Labour force behaviour of elderly two adult households: Evidence from Belgium, Finland and Germany

First draft (please do not quote)

Matthias Deschryvere

22 June 2004

Abstract

This paper studies the effect of individual and spousal characteristics on the labour force participation of elderly two-adult households. The comparative approach studies men and women separately and uses the first 8 waves (1994-2001) of the European Household Panel (ECHP). Results are compared between three countries: Finland, a country with a high female labour force participation and Belgium and Germany, countries where female labour force participation is relatively low. Results of multinomial logit model estimations suggest that country differences are substantive and that men and women behave differently across different channels out of employment. We find evidence that the wife exerts a stronger influence on the husband's retirement decision. One explanation may be found in asymmetric complementarities of leisure: the husbands' enjoyment of non-employment may depend much more on the wife also being non-employed than vice versa. There is evidence that the "assortative mating" effect dominates the "added worker" effect. The results are in line with evidence from the U.S. and have some important implications: Simulations of the effect of changes in the pension system on men's retirement may yield incorrect answers if spill-over effects are ignored.

Matthias Deschryvere, The Research Institute of the Finnish Economy (ETLA) – Lönnrotinkatu 4A, FIN-00120 Helsinki, Finland. Tel:(+)358-9-60 990 246, Fax: (+)358-9-601 753, e-mail: mde@etla.fi.
*This paper has been written during the participation in the REVISER project of ENEPRI, financed by the European Commission. The ECHP data were provided via the CEPS Institute. The usual disclaimer applies.

I. INTRODUCTION

Current and future processes are putting all European pension systems under severe pressure. Although EU pension systems vary over member states the Pay-as-You-go system dominates most countries and has to be seen as most vulnerable. The pressure originates from two main trends. A first fact concerns the population structure and the rising share of older people. This structure is being formed due to falling fertility rates and rising life expectancies. A second fact concerns the declining labour force participation rates of older European people. This second fact magnifies the rising share of older inactive people and consequently the financing problem of the pension system. The analysis in this paper approaches the pension finance problem from this second evolution and we ask what leads older people to leave employment.

The paper focuses on the labour supply behaviour of elderly households in three EU countries: Finland, Belgium and Germany. A common characteristic is their bad ranking of male participation rates for the age group 50 to 64. Finnish males (females) are on place 20 (4) out of 30, Germans are on place 21 (17) whereas Belgians on the second last place 29 (27). Table 1 presents key data per country and sex to describe the magnitude of the problem (OECD, 2003;2004).

Table1: Employment rates, unemployment rates and retirement age

	Belgium		Finland		Germany	
	Men	Women	Men	Women	Men	Women
Employment[a]	46.9	18.2	50.8	42.1	59	29
Unemployment[b]	3.4	1.9	8	7.5	.	.
Effective age[c]	58.8	57	60.1	59.9	60.8	60.5
Official age[d]	65	62[e]	65	65	65	63

[a]Employment/ population rate (in %) adjusted for weekly hours worked for the age group 50-64 in the year 2000. [b]Unemployment rate (in % of total labour force) of the age group 50-64 in 2001. [c]Effective retirement age: Average age of withdrawal from the labour force for individuals older than 40 years in 1995-2000. [d]Official retirement age. [e]65 for women working in the public sector.

The data underline that the (adjusted) employment rates for the age group 50 to 64 are very low. In relation to that stands the gap between the official and the effective retirement age. Variation in this gap has been created by institutional changes enabling employees to retire via early retirement channels. The high unemployment rate in Finland may show one of the latter effects.

Until recently retirement research used to concentrate on the labour supply behaviour of elderly men. As the labour force participation of women has increased attention shifted towards the issue of labour supply behaviour of both men and women and particular attention was paid to the behaviour of both spouses in elderly couples.

Although labour market research has shown that there are gender differences in several important areas, most of the retirement research has studied the behaviour of men. The analyses of gender differences in retirement decisions are more limited and a small but emerging third strain of retirement literature diverts its focus from males to a broader couple approach taking into account retirement decisions of women and

the interrelation and differences between both sexes. Those studies document that husbands and wives co-ordinate work and retirement decisions. A second finding reports differences in the retirement behaviour between married and unmarried individuals[1].

