

Early retirement in Germany, the Netherlands and the United Kingdom: A longitudinal analysis of individual factors and institutional regimes

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Abstract

In this article we investigate whether early retirement patterns vary between countries with distinct early retirement systems. By choosing countries that differ with respect to the coverage and generosity of publicly provided pensions but also with respect to the extent to which the state interferes in the non-public pillars of pension provision, we analyse to what extent such issues have an effect on individual early retirement behaviour. Selectivity effects are expected to be stronger in countries with highly fragmented public systems or private early retirement schemes. By pursuing a shift to more private pension provisions, governments might unintentionally create more inequality in early retirement opportunities among the population. For the analysis we use longitudinal data, i.e. BHPS 1991-2004 (the United Kingdom), the GSOEP 1990-2005 (Germany) and the SEP 1990-2001 (Netherlands) and a discrete-time competing-risks model. The results suggest that pursuing a shift from public to private early retirement schemes can lower the incidence of early retirement. Yet, at the same time, early retirement can get more selective in that only the higher paid are able to afford it.

Introduction

The early retirement trend of the last decades along with the ageing population has led to a number of (proposed) pension reforms in European countries.¹ The majority of such reforms is targeted at raising the retirement age, restricting access to early retirement schemes and/or reducing the generosity of the benefits. In addition, European governments are strongly pursuing a shift in the distribution of responsibility for pension provision from the state to the market and the individual by encouraging the establishment and expansion of (funded) occupational and private pension schemes.² The success of such reforms in reducing the number of early retirees still remains an important question. Early retirement takes place in a variety of ways, *e.g.* via public or occupational early retirement schemes, via private schemes, but also via other social security arrangements. Kohli *et al.* (1991) already showed the use of unemployment and disability as early retirement pathways, notwithstanding the lower level of free choice involved in these retirement routes. When governments aim at creating disincentives for early retirement by lowering the level of public benefits this might increase the number of older workers moving into such substitute pathways (Ebbinghaus, 2006).

In this article, we analyse early retirement patterns in Germany, the Netherlands and the United Kingdom. These countries differ with respect to the policy legacy behind the social security system, not only in terms of the coverage and generosity of publicly provided pensions but also in the extent to which the state interferes in the non-public pillars of pension provision (Esping-Andersen, 1990; Bonoli, 2003). Such differences are expected to create distinct patterns of early retirement (Ebbinghaus, 2006). It is the purpose of this research to analyse this. The research questions dealt with in this article are: To what extent do countries with a different system of pension provision offer dissimilar early retirement routes to older workers? In particular, is early retirement more selective in countries with less public provision of early retirement schemes? To what extent does the generosity differ between the various public and private exit routes and between the countries?

By analysing early retirement behaviour in a comparative perspective using countries with different pension systems, recognising the multitude of early retirement routes, as well as by looking at the interaction of macro-institutional factors and individual level variables, this study adds to the existing literature. Only a few micro-level studies include country-comparisons using multi-risk models (*e.g.* Riphahn, 1997; Miniaci and Stancanelli, 1998; Oswald, 1999; Gruber and Wise, 2004). Rather than focusing only on the social security incentives, or on the ‘pull factors’ that encourage older workers to leave the labour market, as the studies of Gruber and Wise (1999, 2004) do, we study the effect of multiple background and job characteristics within different institutional contexts. The job characteristics can be taken as a proxy for the ‘push factors’ that drive older workers out of the labour market, partly as a consequence of globalising markets (Blossfeld *et al.*, 2006). For this article the socio-economic panel surveys of Germany (GSOEP 1990-2005), the Netherlands (SEP 1990-2001) and the United Kingdom (BHPS 1991-2004) are used. The advantage of using these data sets is that a great deal of information on individuals is available for a long period of time, allowing the

estimation of a discrete-time competing-risks model (Allison, 1982; Jenkins, 2005). A duration model allows the specific account for duration dependence, *i.e.* the dependence of the retirement decision on the workers' tenure which partly determines the worker's entitlement to pension and early retirement schemes.

The paper continues as follows. First, we discuss the differences between the countries' pension systems and early retirement opportunities and we present the hypotheses. Subsequently, the data and the empirical model are explained and the hypotheses are empirically tested. Finally, we discuss the estimation results and conclude with some policy implications.

Different pension systems

Pension systems in general

Pension systems reflect a country's policy legacy with respect to social protection, *i.e.* the coverage and generosity of pensions as well as the extent to which the provision of welfare is relegated to public versus private or occupational responsibility (Esping-Andersen, 1990). In the ideal-typical liberal welfare state regime, the state provides only flat-rate, means-tested basic pensions and the provision of supplementary pensions is left to the market, *i.e.* low decommodification with respect to pension provision. In social-democratic systems, where decommodification is highest, the state provides flat-rate but generous basic pensions as well as supplementary earnings-related pensions. The latter are, however, maximised to avoid large distributional differences within the population (*i.e.* low stratification). Additional pensions are organised within the non-state pension pillars. In the conservative-corporatist regimes, where work performance and status are 'rewarded' in later life, the state provides earnings-related pensions. Private pensions are generally underdeveloped, as there is no need for this because of the generous public pension provision (*ibid.*).

As for early retirement pensions, in liberal welfare states, we expect that the state does not offer such pensions, except those designed for workers who are unable to continue work (*e.g.* disability pensions). Provision of early retirement pensions is left to the market. In social-democratic regimes, where high employment rates at all ages are aimed for, early retirement is also not encouraged by the state. As in the liberal regime, early retirement schemes are to be found in the private pension pillar. In corporatist regimes, however, early retirement schemes are expected to exist as a reward for long service, being highly selective (*e.g.* mainly for white-collar workers). These differences in the organisation of a country's pension system are expected to affect the early retirement decision of older workers (Ebbinghaus, 2006).

... applied to the three case studies

Table 1 shows some details on the countries' pension systems. We immediately observe that the German pension system is most decommodifying, with the state pension on average offering about 70

percent of previous earnings. In both the Netherlands and the United Kingdom, the state pension only replaces about half of the pensioner's earnings. As a consequence of this low state pension, the second (and third) pillar are well-developed in both countries. A difference between the latter two countries is that entitlement to the state pension in the Netherlands is more universal and based on residency (*i.e.* social-democratic), while in the United Kingdom it is contribution-based. A non-contributory minimum income support exists that covers those without sufficient contributions to the basic state pension. In contrast to the liberal policy legacy characterising the British welfare state in general, the British state pension includes a supplementary earnings-related part (SERPS), yet this pension is maximised and offers only medium replacement incomes. Workers are encouraged to participate in occupational or private pensions schemes in which case they are allowed to contract out of the state earnings-related pension. In the Netherlands the state interferes in the second pillar by mandating participation in occupational pension schemes (Schils, 2005). The administration (and policy determination) of the schemes is left to the pension funds together with the social partners. One might say that the Dutch pension system also shares some corporatist elements because of this, making the Dutch welfare state a hybrid type in between the social-democratic and corporatist welfare state (Goodin *et al.*, 2000).

