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EARLY RETIREMENT PATTERNS IN GERMANY, THE NETHERLANDS AND THE UNITED KINGDOM

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ABSTRACT

The main research questions dealt with in this paper are: Is the likelihood of early retirement according to the various routes different for different groups within the working population? To what extent do the existence of more flexible and more generous early retirement schemes result in higher entry rates into early retirement for the working population? To what extent does the generosity differ between the various exit routes and between the countries or regime types? This will be analysed using three unique long-running panel studies, i.e. BHPS 1990-2004 (the United Kingdom), the GSOEP 1990-2005 (Germany) and the SEP 1990-2001 (Netherlands). Using a discrete-time competing-risks model the exit patterns of older workers are examined in these three very different countries in terms of their pension and social security systems. The results show that hazards into retirement and social security are significantly highest in Germany and the Netherlands reflecting the institutional support for these exit pathways. In the United Kingdom early exit is most common through the retirement route but restricted to specific ages. Furthermore, the observed differences in retirement hazards are related to the generosity of the routes. Replacement rates of retirement schemes are highest in Germany and the Netherlands while for all countries it is true that social security replacement rates are lower than those of the retirement schemes.

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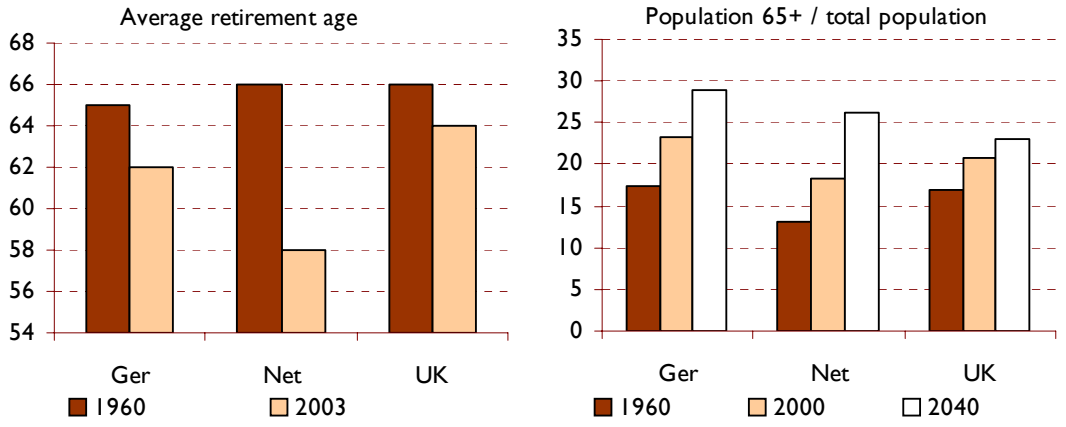
1 INTRODUCTION

As a result of the baby boom in the early post-war period, the fall in fertility rates since the 1960s and increasing life expectancies, the number of older people in the total population has grown. In 1960 about 13 percent of the Dutch population was aged 65 and over, in 2000 this increased to about 18 percent and projections show that by 2040 more than a quarter of the population is aged 65 and over (United Nations, 2005). In contrast to this, the average age at which male workers retire from the labour force has declined from 66 in 1960 to about 58 in 2003 (Eurostat, 2004). This has raised concern among policy makers. The generous levels of retirement benefits and lenient entitlement conditions for older workers in social security schemes have been target of recent reforms. Comparative research on early retirement patterns and associated benefit levels is not only of academic importance but might also yield useful implications for policy makers in their battle to reduce early retirement. In this article, differences in early retirement patterns between individuals in countries with different pension and early retirement systems are analysed. The main research questions dealt with are: Is the likelihood of early retirement according to the various routes different for different groups within the working population? To what extent do the existence of more flexible and more generous early retirement schemes result in higher entry rates into early retirement for the working population? To what extent does the generosity differ between the various exit routes and between the countries or regime types?

Figure 1: Average retirement age and percentage of population aged over 65



Source: Eurostat (2004), United Nations (2005)

The countries chosen for the analysis all face the mentioned trends of an ageing population and a declining retirement age, as shown in Figure 1, yet to a different extent. Both trends are most strongly observed in the Netherlands, and weakest in the United Kingdom. The three countries are different in their early retirement provision. In contrast to Germany, in both the Netherlands and

the United Kingdom, early retirement on a public pension is not possible. It is only conceivable through occupational or private retirement schemes. Generosity of the schemes varies largely between the countries. Finally, the countries differ with respect to the alternative routes that facilitate early retirement. In the Netherlands, though recently changes have been made to this, it used to be relatively easy to claim disability benefits at older ages and job search was lowered for older unemployed workers. In addition, benefits are generally not means-tested and rather generous. In the United Kingdom, however, social security benefits are means-tested and at a minimum level, to ensure use by the 'deserving poor'. Special disability pensions do exist in Germany and the United Kingdom, but conditions are more tight compared to the Netherlands.

By analysing retirement behaviour in a comparative perspective and recognising the multitude of early retirement routes, this study adds to the existing literature. Virtually all existing studies are single-country studies (e.g. Meghir and Whitehouse, 1997; Siddiqui, 1997; Antolin and Scarpetta, 1998; Miniaci and Stancanelli, 1998; Kerkhofs et al., 1999; and Heyma, 2001), though Oswald (1999) compares Germany and Great Britain. Moreover, while Meghir and Whitehouse, Siddiqui and Antolin and Scarpetta estimate single-risk models, i.e. modelling only a transition from employment to non-employment, the others acknowledge the importance of other pathways, such as unemployment or disability and estimate competing risks models. Furthermore, for the analysis three national longer running socio-economic panel data sets are used (GSOEP 1990-2005 for Germany, SEP 1990-2001 for the Netherlands and BHPS 1990-2004 for the United Kingdom). The advantage of using these data sets is that individual information is available for a long period of time allowing the estimation of a challenging econometric model, i.e. a discrete-time competing risks model with a control for unobserved heterogeneity. Such models have not been applied much in the particular domain of retirement studies. In this article both the determinants of early retirement behaviour and the short-run income consequences of early retirement are briefly analysed. Most of the predicted differences between countries or between population groups are associated with differences in generosity of the early retirement schemes. Studies on this subject in the countries of our interest have not been widespread and most of them are focussed on retirement at the official retirement age (e.g. Jenkins and Bardasi, 2002; Zaidi et al., 2003; Huynen and Fouarge, 2005).

The paper continues as follows. Section 2 gives a brief description of the early retirement systems in the three countries. Section 3 describes the theoretical framework, while the empirical model as well as the data are discussed in section 4. Section 5 gives the results of the competing risks models on early retirement and Section 6 shows the income consequences of early retirement in the three countries. Finally, Section 7 summarises and concludes.

2 THREE DIFFERENT PENSION SYSTEMS

In all three countries the state provides income support in old-age. The extent of this pension provision, however, differs between the countries. In Germany, a compulsory social insurance scheme covers all employees and certain groups of self-employed. It is financed on a pay-as-you-go basis. Both the worker and the employer contribute 9.6 percent of earnings to the pension system and pension benefits depend on previous earnings and the length of the insured period. The public pension accounts for 94 percent of the pensioner's income (European Commission, 2004). In the Netherlands, the public, or first-pillar pension[1] consists of a flat-rate pension for all residents based on the period of residency and family status (e.g. about 900 euro a month for single persons and 1250 euro for couples). It is financed on a pay-as-you-go basis with employees contributing 17.9 percent of their earnings. The public pension only accounts for about 46 percent of the pensioner's income (European Commission, 2004). In addition, the state mandated participation in second-pillar pension schemes, that are managed by pension funds on a sector or employer level. These supplementary occupational pensions offer earnings-related pensions, depending on the schemes' rules, determined by the social partners. In the United Kingdom, both a flat-rate basic pension and an earnings-related supplementary pension (SERPS) are provided by the state. The basic pension is a minimum pension based on the length of the insured period (e.g. a full pension with 44 years of service, is about 500 euro a month). The earnings-related pension depends on previous earnings, the length of the insured period, with a maximum of about 890 euro a month. Workers who contribute to a voluntary second or third pillar supplementary scheme, can contract out of SERPS. Following Banks and Smith (2006) the majority of workers with private pension schemes choose to contract out of SERPS because of the minimal pension benefits paid under the state scheme. The state pension accounts for 41 percent of the pensioner's income, about the same as in the Netherlands.

