10% confidence level. The other parameters show no essential differences compared to the estimates discussed above.

[INSERT TABLE 6.3 ABOUT HERE]

Simulation results

To interpret our estimation results we simulate outcomes on the basis of our second model specification. Figure 6.1 shows that individuals under the transitional arrangements postpone early retirement. The major difference between the old VUT scheme and the transitional arrangement is at age 61. After age 61 the transitional arrangement gives outcomes similar to the old VUT schemes, i.e. hardly anyone continues working. This is in line with the fact that in the transitional arrangement postponement after age 61 does not lead to a higher benefit level. Under the transitional arrangement individuals postpone retirement with on average 8 months. The third simulation considers a PP schemes which is actuarially fair. As under this scheme there is a reward to postponing retirement, individuals do decide to postpone retirement. Under such a scheme we expect individuals to postpone retirement on average with about 11 months.

[INSERT TABLE 6.4 ABOUT HERE]

[INSERT FIGURE 6.1 ABOUT HERE]

[10] Note that, consequently, the second specification is not nested in the specification with two baselines, so that we cannot apply a Likelihood Ratio test (LR test) here.

7 Conclusion

In this paper, we have exploited the variation in starting dates across different sectors of industry to estimate the impact of the policy reform on early retirement behavior. We conclude that the policy reform induces workers to postpone early retirement. Model simulations show that the transitional scheme has already led to average retirement postponement by 8 months, which will become almost a year once the transition is completed.

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Figure 3.1 Theoretical effects of policy reform on retirement behaviour