Table 1: Basic features of pension systems in Germany, the Netherlands and the United Kingdom

	DE	NL	UK
<i>First pillar: Public pension</i>			
Minimum pension (replacement rate APW)	0.18	0.51	0.37
Standard pension (replacement rate APW)	0.72	0.51	0.55
Qualification period full pension (in working years)	45	0	44
Share of pensioner's income	94	46	41
Public expenditures on pensions (% of GDP)	13.3	12.9	10.7
Financing principle	PAYG	PAYG	PAYG
Contributions worker / employer / state	9.6/9.6/25	17.9/0/0	10/11.8/0 ^b
Early retirement possible?	yes	no	no
Minimum qualification period early retirement (in working years)	35	n.a.	n.a.
Implicit tax rate at early retirement age	48	n.a.	n.a.
Early retirement pension (replacement rate APW)	0.77	n.a.	n.a.
<i>Second pillar: Occupational pension</i>			
Pension fund assets (% of GDP)	16.3	111.1	80.9
Coverage (% of population)	42	95	70
Share of pensioner's income	1	13	25
Early retirement pension (replacement rate APW)	n.a.	0.85	0.67
<i>Third pillar: Private pension</i>			
Pension fund assets (% of GDP)	n.a.	54.9	n.a.
Share of pensioner's income ^a	2	7	7

^aThe three pension components do not sum to 100 percent. Additional income is gained from other sources.

^bContributions represent the overall contribution rate to the national social security fund.

Sources: European Commission, 2003; Natali, 2004; Scruggs, 2005.

In line with the expectations of a corporatist pension system, the German pension system allows early retirement on a state pension. These so-called seniority schemes usually require a minimum contribution period (about 35 years) in addition to a minimum age (about 60 to 63 years) and are relatively generous with an average replacement rate of 77 percent (Blondal and Scarpetta, 1998). Not only is the general German pension system highly fragmented in terms of coverage and benefit levels, this also applies to the early retirement schemes. Civil servants, for example, have their own pension and early retirement system, generally with a higher level of flexibility (*e.g.* lower minimum age or contribution period) and generosity (*e.g.* higher replacement rate) of the early retirement schemes (Berkel and Börsch-Supan, 2003). This points to relatively high stratification in the German pension system.

In the other two countries early retirement is not possible within the first pillar of the pension system and left to the schemes in the second and third pillar. In the Netherlands early retirement schemes used to be relatively flexible and very generous in comparison to other European countries. During the 1980s, early retirement incentives were particularly strong as from the age of 60 with replacement rates of about 90 percent. During the 1990s the generosity was reduced and entitlement was tightened, yet replacement rates were still over 80 percent and the implicit tax on continued work after age 62 about 140 (Blondal and Scarpetta, 1998; Gruber and Wise, 1999). With the most recent reforms in 2006, the tax incentives for the old early retirement schemes are abolished and a new life course savings scheme is introduced that allows early retirement as from the age of 62 at a replacement rate of 70 percent. As in the Netherlands, the British state pension does not allow early retirement and workers who want to do so must rely on occupational or private pensions. Because of this private provision, such schemes widely vary between workers. Hansen (2000) argued that there are two types of early retirement schemes in the United Kingdom, the 'good' schemes offering a replacement rate of about 80 percent and the 'bad' schemes offering a replacement rate of about 40 percent.

To complete this overview of early retirement pathways, we have to include other social security arrangements, such as unemployment or disability. In all countries under consideration, benefit durations for older workers are extended and medical check-ups as well as job search requirements are lowered. Entitlement conditions are least tight in the Netherlands (*i.e.* highest flexibility) and most tight in the United Kingdom (*i.e.* lowest flexibility). In addition, benefits are most generous in Germany and the Netherlands. Unemployment generally has the lowest replacement rate, although the employer is sometimes willing to supplement unemployment benefits to facilitate early retirement through unemployment, increasing the actual replacement rate. In the United Kingdom social security benefits are means-tested and at a minimum level, to ensure use by the 'deserving poor'. For example, the average production worker's replacement rates for unemployment is 0.37 in the United Kingdom, 0.66 in Germany and 0.77 in the Netherlands. The corresponding replacement rates for disability are 0.24, 0.93 and 0.77 (Scruggs, 2005).

Next, we formulate the expected differences in early retirement patterns between the countries, using socio-economic theories.

Explaining early retirement behaviour

Early retirement patterns in general

The worker's early retirement decision is the outcome of a comparison of multiple retirement opportunities in time (*e.g.* at different ages) and in place (*e.g.* different pathways including pension schemes, disability and unemployment). At each age different retirement opportunities are available to the individual, depending, among other things, on the level of flexibility of the retirement scheme. Two aspects are of relevance here: entitlement and freedom of choice. With regard to the entitlement conditions, certain conditions (*e.g.* minimum age, minimum contribution record) generally have to be met in order to use the exit pathways. It is argued that the easier it is to meet the entitlement conditions or the fewer the number of conditions, the more flexible the schemes are. The decision to choose whether, when and how to retire is not entirely in the hands of the worker himself. First, retirement via disability, for example, is more likely to be the outcome of bad health. Second, both early retirement and unemployment can be the result of so-called 'push factors', such as company restructuring or rising unemployment that might induce early withdrawal from the labour force (Blossfeld *et al.*, 2006; Ebbinghaus, 2006).

In addition to the flexibility, the generosity of the schemes is of importance to the early retirement decision. Life cycle theory states that a rational worker compares the expected future income stream from the early retirement scheme with that of continued employment and chooses the option that yields the highest utility (Fields and Mitchell, 1984). An older worker might be entitled to an early retirement scheme at a certain age, but to use the scheme it must also be financially attractive or affordable. The generosity is usually measured by the replacement income, *i.e.* post-retirement income as a percentage of pre-retirement income (Gruber and Wise, 1999; Blundell *et al.*, 2002). With regard to the generosity, the higher the replacement income, the higher the expected utility flow from leaving employment and, *ceteris paribus*, the higher the expected probability of retirement.