The official retirement age, i.e. the age at which workers are eligible for a full public pension, is 65 for men and women in Germany and the Netherlands and 65 for men and 60 for women in the United Kingdom. Only in Germany it is possible to claim a public pension before this age. For workers with 35 years of service, early retirement is possible at the age of 63. For unemployed older workers or workers with a severe handicap early retirement on a public pension is even possible as from the age of 60. In both the Netherlands and the United Kingdom, workers must rely on second and third pillar provisions for early retirement. In both countries, the (quasi-) mandatory participation in second and third pillar pensions has stimulated the development of occupational and

[1] For this paper the pension pillars are defined according to the definition adopted by the European Commission. The first pillar concerns public, state-managed pension schemes; the second pillar concerns schemes managed on a sectoral or employer-level and the third pillar concerns privately managed schemes (Willmore, 2000).

private pensions. Around 2000, second pillar pension coverage was about 95 percent in the Netherlands, 70 percent in the United Kingdom and only about 40 percent in Germany. Assets as a percentage of Gross Domestic Product mounted to 160 percent in the Netherlands, 81 percent in the United Kingdom and 16 percent in Germany (Natali, 2004).

Early retirement schemes within the second pillar are, as the public early retirement scheme in Germany, usually a reward for long service. In the Netherlands, the conditions are largely determined by the government and the social partners and have been tightened in recent years. For example, during the 1980s the so-called VUT-schemes allowed retirement from the age of 58 with 40 years of service, but the pre-retirement schemes introduced in the late 1990s only allowed retirement as from the age of 60. Most recently, the government has further increased the minimum retirement age to 62 and reduced the financial generosity of the schemes. In the United Kingdom, employer-provided occupational pensions as well as person or stakeholder pensions facilitate early retirement (Banks and Smith, 2006). The minimum early retirement depends on the scheme and usually retirement is possible from an age of 60.

Generosity of the early retirement schemes varies a lot between the countries. Gruber and Wise (1999), among others, calculated implicit tax rates on continued work at early retirement ages, i.e. the change in pension wealth as a percentage of potential earnings in case of continued work, for various OECD countries. They showed that at an early retirement age of 60, the implicit tax is highest in the Netherlands (about 140 percent, including the old VUT-schemes), average in the United Kingdom (about 75 percent) and lowest in Germany (about 35 percent). In addition, replacement rates have been calculated and these are 91 percent for the Netherlands, 62 percent for Germany and 48 percent for the United Kingdom. For the United Kingdom, this study only includes public pensions, but another study of Hansen (2000) showed about the same results. He found that there are two types of pensions 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. It is unknown, however, how many workers are entitled to any of those schemes.

Apart from special early retirement schemes, early retirement is facilitated through other social security arrangements, such as unemployment or disability. Benefit durations are extended for older workers and medical check-ups as well as job search requirements are lowered. In general, entitlement conditions are least tight in the Netherlands and most tight in the United Kingdom. For example, in the Dutch system disability benefits can be claimed as from an incapacity to work of 15 percent, compared to 66.67 percent in the British system. In the Dutch unemployment schemes,

reduced job search for workers aged over 57.5 used to be in practice, yet a few years ago this was changed. Now older workers do have to search actively for a new job to keep their unemployment benefits, except those who do volunteer work or have care responsibilities at home. In the United Kingdom older workers aged over 60 face reduced job search conditions and in Germany, workers aged over 60 who have been unemployed for a year can transform their unemployment benefits into an early retirement pension. Social security benefits are most generous in Germany and the Netherlands. For example, the net replacement rate for an average earning single person without children who becomes unemployed is 86 percent in Germany, 82 percent in the Netherlands and 52 percent in the United Kingdom (OECD, 2004). Finally, in both Germany and the United Kingdom, special disability pensions exist that facilitate early retirement of severely handicapped workers as from the age of 60. In the Netherlands, however, disability benefits are paid until the official retirement age of 65 as from the age of 59 and although medical check-ups are still required on a regular basis, these are less strict than at younger ages.

3 THEORETICAL FRAMEWORK

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 available at certain age). With respect to the latter, the different pathways refer to early retirement (ER), unemployment (UI), disability (DI) or non-social security pathways (PI) reflecting retirement based on other sources of private or household income. It is argued that retirement offers are made to the individual as job offers are made to unemployed workers in the job search framework (Mortensen, 1970).[2] Starting point of the theoretical model is an older worker aged 50 and over in employment. Time periods are assumed to be discrete in nature, equal to the ages of the individual ranging from $t=0$ (or age is 50) to T (time of death). It is assumed that workers maximise expected lifetime utility subject to a lifetime budget constraint as in the life-cycle model (Fields and Mitchell, 1984), or

$$\begin{aligned} Max\, U_t &= \sum_{t=0}^{T} \frac{1}{1+\delta_t} U(C_t, L_t) \\ s.t.\, C_t &= \sum_{t}^{t=R} \frac{1}{1+\delta_t} Y_t^E dt + \sum_{t=R}^{t=T} \frac{1}{1+\delta_t} Y_t^R dt + Y_0^P \end{aligned} \qquad (1)$$

where δ reflects both the interest rate and the subjective rate of time preference at time t, Y_0^P is the individual's initial pension wealth (both occupational and private), Y^E is the individual's income when employed, Y^R is the individual's expected pension income when retired, R is the individual's retirement age.

At each age different retirement offers are available to the individual, depending on the entitlement conditions (e.g. minimum age and contribution period). The freedom of choice, however, is limited in some cases. For example, disability is more likely to be the outcome of bad health and unemployment can be the result of employer-driven behaviour (e.g. reorganisation of the workforce). Even early retirement might be the outcome of such processes. This is all captured by the arrival rate λ_j in the model with $j \in \{ER, UI, DI, PI\}$, or more specific,

λ_{jt} = 1 if the worker is entitled to early retirement route j at time t

= 0 otherwise

It is assumed that the worker receives at the most one offer of each retirement route at each age. Accordingly, at each age t the individual receives maximally four different retirement offers: an early

[2] For a elaborate discussion on how the search model can be translated into a retirement model, see Schils (2005, ch.2).

retirement offer (Y^{ER}_t), a disability offer (Y^{DI}_t), an unemployment offer (Y^{UI}_t) or an inactivity offer (Y^{PI}_t). The probability that no single retirement offer is made to the individual is equal to zero since the worker always has the possibility to quit working without applying for any benefits and move into inactivity ($\lambda_{PIt}>0$) The fact that the expected utility flow might be insufficient for early retirement is captured by the optimal decision strategy.

Each retirement offer is characterised by an expected future utility flow U_{jt}. This is determined by the expected lifetime stream of income (or consumption) and leisure associated with the retirement offer. The retirement offers are independent drawings from a known probability distribution of potential offers $F(U_{jt})$ and the arrival rate is governed by a Poisson process. It is assumed that the retirement offers are independent over time and between each other. The individual decides to accept or decline retirement offers when they arrive. Once an offer is accepted, it leads to permanent retirement at the expected income stream associated with the chosen retirement pathway. This might seem a strong assumption, however, institutions discourage re-entry into employment after early retirement. Additionally, age discrimination in job hiring makes it extremely difficult for older unemployed workers to find employment again.

The optimal decision strategy is marked by the reservation wage property: the individual only accepts a retirement offer if the expected present value of utility from the offered pathway is at least as great as some minimum acceptable value, the reservation utility. Because of the existence of multiple destinations, the individual decides upon multiple destination-specific reservation utilities. For example, one might expect that the reservation utility for social security pathways is higher because of the stigmatic effects of being on social security in some countries. The destination-specific reservation utilities equate marginal costs and marginal benefits of continued 'search for the optimal retirement age and route', or following Lancaster (1990)

$$U^*_{jt} = u_{jt} + \frac{\lambda_{jt}}{\delta_t} \int_{U^*_{jt}}^{\infty} (U_{jt} - U^*_{jt}) dF_j(U_{jt}) \qquad (2)$$

The destination and time specific reservation utilities are a function of current single-period utility from employment, the offered utility flow, the subjective rate of time preference, and the destination-specific arrival rate of retirement offers. This, however, is only part of the optimal strategy. Because of the existence of multiple retirement offers at one point in time the chosen state *j* must be preferred over the alternatives (Devine and Kiefer, 1991). The optimal strategy is then defined as follows:

Accept offer j if $U_{jt} \geq U_{jt}^{*} \wedge U_{jt} \geq U_{st}$ *with* $j \neq s$

Decline offer j if otherwise

In other words, the theoretical probability that an individual will accept exit offer j at time t is

$$\pi_{jt} = P(U_{jt} \geq U_{jt}^{*} \wedge U_{jt} \geq U_{st} \ \forall j \neq s) \tag{3}$$

Once an offer is rejected, it cannot be recalled. Intuitively this implies that a rejected retirement offer at the age of 55 cannot be recalled at a later age, let's say 56. By continued employment in between these two ages, the income flow associated with retirement has changed, the offer is gone and only a new offer at the age of 56 can be reviewed.