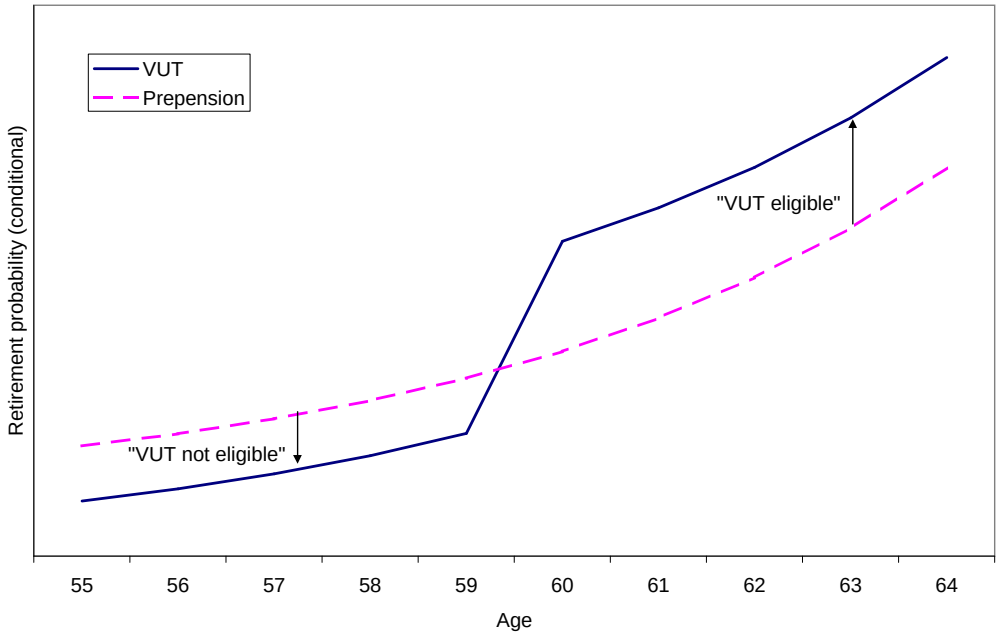

Figure 6.1 Micro simulation results

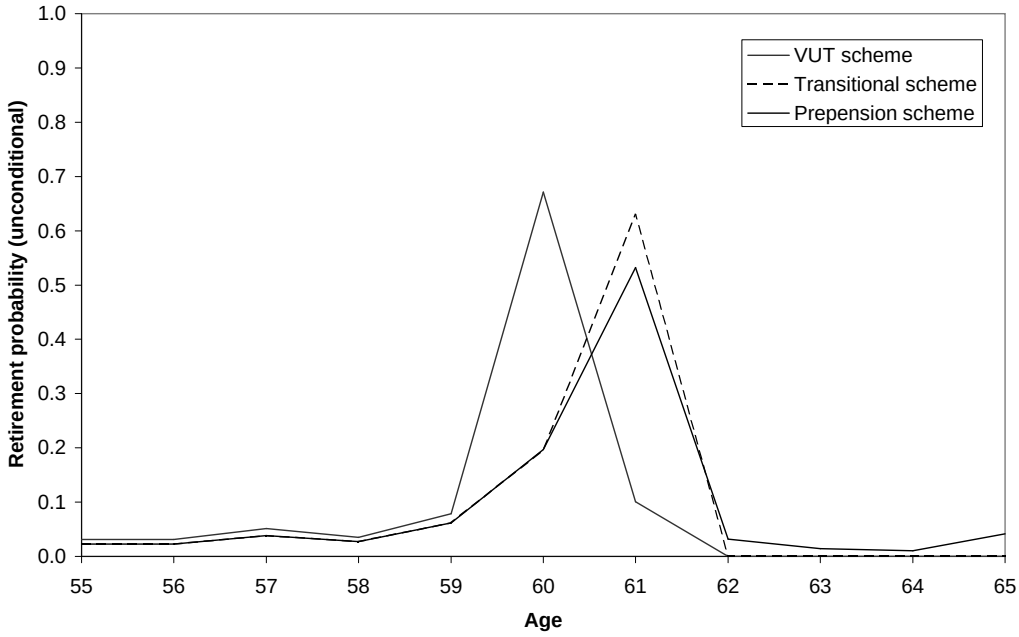

Table 2.1 Early retirement replacement rates for 7 selected pension funds, 1997–2000[a,b]

Date of retirement	Date of birth	Retirement age									
		55	56	57	58	59	60	61	62	63	64
ABP (government)											
< 1 April 1997		0%	0%	0%	0%	0%	80%	80%	80%	80%	80%
≥ 1 April 1997	< 1 April 1942	27%	30%	35%	40%	48%	59%	75%	75%	75%	75%
	≥ 1 April 1942	25%	28%	32%	38%	45%	55%	70%	70%	70%	70%
ABP (education)											
< 1 April 1997		0%	0%	0%	0%	0%	0%	80%	80%	80%	80%
≥ 1 April 1997	< 1 April 1942	27%	30%	35%	40%	48%	59%	75%	75%	75%	75%
	≥ 1 April 1942	25%	28%	32%	38%	45%	55%	70%	70%	70%	70%
PGGM (health care)											
< 1 January 1999		0%	0%	0%	0%	0%	80%	80%	80%	80%	80%
≥ 1 January 1999	in 1939	-	-	-	-	40%	80%	80%	80%	80%	80%
	in 1940	-	-	-	40%	40%	79%	79%	79%	79%	79%
	in 1941	-	-	0%	39%	39%	78%	78%	78%	78%	78%
	in 1942	-	0%	0%	39%	39%	77%	77%	77%	77%	77%
	in 1943	0%	0%	0%	38%	38%	76%	76%	76%	76%	76%
	in 1944	0%	0%	0%	38%	38%	75%	75%	75%	75%	75%
	in 1945	0%	0%	0%	37%	37%	74%	74%	74%	74%	74%
BPSG (cleaning industry)											
< 1 January 1991		0%	0%	0%	0%	0%	0%	80%	80%	80%	80%
≥ 1 January 1991		0%	0%	0%	0%	0%	80%	80%	80%	80%	80%
PHC (catering i ndustry)											
< 1 January 2000		0%	0%	0%	80%	80%	80%	80%	80%	80%	80%
≥ 1 January 2000	< 1 January 1944	0%	0%	0%	80%	80%	80%	80%	80%	80%	80%
	≥ 1 January 1944	0%	0%	0%	0%	80%	80%	80%	80%	80%	80%
BPL (agriculture)											
< 1 January 1998		0%	0%	0%	0%	80%	80%	80%	80%	80%	80%
≥ 1 January 1998		0%	0%	0%	0%	0%	80%	80%	80%	80%	80%
TPG (post)											
Full period		0%	0%	0%	0%	0%	0%	80%	80%	80%	80%
KPN (telecom)											
Full period		0%	0%	0%	0%	0%	0%	80%	80%	80%	80%

[a] Arrangements for workers aged between 55 and 65 in the years from 1989 to 2000, workers born after 1945 are not considered. Replacement rates are constant over time from the moment of early retirement until age of 65. We assume eligibility for VUT (10 years in sector of firm) and a complete contribution history (35 to 40 years at age 65)

[b] We select pension funds for which (i) workers can be identified on the basis of their SBI code, and (ii) for which we are able to construct the early retirement replacement rates.