The level of flexibility and generosity of the early retirement schemes depend on a variety of variables, among which individual characteristics, human capital indicators, job characteristics and institutional variables. Generally, life cycle theory shows that the retirement probability increases with age, mainly because entitlement to early retirement schemes is more likely to occur (Gruber and Wise, 1999), because the retirement income is higher at older ages (*ibid.*), and because preference for leisure increases with age (Gustman and Steinmeier, 1984). The extent to which such positive age effects are found differs between workers. Older female workers, for example, are less likely to meet the entitlement conditions of early retirement schemes due to discontinuous working careers (Hakim, 1996). In addition, life cycle theory predicts a positive relation between bad health and early

withdrawal from the labour force, especially into disability, mainly because of reduced productivity. Without going into details of joint retirement behaviour of couples, household characteristics are also expected to affect early retirement behaviour. Theory is ambiguous on the effect of having a working spouse on the individual's retirement probability. The effect can be negative due to the complementarity of leisure time or assortative mating, but it might also be positive, because of the income spill-overs (Blau and Riphahn, 1999; Dahl *et al.*, 2003). The presence of dependents in the household, either children or relatives that need care, also affects the retirement decision in contrasting ways. On the one hand, the income from work is needed to cover the costs of such dependents, on the other hand leisure time is needed to give personal care. Especially for women, because of the traditional role patterns, having dependents might induce early retirement.

As for human capital indicators, theory predicts an ambiguous effect of human capital on the worker's early retirement probability. On the one hand, it is argued that people with higher human capital levels have invested more time and money in building up this human capital (Becker, 1964). These higher investments increase the individual's payback time period, thereby lowering his early retirement probability. On the other hand, the worker's main return on human capital investments are higher earnings. These have an ambiguous effect on the retirement probability. As pension benefits depend on current earnings, higher wages tend to increase the post-retirement income resulting in a negative income-effect on continued employment (Fields and Mitchell, 1984). In contrast, higher earnings increase the opportunity costs of leisure making retirement more expensive compared to employment, *i.e.* a positive substitution effect on continued employment. Note that the ambiguity does not hold for early exit via social security. In this case, higher wages are expected to sort a negative effect due to reduced entitlement (*e.g.* means-tested or maximised benefits).

Naturally, job characteristics too affect the early retirement decision. A long tenure might encourage early retirement because the entitlement conditions of the schemes are more likely to be met or because the employer encourages early retirement as suggested by the implicit contract theory (Lazear, 1979). In addition, sector and job level differences in early retirement patterns are expected. As argued in Blossfeld *et al.* (2006), the need for company restructuring as a response to globalising markets is highest in 'open' sectors such as manufacturing, and it is particularly low-skilled older workers in these sectors who are most likely being 'pushed' into early retirement or into unemployment. High-skilled workers in more sheltered sectors such as services or the public sector are less likely to be pushed into early retirement or unemployment as a consequence of economic restructuring. In addition, the self-employed are expected to have lower early retirement probabilities. They are generally not eligible for social security or early retirement schemes, and therefore have to rely fully on their privately organised, more costly, arrangements. In addition, the self-employed might have a higher preference for work. It can be argued that workers with a higher preference for work retire later than those with a lower preference.

The country's pension system also affects the flexibility and generosity of early retirement schemes. In general, private early retirement schemes are expected to be more flexible and generous compared to public schemes. In many cases, private schemes only require a minimum age if there are any requirements at all. In addition, apart from the lower freedom of choice with respect to the social security schemes (disability and unemployment), flexibility is also lower because of the tighter conditions that have to be met. The generosity of such schemes, especially for unemployment, is generally lower than that of early retirement schemes, because a return to the labour market is still encouraged. The level of generosity or flexibility of early retirement schemes might differ between (groups of) individuals. In corporatist systems, the generosity of occupational early retirement schemes is expected to vary between occupational groups (*e.g.* civil servants versus private sector workers) as well as between job levels (*e.g.* white-collar versus blue-collar workers). In liberal regimes, where early retirement is a private matter, it is expected that only the workers with higher earnings can afford to save into early retirement schemes. At the core of the current Dutch debate on the new life course scheme enabling early retirement, among other things, is that this private savings scheme increases the selectivity with respect to early retirement, as it does in liberal welfare regimes. It is expected that private early retirement schemes can only be used by male workers, who are working fulltime, belong to higher salary groups, and being among the highest educated.

... applied to the three case studies

As for the individual characteristics, the negative gender effect on early retirement is expected to be smallest in the United Kingdom where female labour participation is highest. Moreover, the effect is expected to be strongest in the Netherlands where part-time employment might add to the insufficiency of the women's contribution record. The positive effect of bad health on early retirement is expected to be strongest in Germany and the United Kingdom where special disability pensions exist. Finally, the income spill-over effect of having a working spouse is expected to particularly reduce exits into means-tested social security routes, as those in the United Kingdom.

The income effect of human capital is expected to be dominant in highly generous early retirement schemes because of the strong incentives to retire early. This effect is expected to be strongest in countries where early retirement is based on private arrangements (*e.g.* Netherlands and United Kingdom). In addition, in corporatist countries such as Germany and to a smaller extent the Netherlands too, strong ties between the firm and the worker exist that are likely to result in increasing wages with seniority. This might lead to a dominant substitution effect and later retirement.

The positive effect of tenure on early retirement particularly holds for Germany, where entitlement to early retirement schemes is strongly related to the contribution period. Furthermore, as mentioned, the generosity of early retirement schemes is expected to vary between sectors in corporatist regimes. In Germany, the pension system is highly fragmented and early retirement in terms of coverage and benefit levels largely differs between occupational groups. Pull effects due to

high generosity and a lower early retirement age are stronger for Germany public sector employees, and to a smaller extent for Dutch civil servants too.

As for general institutional effects, with respect to the generosity of early retirement schemes (Table 1), we expect the early retirement probability to be highest in the Netherlands and lowest in the United Kingdom. In addition, we expect transition rates into early retirement schemes to be higher than those into unemployment or disability schemes, because of the lower replacement rates of the latter routes in all countries. Furthermore, in all countries we expect substitution effects between early retirement and other social security schemes for those workers who are not entitled to the first type of scheme or cannot afford them, and who are more likely to be ‘forced into early retirement’. These substitution effects are expected to be smallest in the Netherlands, where coverage and benefit levels of early retirement schemes are most universal.

We will see whether these expected differences in retirement behaviour between the countries are supported by our data, but first we present the data and empirical model used for the analysis.