The individual's utility index for being employed at time t and moving optimally between states in the future can then be written as follows (Devine and Kiefer, 1991)

$$\begin{aligned} U_{et} &= \frac{1}{1+\delta_t} u_{et} + \frac{\lambda_t}{1+\delta_t} \max(U_{et}, U_{jt} \mid U_{jt}^{*}) + o(t) \\ &= \frac{1}{1+\delta_t} u_{et} + \frac{\lambda_t}{1+\delta_t} \pi_{jt} \end{aligned} \tag{4}$$

The first term on the right-hand side represents the discounted present value of the single-period utility at time t in the present job. The second term on the right-hand side reflects the expected utility flow from the chosen future state, depending on the probability of receiving any retirement offer $(\lambda_t, \quad \lambda_t = \sum_t \lambda_{jt})$, the future utility flows from either continued employment (U_{et}), i.e. in the case of no acceptable retirement offer, or retirement (U_{jt}) and the reservation utility (U^{*}_{jt}). The final term $o(t)$ accounts for the returns to search in the event of more than one offer of a given retirement pathway at time t (e.g. two disability offers at the same time), which can be neglected since it is assumed that only one offer of a given type arrives within a time interval (i.e. only one disability offer). The accompanying reduced-form equation for the transition utility out of employment is given by

$$U_{et} = f(u_e, \delta_t, \lambda_{jt}, U_{et}(Y_{et}, L_{et}), U_{jt}(Y_{jt}, L_{jt}), U_{jt}^{*}) \tag{5}$$

and is further specified in the next section.

4 A DISCRETE-TIME COMPETING-RISKS MODEL OF RETIREMENT

4.1 THE EMPIRICAL MODEL

Equation 5 shows the reduced-form equation for being employed at time t and moving optimally between states in the future. For estimation purposes, an empirical model is chosen in which the dependent variable is an indicator variable for whether the worker is observed to make a transition from employment to non-employment from t to $t+1$, or more formally

Y_{ijt} = 1 if a transition from employment to state j is observed for individual i at time t

= 0 otherwise

The theoretical model showed that this probability is the product of the offer's arrival rate (λ_{jt}) and its acceptance probability (π_{jt}), or

$$\begin{aligned} P(Y_{ijt} = 1) &= \lambda_{jt} P(U_{ijt} \geq U_{ijt}^{*} \wedge U_{ijt} \geq U_{ist}, \forall s \neq j) \\ &= \lambda_{jt} \pi_{ijt} \end{aligned} \tag{6}$$

A reduced-form approach which enables the control for observed and unobserved heterogeneity and the inclusion of time-varying covariates is a duration model (Lancaster, 1990). Issues related to the use of longitudinal data like unobserved heterogeneity and censoring are relatively easy to deal with in duration models. Rather than modelling the transition probability at a certain time (referring to a year), in a duration model this transition probability is specifically modelled at a certain age, capturing duration dependence. The empirical model used in this study is a discrete-time competing-risks model. Although it is recognised that 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. In other words, "the data are not intrinsically discrete, but they are grouped into intervals of unit length, in our case a year" (Jenkins, 2005, p.97). A single-spell model is used implying that only the first exit out of employment after the age of 50 is modelled, no re-entry is allowed.[3]

The set of destination states is represented by J with $j=0$ if the destination state is employment (i.e. no exit observed), $j=1$ if the destination state is retirement, $j=2$ if the destination state is social security (i.e. disability or unemployment) and $j=3$ if the destination state is inactivity (i.e. no social security or pension benefits). Following this, the discrete time hazard out of employment into one of

[3] Re-entry rates after initial retirement appear to be below five percent, except for the United Kingdom, where these are about ten percent in the case the worker becomes unemployed.

the exit states j is the probability of making a transition in the t-th interval, conditional on survival to the beginning of the interval (Jenkins, 2005), or

$$h_j(t) = P(T_j = t \mid T_j \geq t) = \frac{f_j(t)}{S(t-1)} \tag{7}$$

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 = observed exit age - 50.

Because the data are interval-censored, further assumptions about the 'within-interval hazard rates' are necessary. For example, one could assume that the exit out of employment only occurs at the end of the time interval, as did Narendranathan and Stewart (1993) in their analysis of unemployment exit. 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, this latter approach produces approximately the same estimation results as the multinomial logit approach developed by Allison (1982) for intrinsically discrete data. He showed that estimating a multinomial logit model applied to person-period data is one way of estimating a competing risks duration model in discrete time. The specification for the destination-specific hazard rates is then given by

$$h_{ij}(x_{it}, t) = \frac{\exp(\beta_{0j} + \beta_j X_{it} + \theta_{jk})}{1 + \sum_{j=1}^{3} \exp(\beta_{0j} + \beta_j X_{it} + \theta_{jk})} \tag{8}$$

for individual i, $i=1, \ldots N$, $j=\{0,1,2,3\}$ with $j=0$ or continued employment as the reference category, where X_{it} is a vector containing the individual's constant and time-varying explanatory variables, β_j is a vector of destination-specific parameters, β_{0j} being the destination-specific intercept and θ_{jk} the destination-specific baseline hazard. For the specification of this baseline hazard, several options exist. For this analysis, 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_{jk} is constant within each of the k intervals, but differs between them . 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 dummy parameter estimates of the model. This would make the estimation of a model with unobserved heterogeneity unfeasible.

Let τ_j be the destination-specific censoring indicator that is equal to j if a transition is observed to destination state j and is 0 otherwise, then the corresponding likelihood contribution of individual i is equal to (D'Addio and Rosholm, 2004)

$$L_i(\beta_0, \beta, \theta) = \prod_{t=1}^{t} \frac{\exp[\sum \tau_j(\beta_{0j} + \beta_j X_{it} + \theta_{jk})]}{1 + \sum_{j=1}^{3} \exp(\beta_{0j} + \beta_j X_{it} + \theta_{jk})} \quad (9)$$

As a next step, a correction for unobserved heterogeneity is included in the model. Unobserved heterogeneity refers to differences in attributes that are relevant for economic choices but are not observable to the researcher (e.g. taste, motivation or ability). Especially when estimating transitions out of employment, unobservable individual characteristics such as work effort, ability and motivation or cultural and social norms might affect the retirement transition (D'Addio and Rosholm, 2004). When unobserved heterogeneity 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.[4] Following Vermunt (2002), the main difference between these models is the assumption made about the distribution of the latent variable capturing the unobserved heterogeneity. For this study a non-parametric approach to deal with unobserved heterogeneity based on latent class models is used, which is virtually identical to the approach of Heckman and Singer (1984). 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, or l classes (Vermunt, 2002). Consequently, each group of individuals or each class, has its own intercept β_{0l} for the estimated hazard into the various destination states. While the number of classes is rather arbitrary, Guo and Rodriguez (1994) showed that about two or three different classes generally suffice.

The destination-specific hazard then becomes

$$h_{ij}(x_{it}, t) = \frac{\exp(\beta_{0jl} + \beta_j X_{it} + \theta_{jk})}{1 + \sum_{j=1}^{3} \exp(\beta_{0jl} + \beta_j X_{it} + \theta_{jk})} \quad (10)$$

and the corresponding likelihood contribution of an individual i is then equal to

4 For a good overview of a parametric correction for unobserved heterogeneity in discrete time duration models see Jenkins (2005, p.82-84).

$$L'_i = \sum_{l=1}^{L} L_{i|l}\pi_l \qquad (11)$$

where π_l are the location or support points.[5]

4.2 DATA AND SAMPLING

The data used for the analysis are taken from three comparable country-specific panel surveys. For Germany we use 16 waves (1990-2005) of the German Socio-Economic Panel Survey (GSOEP), for the United Kingdom we use 14 waves (1991-2004) of the British Household Panel Study (BHPS) and for the Netherlands we use 12 waves (1990-2001) of the Socio-Economic Panel survey (SEP).[6] All these panel surveys are designed to describe the socio-economic position of individuals over time. Extensive information is obtained on individual, household, human capital, labour and income characteristics. The sample used here is restricted to people aged between 50 and 65 who are employed for at least 15 hours a week.[7]

The dependent variable is the duration in employment after the age of 50. A first methodological issue to deal with is 'left truncation', or delayed entry.[8] Some individuals enter the panel survey at ages over 50, and without further information, either assumptions are necessary about the working history of the individual or the truncated employment spells have to be excluded from the sample. Fortunately, in all three panels, retrospective information on the individual's employment history is available, enabling the reconstruction of the time span between the age of 50 and the age of panel entry. Still, some observations are excluded from the analysis, for two reasons: (1) for some individuals, retrospective information on their labour market history is missing; and (2) some of the 'delayed entrants' experienced non-employment spells in between the age of 50 and the age of panel entry. This is usually referred to as left-censoring: the event of interest took place before the observation period started. The individual has already experienced an exit out of employment after the age of 50 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

5 For this study this model is estimated using Latent Gold, developed by Vermunt and Magdison (2000).
6 The SEP data are used under license of TISSER, Tilburg University. For the other data personal licenses exist. The data provider bears no responsibility for the analyses or interpretations presented in this study.
7 For British women the upper limit is set at 60 as explained before.
8 D'Addio and Rosholm (2002) shows that definitions of censoring and truncation differ across the literature. Here the definition chosen by \citet{Yamaguchi91} is used in which truncation refers to a spell which is already in progress when the observation period begins. Censoring in this respect refers to a spell of interest that ends outside the observation window, i.e. that is not observed.

history files, no information on the explanatory variables is available.[9] The number of excluded observations is smallest in the German and Dutch sample (about 5 percent), but a little higher in the British sample (15 percent). In the end, the sample population for Great Britain consists of 3,629 observations, for Germany of 6,453 observations and for the Netherlands of 1,580 observations.