This paper studies labour force transitions of employed men and women of age 50 to age 69 and analyses the effect of different individual and spousal characteristics on the retirement decision. We use information on socio-demographic, health, and financial characteristics. Our study is based on the 8 first waves (1994-2001) of the European Household Panel (ECHP). Those data offer a high comparability between countries. The contribution of this paper is a comparison of male and female retirement behaviour across three different European countries: Belgium, Finland and Germany. It is crucial to compare results across EU countries as to see in which aspects countries are similar or different and what are the implications of the varying pension systems. Each country's institutional background is used to interpret results.
Our couple approach – explaining labour force transitions both by individual and spousal characteristics - is useful because it will enable us to trace the significance of different cross spousal effects. In addition we will be able to detect asymmetries across gender of the spousal effects. This analysis tests two complementary hypotheses to explain joint retirement behavior. A first hypothesis is the "added worker" hypothesis, a second is the "assortative mating" hypothesis. The "added worker" effect describes behaviour where the labour supply increases when the spouse's income is reduced or disappears. The "assortative mating" effect describes behaviour where the partners have the same preferences, in other words where the labour supply of the two spouses are positively correlated. The justification for our approach is based on the fact that not taking into account those spousal effects may bias estimates and consequently the results of the simulation of policy changes.

There are several ways in how the relation between spouses' retirement is studied. A first group assumes that preferences are given by a household utility function (family utility model) and estimates structural models of joint retirement (Hurd, 1990, Gustman and Steinmeier, 2000; 2002) or studies joint retirement by explaining joint labour market states (Jiménez-Martín et al., 1999).

A second group estimates reduced form models exploring the cross effects of one spouse's characteristics on the other spouse's retirement decision in order to learn whether men and women respond similarly to incentives for retirement and whether spillover effects are significant[2] (Coile, 2003; Dahl et al., 2002, Johnson and Favreault, 2001). This analysis uses a reduced form model. A reduced form analysis of couples' retirement behaviour is agnostic about household behaviour. The advantage is that it does not impose a reciprocal influence of labour force status of both spouses. This is relevant if asymmetries across gender exist.

[1] Dahl et al. (2002) analyses early retirement behaviour of men and women in Norway and offers a short overview of the literature on gender differences.
[2] Browning et al. (1994) specify a bargaining model of intrahousehold allocation. From the bargaining model two equations of labour force participation can be derived, one for the husband and one for the wife. The two equations can be estimated jointly optionally specifying a sharing rule.

The empirical analysis of European retirement decisions has relatively few contributions compared to the U.S. Important studies of retirement decisions of our sample countries are Dellis et al. (2001) for Belgium, Hakola (2002) for Finland and Börsch-Supan et al. (2002) for Germany.

As noted before there are different explanations why an individual retirement decision may be influenced by spillover effects of the spouse: spillover effects may be both due income effects ("added worker effect") and to complementary or substitution of leisure ("assortative matting effect"). If spillover effects are important, estimating individual retirement decisions may lead to significant errors in predicting the effect of a change in social security policy on retirement behaviour. Recent evidence shows that joint retirement is frequent among married couples. Most applied papers show clear evidence of joint retirement due to the correlation in unobservables or assortative matting. For Germany Blau and Riphahn (1999) found strong propensity among couples to spend leisure time together. Financial variables have asymmetric effects on spouses' labour force responses. There are strong impacts of health and age on transition behaviour with systematic cross spouse effects. For Finland Lilja (1996) found that the propensity for early retirement does not differ significantly between males and females and that the presence of a retired spouse encourages the other spouse to retire. For a sample of EU countries Jiménez-Martín et al. (1999) found strong evidence of complementary, but asymmetric, effects between the labour supply decisions of both spouses. Opposite to our results they find that the husband's decision affects more his wife's decision than vice versa. They don't find evidence supporting the "added worker effect".

This analysis contributes to the existing literature in at least three ways: (1) it pays special attention to female retirement and gender differences, (2) it takes into account spill-over effects between spouses as neglecting those may lead to a bias of simulation results of policy changes and (3) it pays special attention to country differences.

The structure of the paper is as follows. Section 2 describes the model. Section 3 presents the data and Section 4 summarizes the estimation results. Section 5 concludes and lists some policy implications.

II. MODEL

2.1. The Probit Model

Individuals (i=1,…,n) flow out of employment at a certain point in time (t=1,…,T) because their expected utility (U_{it}^{er}) exceeds the expected utility of working (U_{it}^{ew}).

$$y_{it}^{*} = U_{it}^{er} - U_{it}^{ew} > 0 \tag{1}$$

The (change in) utility is determined by a vector of observable variables X_{it} (where β is a vector of coefficients) and a stochastic error term u_{it} . We assume the error term to follow a standard normal distribution.

$$y_{it}^{*} = X_{it}\beta + u_{it} \tag{2}$$

Unfortunately the expected utility of an individual that either flows out of employment or keeps on working in period t is not observed. Whether an individual stops working is all that is observed. The observed counterpart to the latent metric variable y_{it}^{*} is y_{it} , which takes a value of either zero (keeps on working in t+1) or one (retires in t+1) as follows:

$$y_{it} = \begin{cases} 1 \;\; if \;\; y_{i}^{*} > 0 \\ 0 \;\; if \;\; y_{i}^{*} \leq 0 \end{cases} \tag{3}$$

Based on previous assumptions on the distribution of u_{it}, the binary choice model can be specified as a probit model and $\Phi(.,.)$ is the normal distribution function.

$$P(y_{it} = 1 | X_{it}) = F(X_{it}\beta) = \Phi(X_{it}\beta) \tag{4}$$

This is a non-linear model that expresses the probability of choosing to stop working and a maximum likelihood estimator is used.