Data, sampling and empirical model

Data and sampling

For the analysis three national panel surveys are used: 16 waves of the German Socio-Economic Panel Survey (GSOEP 1990-2005), 14 waves of the British Household Panel Study (BHPS 1991-2004) and 12 waves of the Dutch Socio-Economic Panel survey (SEP 1990-2001). These panel surveys are designed to describe the socio-economic position of individuals over time and information is obtained on individual, household, human capital and job characteristics. The sample used here is restricted to people aged between 50 and 65 who are employed for at least 15 hours a week.³

The dependent variable in our model is the duration in employment after the age of 50. For individuals who enter the panel survey at ages over 50, retrospective information on the individual's employment history is used to reconstruct the time span between the age of 50 and the age of panel entry. In some cases, the retrospective information shows that the individual has already experienced an exit out of employment after the age of 50 (but before panel entry, referred to as left-censoring⁴) and such spells ought to be included in our analysis since they represent transitions out of employment after the age of 50. Unfortunately, since they are derived from retrospective history files, no information on explanatory variables is available and the observations are excluded. The number of excluded observations is smallest in the German and Dutch sample (about 5 percent of the total sample), but a little higher in the British sample (14 percent of the total sample), reflecting higher labour turnover rates.⁵ In the end, the sample population for the United Kingdom consists of 3,711 observations, for Germany of 5,150 observations and for the Netherlands of 1,580 observations.

Another methodological issue is that of panel attrition. No evidence is found for non-random attrition and we choose not to correct for possible selective attrition of the individual from the panel.

By including a great number of individual characteristics, we hope to minimise the problem.

The destination states are constructed from the samples using information on the individual's main source of income. This information is used rather than the individual's self-reported activity status, because one of the main goals of this study is to examine institutional differences in entitlement to and generosity of benefits. Ideally, with respect to transitions into social security, a distinction between the states of unemployment and disability is preferred. However, the number of observations for each state appears to be too low and a move to either of the two states is considered to be a move into social security. As a result, the competing exit pathways are: (1) employment: main source of income is labour income (no exit observed, in this way right-censoring is accounted for); (2) retirement: main source of income is public, occupational or a private pension; (3) social security: main source of income is either unemployment or disability benefits⁶; and (4) inactivity: not receiving any of the above mentioned benefits.

Apart from age, individual characteristics (*e.g.* sex, health status, marital status, presence of dependents, working status of the spouse, household income), human capital indicators (*e.g.* education level, hourly wages, tenure) and job characteristics (*e.g.* hours worked, sector of industry, type of job, preference for hours worked) and the country's unemployment rate to cover business cycle effects are included in the model.⁷ Summary statistics are shown in Table 2. In contrast to Dahl *et al.* (2003) we have not estimated separate models for men and women, but we have tested for gender differences by including interaction terms and report differences where necessary. Especially in the Netherlands the female participation rate is too low to allow for separate multivariate models. The individual's education level is measured using a rather crude index only allowing for three levels of education: low, medium and high. For Germany low refers to less than high school; medium to completed high school; and high to beyond high school. For the United Kingdom low includes people having a qualification lower than O level; medium refers to people having a O or A level qualification; and higher refers to people having higher qualifications or degrees. For the Netherlands the 'Standard Education Classification' (SOI-1978) is used and low refers to primary and first-level secondary education (secondary education of maximum 4 years); medium refers to second-level secondary education; and higher refers to higher and academic education. Tenure is measured as the duration in employment before the age of 50 since the employment duration after this age is the explanatory variable. Gross individual hourly wages are included in the model. The models are estimated for all countries separately, but to test for country differences an interaction model is estimated of which the results are reported in the text.

Table 2: Summary statistics on covariates

	DE	NL	UK
<i>Individual characteristics</i>			
Mean age	55.9	53.8	54.5
Female (ref: male)	39.74	30.00	44.21
Poor/fair health (ref: good health)	47.50	19.75	24.51
Single (ref: married/cohabiting)	19.00	16.84	15.67
Partner employed	61.75	46.77	73.65
Dependents in household	46.28	36.52	54.65
Mean total household income ^a	22,402	17,033	18,355
<i>Human capital indicators</i>			
Medium education (ref: low education)	56.16	46.33	26.61
High education	26.23	24.43	34.26
Tenure before age 50	23.0	16.3	20.7
Hourly wage ^b	12.6	15.63	11.04
<i>Job characteristics</i>			
Self-employed	10.91	12.53	17.46
Public sector worker	30.06	26.01	32.67
Commercial services (ref: industry)	17.54	30.13	33.20
Non-commercial services	39.51	39.37	35.93
Mean hours worked	40.7	35.95	40.24
Wants to work less hours	17.84	35.89	35.81
Mean national unemployment rate	8.5	5.3	7.0
Total number of observations	5,150	1,580	3,629

^aStandardised using the modified OECD Equivalence scale, in Euros. For Germany and the United Kingdom gross incomes are reported, for the Netherlands net income. ^b in Euros.

A discrete-time competing-risks model

As explained before, the early retirement decision is the outcome of a comparison of multiple retirement opportunities in time (*e.g.* at different ages) and in place (*e.g.* different pathways). Such opportunities are likely to differ between individuals, not only within countries, but also between countries with distinct institutional settings. For estimation purposes, an empirical model is chosen in which the dependent variable, Y_{ijt} , is an indicator variable which is equal to 1 when the older worker i is observed to make a transition from employment to state j at time t , or 0 otherwise. For this study a discrete-time competing-risks model is used. Although the underlying transition process out of employment can be viewed as continuous, a discrete-time model seems most appropriate since the data are gathered on a yearly basis. A single-spell model is used because only the first exit out of employment after the age of 50 is modelled, re-entry is not allowed.⁸ A competing risks model is used to account for the variety in exit pathways available to the worker. The discrete time hazard out of employment into one of the exit states j is the probability of making a transition in the t -th interval, conditional on survival in employment to the beginning of the interval, *i.e.* not having retired at the age of 50, or (Jenkins, 2005)

$$h_j(t) = P(T_j = t | T_j \geq t) = \frac{f_j(t)}{S(t-1)} \quad (1)$$

with $f_j(t)$ being the destination-specific density function at time t and $S(t-1)$ being the survival function in employment until the beginning of the current time interval t . T_j represents the observed duration of

employment until exit to destination j . As a proxy for this, the duration in employment after the age of 50 is used: $T_j = \text{observed exit age} - 50$.