Another methodological issue that requires attention is the issue of panel attrition. Panel attrition refers to people who drop out of the sample. This is only a problem when such attrition is non-random. For example, when people who retire are more likely to drop out of the sample than people who remain employed. Yet, no evidence is found for such non-random attrition when reviewing the literature. To test whether panel attrition is random or not, one could jointly estimate the probability of attrition and the probability of exit out of employment, to account for the possible correlation of the unobserved characteristics. However, at this point, we choose not to model the possible selective attrition of the individual from the panel. By including as many individual characteristics as possible, we hope to minimise the problem.

The destination states are constructed from the samples using information on the employment status and the main source of income. The information on received benefits has been used instead of the individual's self-reported activity status, because one of the main goals of this study is to examine the impact of institutional differences in entitlement to social security benefits on exit behaviour. Ideally, with respect to transitions into social security, a distinction between the states of unemployment and disability would be 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 destination states for workers aged between 50 and 65 who are working at least 15 hours a week are: Employment: no exit observed (by including employment as one of the competing risks, account is taken for right-censoring); retirement: not being employed and main source of income is public, occupational or a private pension; social security: not being employed and main source of Income is either unemployment, disability or social assistance benefits; and inactivity: not being employed and not receiving any of the above mentioned benefits.

To examine the effects of institutional characteristics, ideally replacement rates belonging to the various exit pathways should be included in the model. This would have been an arduous task. Replacement rates for every age after 50 up to 65 have to be calculated, taking into account that replacement rates vary over time due to changes in benefit levels and benefit conditions and that

9 In the literature no single, generally accepted, way of dealing with left-censoring was found. It is not certain that the possible bias of not accounting for left-censoring is worse than a possible bias as a result of the controlling mechanism used to account

they vary by industrial sector of pension fund as far as it concerns the occupational pension schemes. We could estimate the replacement rates first by estimating the likelihood of a transition at a certain age to a particular exit route and then define the corresponding benefit level. This would then be input for the models to be re-estimated. Given the small numbers on which the estimates would have been based the outcomes would be very inaccurate. A related problem is that the covariates that affect the estimation of these replacement rates are largely similar to the ones that affect the exit decision, resulting in a problem of collinearity. Therefore, the covariates that enter the model are likely to affect the level of replacement rates and assumed to cover the effect of institutional characteristics. After having presented the estimation results, actual replacement rates are shown to support this indirect institutional inference.

Variables included in the models are derived from the theoretical model explained before. Apart from age, demographic indicators (e.g. sex, health status), household indicators (e.g. 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. The appendix shows the definition of these variables and the sample statistics. The models are estimated for all countries separately, yet to test for country differences an additional model is estimated in which interaction effects between the covariates of interest and the countries under consideration. In general, when estimating the competing risks models, correcting for unobserved heterogeneity improves the model only a little, suggesting the existence of an unobserved factor Z, which refers to attitude, motivation or ability, and which affects the older workers' probability of staying in employment. In addition, although the unobserved factor does not vary with the covariates, some of the observed factors included in the model somewhat change size and significance when correcting for unobserved heterogeneity. This points to some correlation between these observed factors X and the unobserved factor Z. This correlation exists with respect to having a medium or higher education level, being in good health, being self-employed and working in non-commercial services. It is argued that the model with correction for unobserved heterogeneity yields the 'cleaned' coefficients on the observed factors.[10] For this reason and because of the slightly better model fit of the model, the results of the model with correction for unobserved heterogeneity are presented and discussed here.

for left-censoring.

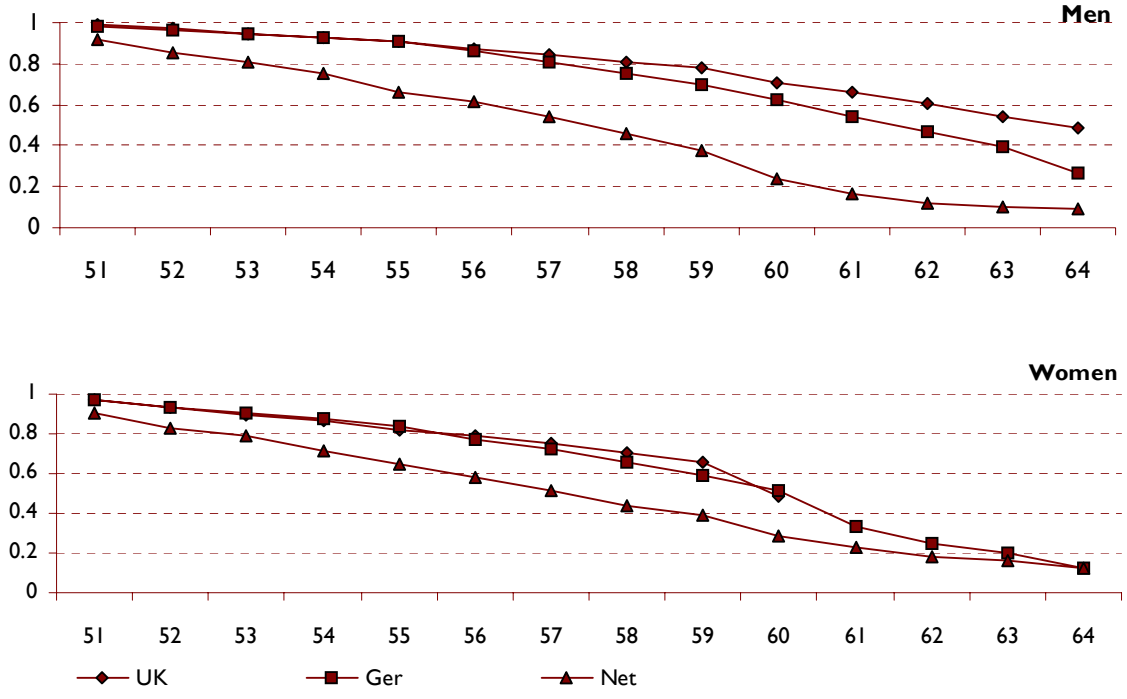
[10] This is only true if the correction for unobserved heterogeneity is correct. When this is not the case, the 'new' covariates are biased rather than `clean'.

5 EARLY RETIREMENT PATTERNS IN GERMANY, THE NETHERLANDS AND THE UNITED KINGDOM COMPARED

5.1 RETIREMENT AGE

The estimated Kaplan Meier survival functions, plotted in Figure 2, give a first impression on the cross-country differences in exits from employment. The survival rate is the number of older workers that remain employed at each age interval. For men, the data confirm the expected country differences. For example, at the age of 60, about 30 percent of the older males in the United Kingdom have left the labour force compared to about 40 percent in Germany and about 75 percent in the Netherlands. In both the United Kingdom and the Netherlands at the age of 60 a kink shows in the survival function, marking common early retirement ages in occupational pension schemes as mentioned earlier. For women, the lowest employment rates are also found in the Netherlands. Now a strong kink is found in Germany at the age of 60, which is most likely explained by the fact that in Germany occupational pension schemes allow women to retire with fewer contribution years than men, making it easier for women to move into retirement. Although this rule was changed with the 1992-pension reforms, the effect is still expected to be present during the 1990s, mainly because the new rule is applied after a transitional period.