Table 2.2 Old-age pension replacement rates for 7 selected pension funds, 1997–2000[a]

Date of retirement	Franchise	Retirement age										
		55	56	57	58	59	60	61	62	63	64	65
ABP (government)												
< 1 April 1997	15 250[d]	53%	54%	56%	58%	60%	70%	70%	70%	70%	70%	70%
≥ 1 April 1997	15 250[d]	53%	54%	56%	58%	60%	61%	63%	65%	67%	68%	70%
ABP (education)												
< 1 April 1997	15 250[d]	53%	54%	56%	58%	60%	61%	70%	70%	70%	70%	70%
≥ 1 April 1997	15 250[d]	53%	54%	56%	58%	60%	61%	63%	65%	67%	68%	70%
PGGM (health care)												
Full period	13 580[e]	53%	54%	56%	58%	60%	70%	70%	70%	70%	70%	70%
BPSG (cleaning industry)												
Full period	0[c]	9%	9%	10%	10%	10%	12%	12%	12%	12%	12%	12%
PHC (catering industry)												
Full period	0[b]	14%	15%	15%	19%	19%	19%	19%	19%	19%	19%	19%
BPL (agriculture)												
< 1 January 1998	13 739[f]	53%	54%	56%	58%	70%	70%	70%	70%	70%	70%	70%
≥ 1 January 1998	13 739[f]	53%	54%	56%	58%	60%	70%	70%	70%	70%	70%	70%
TPG (post)												
Full period	15 881[f]	53%	54%	56%	58%	60%	61%	70%	70%	70%	70%	70%
KPN (telecom)												
Full period	12 368[f]	53%	54%	56%	58%	60%	61%	70%	70%	70%	70%	70%

[a] Arrangements for workers aged between 55 and 65 in the years from 1989 to 2000, workers born after 1945 are not considered. Replacement rates of pensionable salary, which is equal to the gross wage minus the franchise. We assume eligibility for VUT (10 years in sector of firm) and a complete contribution history (35 to 40 years at age 65). The pension funds BPSG and PHC are different from the other funds, as they do not use a franchise implying a larger pensionable salary. The pension funds use the exact age of retirement (accurate to the nearest month) to calculate the pension benefit.

[d] Information from 2004

[e] Information from 2003

[f] Information from 2002

Table 6.1 Estimation results

Variable	Estimate		Standard error
Baseline hazard			
Age 55	– 4.06	*	(0.47)
Age 56	– 3.96	*	(0.50)
Age 57	– 3.64	*	(0.50)
Age 58	– 3.90	*	(0.52)
Age 59	– 2.80	*	(0.51)
Age 60	– 1.58	*	(0.48)
Age 61	– 0.95		(0.51)
Age 62	– 2.01	*	(0.60)
Age 63 and 64	– 2.86	*	(1.13)
Change in baseline hazard due to PP			
Age 55	0.17		(0.34)
Age 56	– 0.77		(0.50)
Age 57	0.36		(0.32)
Age 58	0.29		(0.37)
Age 59	– 0.64		(0.36)
Age 60	– 0.67	*	(0.26)
Age 61	0.46	*	(0.21)
Age 62	0.32		(0.47)
Age 63 and 64	0.84		(1.12)
Pension funds			
ABP	0.21		(0.20)
BPSG	– 0.44		(0.59)
PHC	0.16		(0.31)
BPL	0.65	*	(0.25)
TPG and KPN	1.03	*	(0.21)
Year dummies			
1990	0.19		(0.50)
1991	– 0.28		(0.49)
1992	0.56		(0.45)
1993	0.44		(0.45)
1994	0.13		(0.45)
1995	0.16		(0.44)
1996	– 0.13		(0.44)
1997	0.06		(0.46)
1998	– 0.28		(0.47)
1999	0.04		(0.46)
Individual characteristics			
Single woman	– 0.24		(0.20)
Single man	0.14		(0.18)
Nonsingle woman	– 0.17		(0.15)
Underage children	– 0.26	*	(0.10)
High income	0.30	*	(0.11)
Mortgage debt	– 0.00		(0.02)
House value	– 0.03		(0.02)
Statistics			
Number of observations			2937
Log-likelihood			– 1979.16

Reference groups: PGGM, 1989, nonsingle man, no high income.

* significant at the 5% level.