Because the data are interval-censored, further assumptions about the ‘within-interval hazard rates’ are necessary. One could assume that the exit out of employment only occurs at the end of the time interval or one could assume that the (continuous) hazard is constant within the time intervals. Jenkins (2005) shows that in the case of a relatively small interval hazard rate, the latter approach produces approximately the same estimation results as the multinomial logit approach developed by Allison (1982) for intrinsically discrete data. The specification for the destination-specific hazard rates is then given by

$$h_{ij}(x_{it}, t) = \frac{\exp(\beta_0^j + \beta^j x_{it} + \theta_k^j)}{1 + \sum_{j'=1}^3 \exp(\beta_0^{j'} + \beta^{j'} x_{it} + \theta_k^{j'})} \quad (2)$$

for worker i , $i=1, \dots, N$, where $j=1, \dots, J$ is the set of destinations states, x_{it} is a vector containing the observed characteristics, β^j is a vector of destination-specific parameters, β_0^j the destination-specific intercept term and θ_k^j is the destination-specific baseline hazard. For the specification of the baseline hazard, a piecewise constant hazard model is used, including dummies for k two-year age groups (*i.e.* age 51/52, 53/54, ..., 63/64). θ_k^j is constant within each of the k intervals, but differs between them (Jenkins, 2005). The main reason for this aggregating over the two-year time intervals is that there might be insufficient observations for a shorter time interval of one-year, *i.e.* no exits, to identify the model.

In our model, we correct for unobserved heterogeneity, *i.e.* the variation between individuals that is not captured by the observed variables. When it is not accounted for, positive duration dependence is likely to be underestimated (or negative duration dependence overestimated) and the estimated coefficients for time-varying covariates are likely to be biased (Lancaster, 1990). Reviewing the literature on how to control for such unobserved heterogeneity, several models have been proposed, both parametric and non-parametric (Jenkins, 2005, p.82-84). A parametric approach implies the inclusion of an time-constant and independent individual effect ε_i in the model. In that case, however, the model results are subject to the functional distribution of this unobserved individual effect. Accordingly, for this study we use a non-parametric approach to deal with unobserved heterogeneity based on latent class models. The core assumption of the model is that, apart from observed characteristics, unobserved characteristics account for differences in transition behaviour between a number of classes in the sample (Vermunt, 2002). Consequently, each group of individuals or each class l , has its own intercept β_{0l} for the estimated hazard into the various destination states, or more formally

$$h_{ij}(x_{it}, t) = \frac{\exp(\beta_{0l}^j + \beta^j x_{it} + \theta_k^j)}{1 + \sum_{j'=1}^3 \exp(\beta_{0l}^{j'} + \beta^{j'} x_{it} + \theta_k^{j'})} \quad (3)$$

The likelihood contribution of an individual belonging to class l is:

$$L_i = \sum_{l=1}^L L_{i|l} \pi_l \quad (4)$$

with π_l reflects the probability that the individual belongs to class l . The number of classes is found by sequentially including more classes until the likelihood is no longer improving. In our model the number of classes is two.

Observed early retirement patterns in Germany, the Netherlands and the United Kingdom

Individual characteristics

Table 3 shows the estimated (baseline) age effects on the probabilities into the various exit pathways. In all countries, these probabilities are an increasing function of age. The age-specific increase in the exit to retirement starts earliest and is most prevalent in the Netherlands. In this country, there is a gradual increase in the retirement hazard as from the age of 55. Retirement opportunities are seemingly not so much centred around specific ages, probably reflecting the private nature of the occupational pensions. A drop in the retirement hazard at ages 63-64 is observed, which is related to the financial incentives in the Dutch second pillar pension system, where the implicit tax on continued work is highest until the age of 62 (Gruber and Wise, 2004). In the United Kingdom the increase in the retirement hazard is most modest. The British pension system provides an incentive to retire from the age of 60 onwards, whereas the German peak is reached somewhat later, around the age of 61/62. It can be argued that once an early retirement opportunity is available, people are likely to take the opportunity, because waiting for a better opportunity at a later stage might be a risky strategy. Future opportunities might be less attractive, and risk-averse agents are likely to take the first opportunity.

The exit probabilities into social security show less age-dependence. The estimated effects are strongest in Germany and the Netherlands, where social security benefits are most generous and flexible to use, as argued before. In Germany, some evidence is found for the existence of a substitution effect between the social security and retirement routes, with the retirement hazard sharply increasing and the social security hazard declining from this age onwards. When workers are eligible for early retirement benefits, they do not need to leave through social security arrangements that offer lower replacement rates.

Table 3: Estimation results of discrete-time competing-risks model for early retirement relative to staying employed^a