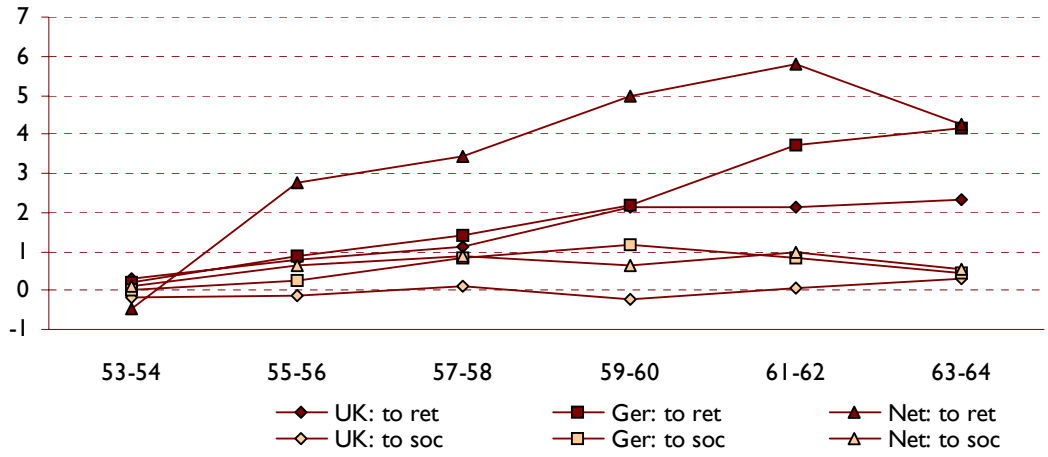
Figure 2: Estimated Kaplan Meier survival functions for exit out of employment 1990-2004, by sex and country



Source: GSOEP (1990-2005), BHPS (1992-2004), SEP (1990-2001)

Figure 3 shows the country-specific baseline hazards into the various exit states, also shown in Table 1. Hazards into the retirement state are increasing for all countries. The age-specific increase in the exit to retirement starts earliest and is most prevalent in the Netherlands. In the United Kingdom the increase in the early retirement probability is most modest. As from the age of 60 a steep increase is found in Germany while the retirement hazard in Great Britain remains about the same. For the Netherlands a drop in the retirement hazard at ages 62-63 is observed. This is related to the financial incentives in the Dutch second pillar pension system. The implicit tax on continued work in the Netherlands is highest until the age of 62 as is nicely shown by Nelissen (2001). 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. In the Netherlands, there is a more gradual increase as from the age of 55. Retirement offers are seemingly not so much centered around specific ages and there seems to more 'free choice' in choosing the age to retire. Furthermore, it might be argued that once an offer is obtained, people are likely to accept it, because waiting for a better offer at a later stage might be a risky strategy. Future offers might be less attractive, and risk-averse agents are likely to accept the offer at the earliest age.

Figure 3: Estimated baseline hazards into various retirement states 1990-2004, by country



Source: GSOEP (1990-2005), BHPS (1992-2004), SEP (1990-2001)

As for the age dependence of the hazard into social security, no clear pattern is found. The estimated baseline hazards are highest in both Germany and the Netherlands, where social security benefits were found to be 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. For

Great Britain, this substitution effect does not seem to exist. The estimated baseline hazard into social security even increases after the age of 60 which is likely related to the existence of disability pensions.

5.2 DEMOGRAPHIC INDICATORS

With respect to gender differences, as shown in Table 1, women in the United Kingdom have a higher probability to move into retirement, while the reverse is found for Dutch women. These results are in line with earlier findings of Lindeboom (1998) and Heyma (2001) for the Netherlands. In the United Kingdom women still face less tight conditions for entry into early retirement schemes, which are absent in the Netherlands. In this latter country, men and women are treated equally in retirement schemes and women are less likely to meet the conditions with respect to the minimum number of working or contribution years due to disrupted working careers. Their contribution record is hence too short or they have paid too few contributions due to part-time work to afford early retirement. The same reasoning can be used to explain the lower transition probabilities into social security for Germany and the Netherlands. In all countries, women are most likely to move into inactivity without benefits, mainly as a result of the mentioned ineligibility for retirement and social security benefits.

The contended positive effect of a bad state of health on the exit probability is observed for both the transition into retirement and into social security, with the latter effect being the strongest, indicating that health impairments are more prominent for exit into disability. Kerkhofs et al. (1999) found that people who move into disability have a tendency to overstate their health problems in order to become entitled to disability benefits. The effect on the retirement hazard is strongest in Germany and the United Kingdom, which is explained by the fact that special disability schemes exists for people in bad health in these countries within the early retirement schemes. In the Netherlands, retirement through early retirement schemes is not related to bad health, whereas retirement through social security is.

In both Germany and the United Kingdom, workers with a working partner are less likely to exit to retirement. This is in line with the theoretical expectation that having a working spouse increases the labour supply of the individual because of the complementarity of the spouses' leisure time (i.e. a decreased utility derived from leisure time for the individual when the spouse continues to work). Previous studies show some evidence for the hypothesis that the retirement decision is made jointly with the partner (Clark et al., 1980; An et al., 1999; Blau and Riphahn, 1999), which supports the positive effect on the individual's labour supply. Because of the alleged joint decision to retirement

of both partners, the estimation of a joint utility model seems more appropriate, but this goes beyond the scope of this study. From theory another yet contrasting expectation is derived for having a working spouse in that it might pull the worker out of the labour market because of the positive spill-over effects of these other income sources. Although Miniaci and Stancanelli (1998) found support for this for the United Kingdom, our results only show this for the Netherlands. The more income is earned by other people in the household (either his spouse or other people in the households), the higher the likelihood of the retirement of the older worker in the household. In the United Kingdom, we find a negative income effect for the transition into social security, which is likely to be due to the existence of means-tested benefits. This effect is absent in the other two countries, where social security benefits are generally not means-tested. In fact, in the United Kingdom workers with employed spouses show lower probabilities to move into any of the retirement states, suggesting support for the preference complementarity hypothesis in this country.

In addition, it turns out that having dependents (either children or other family members that need care) reduces the exit into retirement in Germany and the United Kingdom most likely because of 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 models that were estimated to test for gender differences. In the United Kingdom, due to the existence of child care benefits, having dependents does increase the probability to move into social security, but the probability to move into inactivity is lowered because of the financial means needed. Finally, we find that Germans from the Eastern region are more likely to exit work through social security or inactivity rather than through early retirement. This might be due to the increased instability of employment in this part of Germany. The inhabitants of the former East Germany faced strong barriers after the transition in 1989 to catch up with the West Germans, a factor that particularly pertains to older workers.

5.3 HUMAN CAPITAL INDICATORS

For the effect of human capital on the individual's exit probability, an ambiguous outcome is derived from human capital theory (Becker, 1964). 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. These higher investments increase the individual's payback time period (or his utility from employment), increasing his reservation utility for transiting into early retirement and thereby lowering his early retirement probability. On the other hand, it is argued that the main return on investment in human capital for the individual are higher earnings. Higher earnings are expected to have an ambiguous effect on the retirement probability. First, higher earnings increase the opportunity costs of leisure

making retirement more expensive compared to employment, i.e. a positive substitution effect on continued employment. Second, the higher wages increase post-retirement income as well since this is dependent on pre-retirement income, i.e. a negative income-effect on continued employment. From theory it is not clear which effect is dominant and whether higher human capital induces earlier retirement or not. Note that this ambiguous effect of higher human capital (and wages) only applies to the transition into retirement. For the transition into social security, higher human capital (represented by higher wages) are expected to have a negative effect due to reduced entitlement. This is especially true for means-tested social security benefits (i.e. not available for people with earnings above a certain threshold) or benefits up to a certain amount (i.e. maximum benefits).

The results only show an effect of education level on early retirement in the United Kingdom, where the probability to retire early increases with education level. Although not supported by our data, other studies showed a similar effect for Germany (Antolin and Scarpetta, 1998; Oswald, 1999). Analogous to the education effect, the income effect of higher wages seems dominant in the United Kingdom. For Germany and the Netherlands, the substitution effect seems dominant, with higher wages reducing the exit probability to retirement. Seniority wage agreements where wages increase strongly with age at older ages, increase the opportunity costs of retirement. This effect is significantly strongest in Germany. Our models further confirm the negative effect of higher human capital for Germany and the United Kingdom. Older workers with the lowest education level have the highest probability of moving into social security. In all countries, higher wages reduce the probability of exit into social security. This effect is significantly weakest in the Netherlands, where social security is least means-tested or otherwise related to low income.

In general, a worker's proficiency in working skills, and hence his human capital increases by working and performing tasks over and over again. From theory, some additional effects of tenure on individual retirement patterns can be derived. A long tenure signals a good employer-employee match since a mismatch would manifest itself early in the employer-employee relation (Jovanovic, 1979). From this perspective, the probability to become unemployed is expected to be lower for people with longer tenure. Yet, 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 after long service. This effect seems to be present in Germany and the United Kingdom where retirement probabilities are higher for workers with longer tenure and the probabilities to inactivity without benefits are lower.