Source: own calculations based on the IPO data set.

Table 6.2 Estimation results

Variable	Estimate		Standard error
Baseline hazard			
Age 55	– 5.70	*	(0.60)
Age 56	– 5.67	*	(0.63)
Age 57	– 5.09	*	(0.62)
Age 58	– 5.41	*	(0.63)
Age 59	– 4.47	*	(0.63)
Age 60	– 3.04	*	(0.61)
Age 61	– 0.50		(1.14)
Age 62	– 1.41		(1.18)
Age 63 and 64	– 1.72		(1.25)
Pension funds			
ABP	1.51	*	(0.33)
BPSG	0.35		(0.90)
PHC	0.75		(0.43)
BPL	1.40	*	(0.37)
TPG and KPN	2.42	*	(0.36)
Year dummies			
1990	0.20		(0.49)
1991	– 0.32		(0.45)
1992	0.54		(0.45)
1993	0.47		(0.45)
1994	0.27		(0.45)
1995	0.23		(0.45)
1996	– 0.09		(0.45)
1997	0.18		(0.47)
1998	– 0.14		(0.48)
1999	0.16		(0.47)
Dif-in-dif variables			
ABP * VUT * age 60	2.56	*	(0.32)
ABP * VUT * age 55..59	0.32		(0.21)
Individual characteristics			
Single woman	– 0.14		(0.29)
Single man	0.35		(0.22)
Nonsingle woman	– 0.20		(0.20)
Underage children	– 0.36	*	(0.13)
High income	0.55	*	(0.14)
Mortgage debt	– 0.00		(0.03)
House value	– 0.05		(0.03)
Heterogeneity			
α	0.47		
γ	2.14		
Statistics			
Number of observations			2937
Log-likelihood			– 1941.84

Reference groups: PGGM, 1989, pre-pension scheme, nonsingle man, no high income.

* significant at the 5% level.

Source: own calculations based on the IPO data set.

Table 6.3 Estimation results

Variable	Estimate		Standard error
Baseline hazard			
Age 55	– 4.02	*	(0.51)
Age 56	– 4.00	*	(0.55)
Age 57	– 3.48	*	(0.56)
Age 58	– 3.72	*	(0.58)
Age 59	– 2.80	*	(0.57)
Age 60	– 1.59	*	(0.56)
Age 61	0.31		(0.67)
Age 62	0.16		(0.91)
Age 63 and 64	0.09		(0.87)
Pension funds			
ABP	0.22		(0.24)
BPSG	– 1.15		(0.64)
PHC	0.33		(0.41)
BPL	0.79	*	(0.33)
TPG and KPN	1.52	*	(0.30)
Year dummies			
1990	0.32		(0.50)
1991	– 0.22		(0.49)
1992	0.61		(0.45)
1993	0.53		(0.45)
1994	0.35		(0.44)
1995	0.33		(0.45)
1996	– 0.12		(0.45)
1997	– 0.02		(0.46)
1998	– 0.43		(0.46)
1999	– 0.17		(0.46)
Financial incentives			
ER Pension Wealth[a]	2.14	*	(0.86)
Peak Value	-2.34		(1.42)
Individual characteristics			
Single woman	– 0.23		(0.27)
Single man	0.01		(0.22)
Nonsingle woman	– 0.48	*	(0.19)
Underage children	– 0.24	*	(0.12)
Mortgage debt	0.02		(0.02)
House value	– 0.08	*	(0.03)
Heterogeneity			
α	0.61		
γ	1.58		
Statistics			
Number of observations			2937
Log-likelihood			– 1984.42

Reference groups: PGGM, 1989, nonsingle man.

[a] ER Pension Wealth was calculated at an individual discount rate of 5%.

* significant at the 5% level.

Source: own calculations based on the IPO data set.

Table 7.1 Simulation results of retirement probabilities (unconditional) under the ABP schemes

Age	VUT	Transitional scheme	Pre-pension
55	0.03	0.02	0.02
56	0.03	0.02	0.02
57	0.05	0.04	0.04
58	0.04	0.03	0.03
59	0.08	0.06	0.06
60	0.67	0.20	0.20
61	0.10	0.63	0.53
62	-	-[a]	0.03
63	-	-[a]	0.01
64	-	-[a]	0.01
65	-	-[a]	0.04

[a] The simulations show that retirement after age 61 increases by about one third as the VUT scheme is replaced by the transitional scheme. The absolute figures however remain negligibly small.