	DE		NL		UK	
	b	(s.e.)	b	(s.e.)	b	(s.e.)
<i>To retirement</i>						
Aged 53 – 54	0.33	(0.365)	-0.47	(1.224)	0.30	(0.214)
Aged 55 – 56	0.88**	(0.339)	2.74*** ¹	(0.760)	0.78***	(0.204)
Aged 57 – 58	1.52*** ¹	(0.322)	3.41*** ¹	(0.754)	1.11***	(0.201)
Aged 59 – 60	2.30*** ¹	(0.309)	5.00*** ^{1,2}	(0.742)	2.12***	(0.185)
Aged 61 – 62	3.74*** ¹	(0.302)	5.78*** ¹	(0.770)	2.17***	(0.198)
Aged 63 – 64	4.19*** ¹	(0.314)	4.24*** ¹	(0.967)	2.41***	(0.209)
Female	0.01	(0.154)	-0.90**	(0.357)	0.32**	(0.128)
Bad health	0.70***	(0.114)	0.05	(0.236)	0.50***	(0.100)
Single	0.35*	(0.192)	0.28	(0.585)	-0.12	(0.134)
Partner employed	-0.34***	(0.110)	-0.31	(0.216)	-0.52***	(0.108)
Dependents	-0.32***	(0.115)	-0.15	(0.236)	-0.20**	(0.097)
Household income	0.01	(0.002)	0.01**	(0.005)	0.01	(0.005)
Medium education	-0.05	(0.129)	0.30	(0.257)	0.19*	(0.122)
High education	-0.28	(0.205)	-0.10	(0.358)	0.36***	(0.116)
Tenure < age 50	0.01*	(0.006)	0.01	(0.011)	0.01**	(0.005)
Hourly wage	-0.03***	(0.010)	-0.02** ²	(0.008)	0.01***	(0.010)
Comm. Services	0.07	(0.164)	-0.07	(0.271)	-0.03	(0.128)
Non-comm. Services	0.01	(0.160)	-0.14	(0.294)	-0.10	(0.179)
Self-employed	-0.69***	(0.238)	-2.72*** ^{1,2}	(0.567)	-1.03***	(0.189)
Public sector	0.33** ¹	(0.156)	0.07	(0.280)	0.42**	(0.146)
Hours worked	-0.03***	(0.006)	-0.02	(0.012)	-0.02***	(0.005)
Wants less hours	0.37***	(0.116)	-0.49*	(0.295)	0.38***	(0.097)
Unemployment rate	-0.09	(0.059)	0.18	(0.107)	0.23***	(0.023)
Class – 1	-3.79***	(0.622)	-5.96***	(1.180)	-6.07***	(0.850)
Class – 2	-8.10	(2.774)	-5.64***	(1.165)	-5.96***	(0.652)
<i>To social security</i>						
Aged 53 – 54	-0.12	(0.237)	0.10	(0.396)	-0.19	(0.231)
Aged 55 – 56	0.13	(0.233)	0.63	(0.415)	-0.13	(0.252)
Aged 57 – 58	0.75*** ¹	(0.218)	0.88** ¹	(0.442)	0.07	(0.261)
Aged 59 – 60	1.17***	(0.219)	0.65	(0.533)	-0.26	(0.358)
Aged 61 – 62	0.90*** ¹	(0.272)	0.96	(0.677)	0.06	(0.374)
Aged 63 – 64	0.57	(0.398)	0.55	(1.127)	0.10	(0.412)
Female	-0.75***	(0.186)	-1.05**	(0.442)	-0.19	(0.219)
Bad health	0.35*** ¹	(0.136)	0.81***	(0.288)	1.17***	(0.153)
Single	0.18	(0.248)	0.95	(0.667)	-0.15	(0.225)
Partner employed	0.08	(0.144)	-0.03	(0.291)	-0.55***	(0.190)
Dependents	-0.17	(0.137)	-0.34	(0.320)	0.38**	(0.161)
Household income	0.01	(0.003)	0.01	(0.007)	-0.02	(0.016)
Medium education	-0.22	(0.148)	-0.43	(0.328)	-0.46**	(0.193)
High education	-0.42	(0.271)	-0.03	(0.490)	-0.41**	(0.204)
Tenure < age 50	-0.01	(0.007)	-0.02	(0.016)	-0.01	(0.007)
Hourly wage	-0.07***	(0.014)	-0.07*** ^{1,2}	(0.015)	-0.08*	(0.061)
Comm. Services	-0.19	(0.182)	0.85**	(0.367)	-0.22	(0.181)
Non-comm. Services	-0.13	(0.210)	0.04	(0.439)	-0.62*	(0.317)
Self-employed	-2.47***	(0.587)	-2.13***	(0.725)	-0.25	(0.247)
Public sector	-1.00*** ¹	(0.261)	-0.40	(0.448)	-0.80***	(0.315)
Hours worked	-0.02***	(0.007)	-0.04**	(0.016)	-0.02***	(0.008)
Wants less hours	-0.02	(0.153)	0.16	(0.369)	-0.06	(0.158)
Unemployment rate	0.18***	(0.064)	0.23	(0.142)	0.10**	(0.039)
Class – 1	-3.07***	(0.672)	-1.56	(1.252)	-2.29*	(1.316)
Class – 2	-8.31	(1.187)	-6.60	(10.362)	-2.84	(2.400)

Source: GSOEP (1990-2005), SEP (1990-2001) and BHPS (1991-2004)

^aThe results of the transition to inactivity are omitted here. *significance on a 10% level, **on a 5% level and ***on a 1% level. ¹country effect is significantly different (on 5% level) from UK, ²country effect is significantly different (on 5% level) from DE.

Table 3 further shows that, according to our predictions, Dutch women have a lower hazard rate into early retirement, whereas the effect is reversed for British women. This latter finding is likely due to the fact that the official retirement age is (still) lower (60) for British women. We also find lower female exit probabilities to social security in Germany and the Netherlands, which can be explained by the insufficiency of the contribution record as explained earlier. Consequently, women are most likely to move into inactivity without benefits (*e.g.* partner's income). The contended positive effect of a bad state of health on the retirement probability in the two countries (DE and UK) with special disability pensions is supported by the data. In addition, in all countries a bad state of health increases the probability to exit via social security, with the strongest effect found in the Netherlands and the United Kingdom. Kerkhofs *et al.* (1999), however, found that people who move into disability have a tendency to overstate their health problems in order to become entitled to disability benefits.

In both Germany and the United Kingdom, workers with an employed spouse are less likely to exit to early retirement. This is in line with the theoretical expectations of joint retirement behaviour (*e.g.* complementarity of leisure time or assortative mating). In the United Kingdom, having an employed spouse also lowers the probability of a transition into social security, which is probably because of the existence of means-tested benefits. In addition, it turns out that having dependents (either children or other family members that need care) reduces the early retirement probability in Germany and the United Kingdom which might be related to the higher income needs of the household that are better met by continued work. Although it is suspected that this would mainly be a male effect (*i.e.* women are more likely to exit because of care responsibilities), this is not supported by additional gender-specific models that were estimated.

Human capital and job indicators

The results show that higher education levels and higher wages increase the probability of a transition into early retirement schemes in the United Kingdom. This supports the idea that the use of private early retirement schemes is more common among the higher educated or people with higher earnings, *i.e.* selectivity. It is also in line with a dominant income effect of higher wages, whereas the substitution effect seems to be dominant in the other two countries where higher wages reduce the probability to retire early. This effect is significantly strongest in Germany, where seniority wage agreements (increasing wages with age) are most common and opportunity costs of retirement highest. In addition, we find the expected negative effect of a higher level of human capital on the transition to social security for Germany and the United Kingdom. Apart from the effect of means-tested, the stigmatic effect of social security might also play a role for the higher-educated. Although the wage effect is also found for the Netherlands, it is significantly weaker mainly because social security is least means-tested or otherwise related to low income (*i.e.* universal provision). Our results also show that tenure increases the early retirement probabilities in Germany and the United Kingdom. Although

we expected the effect to be strongest in Germany because of early retirement schemes acting as a reward for long service, this is not supported by the data.