Table 1: Estimation results of competing-risks models for early retirement

	Germany		The Netherlands		The United Kingdom	
	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)
TO RETIREMENT						
Aged 53 – 54	0.22	(0.327)	-0.47	(1.224)	0.30	(0.213)
Aged 55 – 56	0.89***	(0.296)	2.74*** [1]	(0.760)	0.78***	(0.202)
Aged 57 – 58	1.40*** [1]	(0.285)	3.41*** [1]	(0.754)	1.11***	(0.200)
Aged 59 – 60	2.20*** [1]	(0.272)	5.00*** [1,2]	(0.742)	2.11***	(0.185)
Aged 61 – 62	3.71*** [1]	(0.262)	5.78*** [1]	(0.770)	2.14***	(0.201)
Aged 63 – 64	4.14*** [1]	(0.275)	4.24*** [1]	(0.967)	2.31***	(0.221)
Female	0.15	(0.134)	-0.90**	(0.357)	0.28**	(0.123)
Bad health	0.76***	(0.108)	0.05	(0.236)	0.51***	(0.101)
Single	0.25	(0.194)	0.28	(0.585)	-0.17	(0.139)
Partner employed	-0.38***	(0.104)	-0.31	(0.216)	-0.54***	(0.109)
Dependents	-0.30***	(0.108)	-0.15	(0.236)	-0.19*	(0.101)
Household income	0.01	(0.003)	0.01**	(0.005)	0.01	(0.005)
Medium education	-0.08	(0.130)	0.30	(0.257)	0.21*	(0.123)
High education	-0.23	(0.175)	-0.10	(0.358)	0.38***	(0.117)
Tenure < age 50	0.01*	(0.006)	0.01	(0.011)	0.01**	(0.004)
Hourly wage	-0.03***	(0.008)	-0.02** [2]	(0.008)	0.01***	(0.008)
Comm. Services	0.11	(0.143)	-0.07	(0.271)	0.01	(0.130)
Non-comm. Services	-0.04	(0.152)	-0.14	(0.294)	-0.03	(0.181)
Self-employed	-0.56***	(0.201)	-2.72*** [1,2]	(0.567)	-0.10***	(0.188)
Public sector	0.26* [1]	(0.143)	0.07	(0.280)	0.37**	(0.153)
Hours worked	-0.03***	(0.005)	-0.02	(0.012)	-0.02***	(0.004)
Wants less hours	0.36***	(0.108)	-0.49*	(0.295)	0.41***	(0.097)
East Germany	-0.37***	(0.149)				
Unemployment rate	-0.09	(0.060)	0.18	(0.107)	0.23***	(0.024)
Class – 1	-3.79***	(0.629)	-5.96***	(1.180)	-6.07***	(0.516)
Class - 2	-9.46	(8.777)	-5.64***	(1.165)	-5.98***	(0.497)
TO SOCIAL SECURITY						
Aged 53 – 54	-0.01	(0.184)	0.10	(0.396)	-0.17	(0.227)
Aged 55 – 56	0.24	(0.182)	0.63	(0.415)	-0.11	(0.243)
Aged 57 – 58	0.82*** [1]	(0.173)	0.88** [1]	(0.442)	0.11	(0.254)
Aged 59 – 60	1.19***	(0.175)	0.65	(0.533)	-0.21	(0.322)
Aged 61 – 62	0.82*** [1]	(0.229)	0.96	(0.677)	0.07	(0.351)
Aged 63 – 64	0.43	(0.370)	0.55	(1.127)	0.28	(0.388)
Female	-0.46***	(0.140)	-1.05**	(0.442)	-0.15	(0.208)
Bad health	0.40*** [1]	(0.112)	0.81***	(0.288)	1.17**	(0.153)
Single	0.13	(0.207)	0.95	(0.667)	-0.17	(0.227)
Partner employed	-0.09	(0.111)	-0.03	(0.291)	-0.59***	(0.184)
Dependents	-0.12	(0.110)	-0.34	(0.320)	0.38**	(0.158)
Household income	0.01	(0.003)	0.01	(0.007)	-0.02*	(0.013)
Medium education	-0.26*	(0.135)	-0.43	(0.328)	-0.48**	(0.191)
High education	-0.37*	(0.202)	-0.03	(0.490)	-0.42*	(0.211)
Tenure < age 50	-0.01	(0.005)	-0.02	(0.016)	-0.01	(0.006)
Hourly wage	-0.07***	(0.012)	-0.07*** [1,2]	(0.015)	-0.08**	(0.031)
Comm. Services	-0.17	(0.146)	0.85**	(0.367)	-0.23	(0.175)
Non-comm. Services	-0.24	(0.156)	0.04	(0.439)	-0.65**	(0.299)
Self-employed	-1.95***	(0.393)	-2.13***	(0.725)	-0.25	(0.218)
Public sector	-0.74*** [1]	(0.171)	-0.40	(0.448)	-0.80***	(0.302)
Hours worked	-0.02***	(0.006)	-0.04**	(0.016)	-0.02***	(0.007)
Wants less hours	-0.02	(0.115)	0.16	(0.369)	-0.06	(0.160)
East Germany	0.21*** [1]	(0.064)				
Unemployment rate	0.69***	(0.132)	0.23	(0.142)	0.10**	(0.040)
Class – 1	-3.42***	(0.632)	-1.56	(1.252)	-2.14***	(0.702)
Class - 2	-7.81	(9.892)	-6.60	(10.362)	-3.35	(2.364)

Table continued on next page

Table 1, continued

TO INACTIVITY						
Aged 53 – 54	0.36	(0.245)	-0.35	(0.316)	0.40**	(0.197)
Aged 55 – 56	1.01***	(0.264)	0.16	(0.322)	0.21	(0.222)
Aged 57 – 58	1.33*** [1]	(0.292)	0.54	(0.335)	0.30	(0.240)
Aged 59 – 60	1.70*** [1]	(0.325)	0.51	(0.416)	0.62**	(0.259)
Aged 61 – 62	1.69*** [1]	(0.367)	1.02**	(0.467)	0.15	(0.346)
Aged 63 – 64	2.35*** [1]	(0.443)	0.42	(1.782)	0.43	(0.393)
Female	0.60	(0.259)	1.17***	(0.287)	0.84***	(0.185)
Bad health	-0.11	(0.153)	-0.28	(0.264)	0.17	(0.157)
Single	-0.45	(0.336)	-0.40	(0.627)	-0.72***	(0.248)
Partner employed	-0.21	(0.165)	-0.35	(0.234)	-0.30*	(0.170)
Dependents	0.18	(0.174)	0.26	(0.231)	-0.30**	(0.143)
Household income	0.00	(0.002)	0.01**	(0.003)	-0.01	(0.008)
Medium education	0.13	(0.226)	-0.12	(0.263)	-0.21	(0.178)
High education	0.24	(0.291)	0.40	(0.308)	0.22	(0.172)
Tenure < age 50	-0.03***	(0.010)	0.01**	(0.012)	-0.02**	(0.006)
Hourly wage	-0.06***	(0.012)	0.00	(0.001)	0.01	(0.013)
Comm. Services	-0.05	(0.233)	-0.35	(0.279)	-0.01	(0.175)
Non-comm. Services	-0.02	(0.228)	-0.92	(0.326)	-0.48*	(0.254)
Self-employed	0.78***	(0.260)	1.01	(0.295)	0.59***	(0.182)
Public sector	-0.89***	(0.236)	0.27	(0.326)	-0.32	(0.235)
Hours worked	-0.06***	(0.008)	-0.02	(0.010)	-0.03***	(0.006)
Wants less hours	0.09	(0.175)	0.14	(0.262)	-0.24	(0.150)
East Germany	0.17*	(0.088)				
Unemployment rate	-0.69**	(0.265)	-0.03	(0.096)	0.09**	(0.007)
Class – 1	-4.13***	(0.925)	-3.41**	(1.399)	-2.93***	(0.724)
Class - 2	-0.26	(0.839)	-3.15**	(1.435)	-6.47	(11.07)

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

* indicates significance on a 10% level, ** on a 5% level and *** on a 1% level. [1] denotes that the country effect is significantly different (on a 5% level) from that in the United Kingdom, [2] denotes that the country effect is significantly different (on a 5% level) from that in Germany.

5.4 JOB-RELATED INDICATORS

Several aspects of the older workers' employment situation are expected to affect his probability to leave employment. First, consider sector of industry. In some sectors it is much more common to retire early than in other sectors. For example, the mandatory retirement age in the Dutch banking sector used to be 62, three years before the official retirement age. The employee is forced to either retire or to seek employment in another job outside the banking sector. The probability that this latter event takes place is very low, implying that the majority of bank employees aged 62 years retire early. In addition, in sectors where a worker's productivity declines fastest with age, such as industry, older workers might be more at risk of involuntary early exit. The results show no sign of these presumed effects though. Furthermore, public sector employees by contrast, are known to have the most generous early retirement benefits and therefore the highest expected utility from retirement and the highest transition probability into retirement. This effect is supported by our results, at least for Germany and the United Kingdom. Public sector employees have lower probabilities of moving into inactivity with or without social security benefits, and a higher probability to use early retirement schemes. This effect is not found 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.

Being self-employed reduces both the chances of exit to retirement and to social security in all countries. They are generally not eligible for social security schemes or early retirement schemes, and therefore have to rely fully on their privately organised, more costly, arrangements although participation in public schemes is in many cases possible, on a voluntary basis. This latter is reflected by their higher likelihood to move into inactivity without social security benefits, which is observed in Germany and the United Kingdom.