The results further show higher early retirement probabilities for public sector workers in both Germany and the United Kingdom. The entitlement to the schemes reduces the probabilities of moving into inactivity with or without social security benefits for public employees in both countries. The effect is not observed in the Netherlands where early retirement schemes are most universal with the main difference being the minimum retirement age which is lower for public sector employees. In the Dutch sample, the average age of early retirement of public sector workers is 55.0, whereas the average age of early retirement of private sector workers is 56.6. In contrast to the studies of Blossfeld *et al.* (2006), no evidence is found for lower exit probabilities of workers in the service sector, except for a small lower probability of British non-commercial service workers to social security. In the Netherlands, even a positive effect is found for service sector workers on the transition probability into social security. The idea that the self-employed are least likely to exit early is supported by the data. In all countries, being self-employed reduces both the chances of exit to retirement and to social security in all countries. The effect is strongest for the Netherlands, where early retirement is largely organised within the occupational second-pillar pensions and relies on collective bargaining excluding the self-employed.

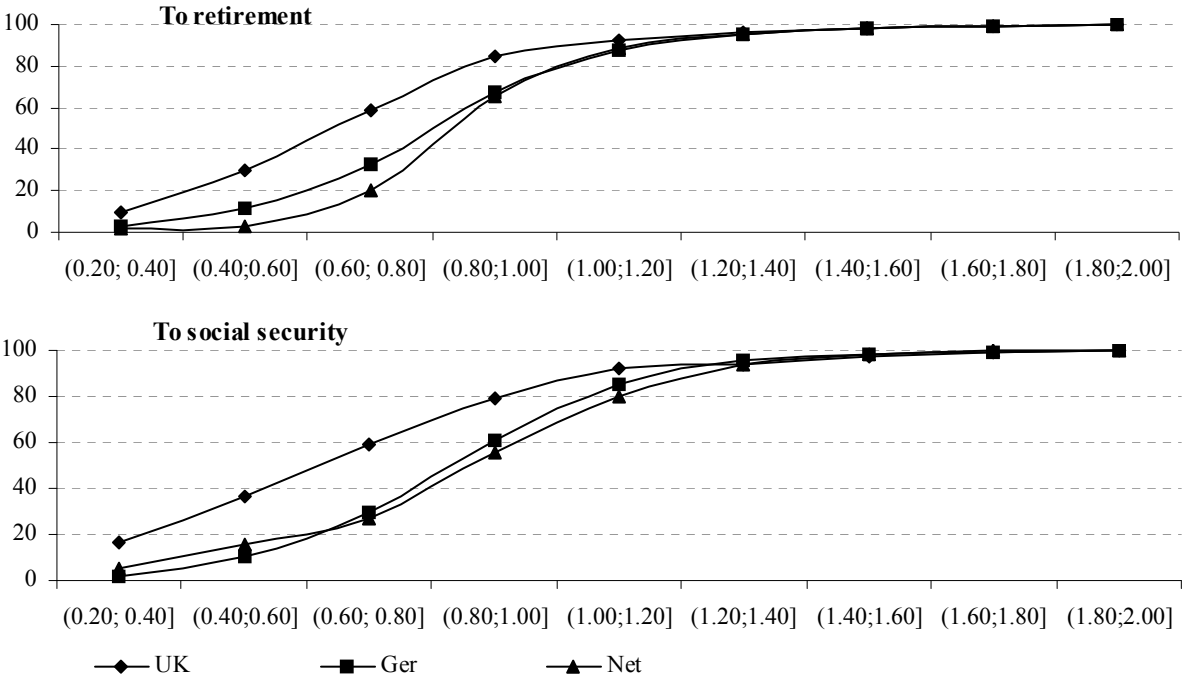
As a proxy for the impact of people's preference for working, both the actual and the preference for a reduction in working hours are included. The evidence suggests that working more hours signals a stronger commitment to work in Germany and the United Kingdom, either due to preferences for work or to higher income needs. Interestingly, older workers who have a preference for working fewer hours than they currently do, have a higher probability to retire in Germany and the United Kingdom, while the reverse is found for the Netherlands. A possible explanation might be that part-time work is common in the Netherlands, allowing workers who want to reduce their working hours to do so. In the United Kingdom, where part-time work is less common, workers are more or less obliged to retire because there are no part-time jobs available to them.

Income effects of early retirement

As explained in the theoretical section, many of the expected and observed effects on early retirement are related to the level of generosity of early retirement schemes. In general early retirement is usually possible at the expense of a lower income in the years after retirement, compared to the income during the years of working. Older workers are willing to pay this price because their preference for leisure has increased. The income effects are however different between countries, between schemes and between different groups of workers. In this section, some evidence is presented on such differences. Analogous to a paper of Zaidi *et al.* (2003) net equivalent household incomes are taken as the basis for the analysis. Individuals share resources with other family members and pension benefits often depend on the family status of the individual. For the same reason, net rather than gross incomes are used. Tax

exemptions might differ between the countries, leading to differences in income after retirement. A common way to examine the income consequences of retirement is to look at the replacement rates: the ratio of net equivalent household income at $t+1$ over net equivalent household income at t , when exit is observed at t . Figure 1 shows such replacement rates.

Figure 1: Replacement rates of retired individuals by country (cumulative frequencies)



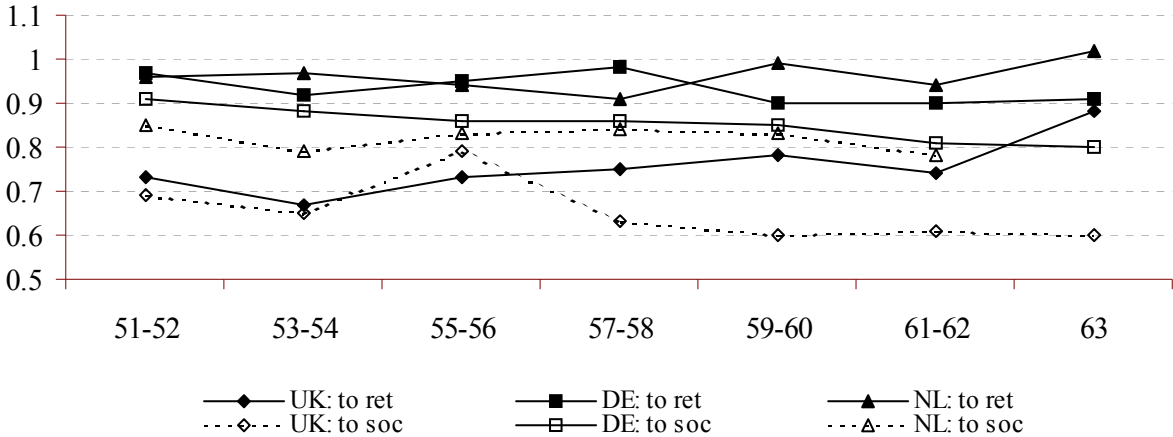
Source: Author's own calculations

Replacement rates are lowest in the United Kingdom, where the median replacement rate for early retirement schemes is 74 percent of previous income. In both Germany and the Netherlands, replacement rates are significantly higher with median replacement rates of 90 and 94 percent respectively. These country differences comply with the expectations. In addition, in all countries replacement rates of social security are lower compared to those of retirement, though the difference is not significant on a 10 percent level in any of the countries. The difference is largest in the United Kingdom where the median replacement rate for social security is 0.70, compared with 0.95 in the Netherlands and 0.94 in Germany. Again this supports the expected country variation set out in the theoretical section.

Next, it is interesting to see whether the replacement rates vary with characteristics of the individual. Previous studies as well as our estimation results showed that the level of replacement income during retirement is different at different retirement ages (Hansen, 2000; Gruber and Wise, 2004). The pension system provides incentives to retire at certain ages and disincentives to retire at other ages as shown previously. Figure 2 shows the average observed replacement rates at different retirement ages for the two exit routes. Although the differences in replacement rates at different ages

are small and not statistically significant, the results are still illustrative. While for Germany and the Netherlands, average replacement rates for the early retirement route are most stable with age, for the United Kingdom small spikes are observed around the ages of 60 and at the age of 63, analogous to our earlier findings in the retirement hazard. For Germany, average replacement rates seem somewhat higher before the age of 60, but differences are small. Furthermore, average replacement rates for social security are declining with age in all countries, but this is especially true for the United Kingdom. Workers who are not entitled to early retirement schemes and who exit employment, are worse off. In addition, it is worth noting that the average replacement rates for social security in Germany and the Netherlands are even higher than those of the early retirement route in the United Kingdom, at least until the age of 62. This shows the stronger incentives for early retirement via any of the available pathways in the two continental countries included in our analysis.

Figure 2: Average replacement rates at different ages, by country



Source: Author's own calculations

Concluding remarks

In this article, early retirement behaviour of older workers' retirement behaviour is studied in a comparative perspective, using longer running panels. By using countries with contrasting early retirement institutions, it is investigated whether early retirement patterns vary accordingly. The findings suggest that the differences in pension and early retirement systems are reflected in the retirement behaviour of older workers. In the United Kingdom, where labour market participation is strongly encouraged and early retirement possibilities are most limited, *i.e.* a liberal residualist pension and early retirement system with early retirement mainly organised within the private pension pillars, the lowest number of early exits are found. In Germany and the Netherlands the hazard rates into retirement are significantly higher. Moreover, while Germany and the United Kingdom show peaks in the retirement hazard at marked ages, in the Netherlands, early retirement is less restricted to specific ages and seems to be most generous from the age of 60 till age 62. Although the observed patterns are

more unstable, the results also show that social security pathways such as disability and unemployment are least likely to be used as early retirement pathways in the United Kingdom. In Germany and the Netherlands, where such alternative routes are more generous, retirement and social security seem to act as communicating vessels.

The observed differences in retirement hazards between the countries and between the exit routes are largely related to the generosity of the schemes. In all countries the observed replacement rates after exit from the labour force are lowest for social security compared to exit into retirement. In addition, the lowest replacement rates are found for the United Kingdom, whereas the highest are found in Germany and the Netherlands, which is in accordance with the findings on early retirement probabilities. Although not significant, the age-specific replacement rates suggest that at the observed spikes in the early retirement hazard, the generosity of the schemes is higher compared to other ages. When differences are observed, these are large related to differences in the pension and social security system. This suggests that institutions and social security policies indeed play a role in explaining older worker's retirement behaviour across countries. Pursuing a shift from public to private early retirement schemes can lower the incidence of early retirement. Yet, at the same time, early retirement might become more selective, *i.e.* early retirement is only affordable for white, male high-paid workers or more older workers might be pushed into social security exit pathways. This latter is especially true for Germany and the Netherlands when the working environment (still) not fosters the continued employment of older workers (*e.g.* low training probabilities, inflexible industrial relations). When reforming the early retirement system, such effects need to be taken into account to avoid negative and unintentional distributional changes among the population.

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Notes

¹ Early retirement refers to exit from the labour force before the country's official retirement age, or the age at which the individual is entitled to a full public old-age pension, if, the other conditions on residency and contribution record are met.

² The pension pillars are defined using the European Commission's definition. The first or public pillar concerns public, state-managed pension schemes; the second or occupational pillar concerns schemes managed on a sector or employer-level and the third or private pillar concerns privately managed schemes (Willmore, 2000).

³ The limitation of 15 hours a week is merely data-driven. The work-related questions are not asked to people working less than 15 hours a week.

⁴ D'Addio and Rosholm (2002) show that definitions of censoring differ across the literature. Here it refers to a spell of interest that ends outside the observation window, *i.e.* that is not observed.

⁵ A detailed analysis shows that there are no systematic sex or age differences between the excluded and included cases, except that there are more low educated people among the excluded group (44 percent compared to 35 percent among included cases) and slightly more people in bad health (8 percent compared to 5 percent). This suggests the existence of a (small) selection bias. However, in the literature no single, generally accepted, way of dealing with left-censoring was found. It is uncertain whether the possible bias of not accounting for left-censoring is worse than a possible bias as a result of the controlling mechanism for left-censoring.

⁶ We realise that the interpretation of exits into social security might be somewhat difficult because of this, yet we see no other solution to avoid small sample size problems.

⁷ With the model specification chosen for our analysis it is impossible to include additional time dummies to control for institutional reforms. A detailed analysis of predicted probabilities to retire over time reveals that the observed retirement patterns in Germany and the Netherlands are quite stable, whereas in the United Kingdom hazards decline until 1997 after which they remain stable. A quick comparison of retirement behaviour before and after 1997 shows however no systematic differences in the determinants of retirement behaviour. It is the level of early retirement that has declined, which is accounted for by the baseline hazards of the discrete-time duration model.

⁸ Re-entry rates appear to be below 5 percent, except for the United Kingdom, where these are about 10 percent in the case the worker becomes unemployed. Detailed analysis of the re-entries shows that there are no systematic sex or age differences between the re-entries and non-re-entries, except that there are slightly less low educated people among the re-entries (45 percent compared to 48 percent) and slightly more people in good health (70 percent compared to 66 percent). This suggests the existence of a (small) selection bias, yet the use of a multi-spell model implies further methodological issues and controlling mechanisms that might cause other selection problems. Because of the relative small size of re-entry in the UK and the need for a comparison with the other two countries, we have chosen a single-spell model here.