As a proxy for the impact of people's preference for working, both the actual and preferred weekly number of working hours are included in the model. 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.

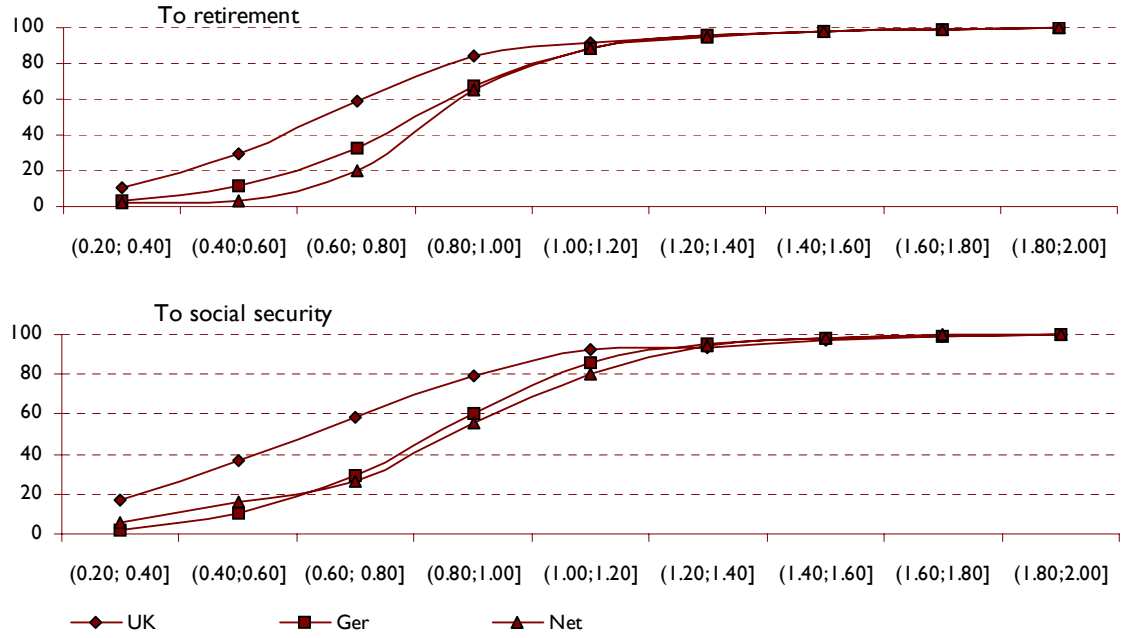
Finally, the national unemployment rate is included to cover business cycle effects and it shows that exits are more common in times of higher unemployment. The effect is not significant for the Netherlands.

6 INCOME EFFECTS OF EARLY RETIREMENT

In general early retirement is usually possible at the 'price' of a lower income in the years after retirement, compared to the income during the working years. Older workers are willing to pay this price because their preference for leisure has increased. From theory differences in such income drops between countries, between schemes and between different groups of workers. In fact, many of the observed differences in early retirement behaviour discussed in the previous section are expected to be related to differences in the generosity of early retirement schemes. In this section, some evidence is presented on such differences, although it should be noted that this is still explorative. 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. Differences in gross income are expected to be large. Tax exemptions might differ between the countries, leading to differences in income after retirement. Finally, to control for differences in household size between individuals, equivalent household income, using the OECD modified equivalence scale.

One 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 4 shows the replacement rates for workers who retired from t to $t+1$. Replacement rates are lowest in Great Britain, 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 our 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% 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. Earlier it was mentioned that social security schemes in these latter countries are much more generous compared to those in the United Kingdom. With respect to the inactivity exit, we find that in Great Britain the average replacement rate is about the same as that of the retirement exit (i.e. average replacement rate is 0,75). In Germany and the Netherlands, however, we find that the average replacement rate of the inactivity exit is actually higher than that of the retirement route. The ratio of the average replacement rate of inactivity over that of retirement is 1.06 in Germany and 1.10 in the Netherlands.

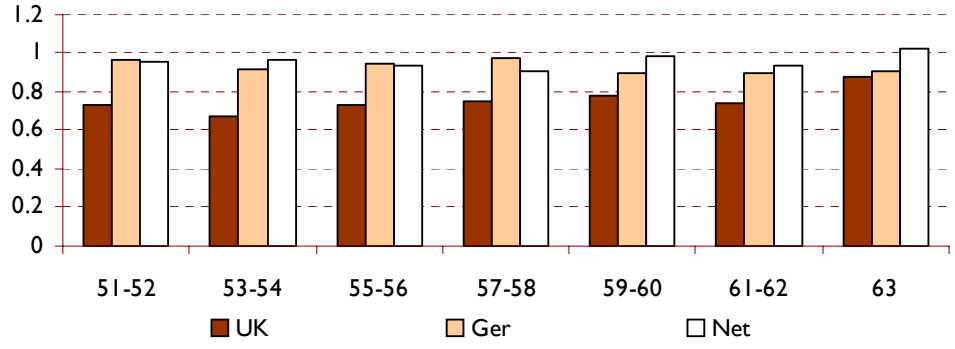
Figure 4: Replacement ratios of retired individuals by country (cumulative frequencies)



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

Previous studies showed that the level of replacement income during retirement is different at different retirement ages (e.g. Hansen, 2000; Nelissen, 2001). Because of this, the pension system provides incentives to retire at certain ages and disincentives to retire at other ages as shown previously. Figure 5 shows the average observed replacement rates at different retirement ages for the early retirement route.[11] Although the differences are not statistically significant, the results are illustrative. While for Germany and the Netherlands, replacement rates are most stable with age, for the United Kingdom two small spikes are observed around the ages of 60 and 63, analogous to our earlier findings in the retirement hazard. For Germany, replacement rates seem somewhat higher before the age of 60, but differences are really small.

Figure 5: Average replacement rates at different retirement ages, by country



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

[11] The analysis is limited to exits at the age of 63 because at the age of 65 public pensions become available to pensioners in all countries, that affects the income consequences. This, however, goes beyond the scope of this research.

To see whether replacement rates vary with other characteristics of the individual, Table 2 shows the estimation results of a simple linear regression of the replacement rate of the early retirement route. In general, differences are very small, not yielding many significant results. One of the theoretical expectations is that the income consequences for workers who are forced to retire are more severe compared to workers who choose 'freely' to retire early. The latter group is expected to face a smaller drop in income because the retirement transition was planned and income consequences were taken into consideration. Some effects seem to support this notion. For example, in Germany, the negative income consequences of workers who are forced to leave the labour market at an early stage because of health problems are larger compared to workers who leave employment in good health. Similar effects are found by Danø (2005) for Denmark. Additionally, in the Netherlands, older workers who are laid off in times of high unemployment are confronted with lower replacement incomes.

In the United Kingdom it was shown that people with higher levels of human capital have a higher probability to retire earlier. The simple regression here shows that replacement incomes are indeed highest for workers with a high education level. This suggests that high-educated workers are entitled to the so-called 'good' early retirement schemes in terms of Hansen (2000), as mentioned before. At first sight, the negative effect of household income might seem opposite to this. Yet, it was explained that public pensions are maximised in the United Kingdom lowering the average replacement rate at higher income levels. In the other countries too, replacement rates are lower at higher levels of household income, yet the effects are smaller. Finally, German public sector employees receive more generous early retirement pensions compared to their private-sector colleagues. This is in line with our earlier findings that German public sector workers have a higher probability to retire early.

Table 2: Estimation results of regression model for level of replacement rates of early retirement

	Germany		**The Netherlands**		**The United Kingdom**	
	Coeff.	**(s.e.)**	**Coeff.**	**(s.e.)**	**Coeff.**	**(s.e.)**
Female	-0.029	(0.023)	-0.023	(0.045)	0.030	(0.034)
Exit age 57-60	0.034	(0.042)	-0.045	(0.110)	0.054	(0.043)
Exit age 61-64	-0.041	(0.037)	-0.004	(0.104)	0.085**	(0.041)
Bad health	-0.061***	(0.023)	-0.014	(0.031)	-0.009	(0.034)
Medium education	0.010	(0.024)	0.002	(0.039)	0.067	(0.043)
High education	0.023	(0.032)	0.076	(0.060)	0.082*	(0.044)
Tenure	-0.001	(0.001)	-0.001	(0.002)	-0.002	(0.002)
Household income	-0.003***	(0.001)	-0.004*	(0.002)	-0.011***	(0.002)
Public sector	0.038	(0.022)	0.014	(0.032)	0.026	(0.034)
Unemployment rate	-0.006	(0.012)	-0.036**	(0.017)	0.001	(0.010)
Constant	1.118***	(0.114)	1.334***	(0.164)	0.818***	(0.111)
Number of obs	796		203		324	

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

7 CONCLUDING REMARKS

In this paper, early retirement behaviour of older workers retirement behaviour is studied in a comparative perspective, using longer running panels. By using countries that differ with respect to their early retirement systems, it can be investigated whether early retirement patterns are different accordingly. The findings suggest that the differences in pension and early retirement systems are indeed 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, 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 these pathways seem to function as substitutes for early retirement schemes for those workers who are not eligible for the latter schemes.

The observed differences in retirement hazards between the countries and between the exit routes are related to the generosity of the schemes. In all countries the observed replacement rates after exit from the labour force rates 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.

As for the effect of other covariates, the outcomes show that the countries are not as dissimilar as expected. Germany and the United Kingdom show much similarity in that a bad state of health, working in the public sector and having a preference for working less hours, increase the exit probability into retirement. Having a working spouse, having dependents, working more hours, on the contrary decrease this probability. However, they differ with respect to the effect of the wage level. In Germany a higher wage decreases the retirement hazard, as it does in the Netherlands, while in the United Kingdom the reverse is found. For the United Kingdom it is likely to be true that workers with higher levels of human capital (i.e. higher education level or higher wage) have access to so-called `good' early retirement schemes that offer generous replacement incomes. The countries share the finding that the self-employed are less likely to exit into retirement, with the

effect being significantly strongest in the Netherlands. In this latter country, the least variance with covariates on the early retirement probability is found, which is explained by the fact that early retirement schemes are most universal.

With respect to the hazard to social security the three countries share the fact that a bad state of health increases the likelihood of exit into social security, with the weakest effect found in Germany. This is explained by the availability of generous disability pensions being part of the retirement schemes in this country, acting as a substitute for exit into social security. Moreover, having a higher wage or working more hours too decrease the probability to use social security schemes, mainly because of the means-test or maximum benefits associated with this route. In Germany and the United Kingdom, a negative effect on the social security hazard is found for having a higher education level and for working in the public sector. This suggests a segregation on the labour market with high level and public workers being the best protected against transiting into social security. Such workers are most likely to be eligible for the more generous early retirement schemes. The Netherlands and Germany share the finding that both women and the self-employed have a lower probability to move into social security. These groups are least likely to meet the entitlement conditions of the schemes.

These observed differences suggest that institutions and social security policies indeed play a role in explaining older worker's retirement behaviour across countries. The study adds to the literature in the use of long-running panel data, allowing the application of advanced duration models and to correct for unobserved heterogeneity. In addition, its comparative perspective permitted a focus on the role of the institutional context for explaining country differences. In the near future, the approach needs to be extended and refined by including more detailed institutional characteristics of the social systems, such as the replacement rates of the various exit routes at different ages. Changes in policies, benefit levels and hence replacement rates over time, as well as changes in human capital investments have to be taken into account to improve the explanatory power of our models and the robustness of our parameter estimates.

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APPENDIX: DATA CONSTRUCTION AND SAMPLE STATISTICS

Table A1 presents some descriptives of our indicator variables. The covariates are divided into four groups: demographic indicators, human capital indicators, job-related indicators and macro economic indicators.

Table A1: Summary of sample statistics, by country

	Germany (GSOEP)	Netherlands (SEP)	United Kingdom (BHPS)
DEMOGRAPHIC INDICATORS			
Mean age	55.9	53.8	54.5
Female (ref: male)	39.74	30.00	44.21
Poor/fair health (ref: good)[a]	47.50	19.75	24.51
Single (ref: married/cohabitating)	19.00	16.84	15.67
Partner employed (ref: partner not employed)	61.75	46.77	73.65
Dependents in household	46.28	36.52	54.65
Mean total household income[b]	22,402	17,033	18,355
East-German (ref: West-German)	27.0		
HUMAN CAPITAL INDICATORS			
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[c]	12.6	15.63	11.04
JOB CHARACTERISTICS			
Self-employed	10.91	12.53	17.46
Public sector (ref: private sector)	30.06	26.01	32.67
Commercial services (ref: industry/primary)	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	6,453	1,580	3,629

[a]For the Netherlands only asked since 1994. [b]Standardised using the modified OECD Equivalence scale, expressed in Euros. For Germany and the United Kingdom gross incomes are reported, for the Netherlands net income. [c]expressed in Euros.

Men are over-represented in most of the country samples, with this being smallest in the United Kingdom. Female labour participation is lowest in the Netherlands, although a recent study of Vlasblom and Schippers (2004) shows that it has been rising fast in recent years. Separate estimation of the models for men and women are preferred, yet the resulting low number of transitions into the various exit states are expected to yield biased estimation results. There seems to be a trade off between the estimation of single-risk gender-specific models , or the estimation of competing-risks models without distinguishing including a gender dummy. For this study we have decided to choose the latter and where necessary interaction with gender is tested for. With respect to health, self-reported health is taken, rather than other measures of health. The main reason for this is the inconsistency between the separate panels of the more objective health measures. Some questions are present in one panel set but absent in another, making it difficult to derive a comparable measure of health. The majority of older workers in the Netherlands and the United Kingdom is in good health, though in Germany the majority reports being in bad or poor health. This is observed

in other studies too (e.g. Oswald, 1999), it seems that German workers are likely to overstate any health problems.

The individual's education level is measured using a rather crude index only distinguishing between three levels of education: low, medium and high. For Germany, low refers to education levels of less than high school; medium to completed high school; and high to levels higher than high school. For Great Britain low includes people having a qualification lower than the 'O' level; medium refers to people having a 'O' or 'A' level qualification; and high 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 a maximum of four years); medium refers to second-level secondary education; and high refers to higher and academic education. In Germany and the Netherlands, the majority of older workers have a medium education level, while in Great Britain the majority seem to have a low education level. Tenure is measured as the duration of the employment spell before the age of 50, because the duration of employment from this age is the dependent variable in the models. Gross individual hourly wages are used, and of the three countries these appear to be highest in the Netherlands. Perhaps the seniority wage system is most rewarding to older workers in the Netherlands.

Household characteristics include a dummy for being single, the spouse's employment status, a dummy for having dependents (either children or other people) in the household and household income. Only about 15 percent of the older workers are single, and with respect to the spouse's employment status, the Netherlands resembles a rather `traditional' role pattern with husbands working full-time and spouses not working at all at later ages. In Great Britain, the highest percentage of two-earner families is found, which is rather 'typical' in liberal regimes, because of the strong dependence on the labour market. With respect to household income, ideally the individual's own labour income is to be excluded: however, this appeared impossible in the Dutch case. Therefore, for the Netherlands net equivalent annual total household income is included (as well as gross individual hourly wage) For standardisation, the modified OECD equivalence scale is used. To minimise the collinearity problems, household income is only included for people living in households consisting of at least two persons. In addition, to get a clearer picture of the effects of income, an interaction effect between household income and hourly wage is included. For Great Britain and Germany, gross equivalent annual `other' household income is included, i.e. net of individual gross labour earnings. Finally, for the German sample, a dummy is included to control for the effect of dissimilar arrangements in former East-Germany. The two parts of Germany still differ with respect to their retirement schemes.

Job characteristics include actual weekly working hours, the preferred weekly working hours and dummies for being self-employed, being a public sector employee and being a service sector worker (both commercial and non-commercial). The highest percentage of self-employment is found in Great Britain which might be explained by the liberal, market-oriented welfare state in which the incentives to work either in paid work or in self-employment are strong. In both the Netherlands and Great Britain, the majority of older workers is found in the service sector. The correlation between working in the public sector and working in the service sector appeared to be sufficiently low (Netherlands 0.30, Germany 0.56 and Great Britain 0.46) to include both of these variables in the model. In all countries, older workers primarily work full-time. To control for business cycle effects, the national unemployment rate is included.

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AIAS is a young interdisciplinary institute, established in 1998, aiming to become the leading expert centre in the Netherlands for research on industrial relations, organisation of work, wage formation and labour market inequalities.

As a network organisation, AIAS brings together high-level expertise at the University of Amsterdam from five disciplines:

- Law
- Economics
- Sociology
- Psychology
- Health and safety studies

AIAS provides both teaching and research. On the teaching side it offers a Masters in Advanced Labour Studies/Human Resources and special courses in co-operation with other organizations such as the National Trade Union Museum and the Netherlands Institute of International Relations 'Clingendael'. The teaching is in Dutch but AIAS is currently developing a MPhil in Organisation and Management Studies and a European Scientific Master programme in Labour Studies in co-operation with sister institutes from other countries.

AIAS has an extensive research program (2000-2004) building on the research performed by its member scholars. Current research themes effectively include:

- The impact of the Euro on wage formation, social policy and industrial relations
- Transitional labour markets and the flexibility and security trade-off in social and labour market regulation
- The prospects and policies of 'overcoming marginalisation' in employment
- The cycles of policy learning and mimicking in labour market reforms in Europe
- Female agency and collective bargaining outcomes
- The projects of the **LoWER** network.

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