We report the marginal effects found by differentiating equation (4). Thus, the marginal effects are to be interpreted as the change in the probability of flowing out of employment given a change in an explanatory variable X_{it}. We allow the covariates to have various impacts on the flow out of employment for the two genders by carrying out the analysis separately for males and females.

The sample only considers individuals who have selected themselves into the sample: first into employment, and thereafter into non-employment. There are certainly lots of unobservable phenomena involved in individual choices. Because of this self-selection problems reservations should be made concerning the interpretation of our results.

2.2. The Multinomial Logit Model

For each individual we define a latent variable, which denotes the change in utility from moving from the state work in year t to unemployment or inactivity in year t. Individuals (i=1,…,n) flow out of employment at a certain point in time (t=1,…,T) because their expected utility (U_{it}^{en}) exceeds the expected utility of working (U_{it}^{ew}).

$$y_{ijt}^{*} = U_{ijt}^{en} - U_{it}^{ew} > 0 \qquad \text{with j = 0,1,2 and t = 1994..Ti} \tag{5}$$

The change is utility is determined by a vector of observable variables X_{it} (where β is a vector of coefficients) and a stochastic error term u_{it} . The underlying hypothesis is that the determinants of the transitions from work into the states of unemployment or inactivity are identical. We assume the error term to follow a type-I extreme value distribution that is independently and identically across alternatives j and individuals i.

$$y_{ijt}^{*} = X_{it}\beta_{j} + u_{ijt} \tag{6}$$

Unfortunately the expected utility of an individual that either flows out of employment to unemployment, to inactivity or keeps on working in period t is not observed. Whether an individual becomes unemployed, inactive or continues working is all that is observed. The observed counterpart to the latent metric variable y_{it}^{*} is y_{it} , which takes a value of either zero (keeps on working in t+1) or one (retires in t+1) as follows:

$$y_{ijt} = \begin{cases} 1 \;\; if \;\; y_{ijt}^{*} > 0 \\ 0 \;\; if \;\; y_{ijt}^{*} \leq 0 \end{cases} \tag{7}$$

Based on previous assumptions on the distribution of u_{ijt}, the choice model can be specified as a multinomial logit model and $\Phi(.,.)$ is the type I extreme-value distribution and identically distributed across alternatives and individuals.

$$P(y_{ijt} = 1 | X_{it}) = F(X_{it}\beta_{j}) = \Phi(X_{it}\beta_{j}) = \frac{e^{\beta_{j}x_{it}}}{\sum_{j=0}^{2} e^{\beta_{j}x_{it}}} \tag{8}$$

This is a non-linear model that expresses the probability of choosing state j and a maximum likelihood estimator is used.

We report the marginal effects found by differentiating equation (8). Thus, the marginal effects are to be interpreted as the change in the probability of ending in a particular state j given a change in an explanatory variable X_{it}. By carrying out the

analysis separately for males and females, we allow the covariates to have various impacts on the flow out of employment for the two genders.

The sample only considers individuals who have selected themselves into the sample: first into employment, and thereafter into non-employment. There are certainly lots of unobservable phenomena involved in individual choices. Because of this self-selection problems reservations should be made concerning the interpretation of our results.

III. DATA

The concept of retirement

Retirement can be defined in many ways. Empirical research has measured retirement either based on labour market participation information or on income information. To avoid the problematic nature of retirement our study uses labour force status as the basis for definition and measurement. In this approach we categorize individuals by their labour force status, employed or non-employed. The objective of this paper is to explain transitions out of employment of elderly individuals. The sample only includes individuals that report to be working in year t. The dependent transition dummy gets the value 1 in year t if an individual reports to be non-employed in year t+1. The transition dummy gets the value 0 in year t if an individual reports still to be employed in t+1. As it is crucial to raise the labour force participation of the elderly, concentrating on simple transitions out of employment is highly relevant. Individuals may however flow out of employment to different states, like unemployment or inactiveness. It may therefore be useful to concentrate on each of those channels by explaining a discrete variable that changes its value with each end state. As a share of older people gradually reduce their working time as they age, a useful elaboration of the analysis may take into account both part-time and full-time employment.

Couples labour supply

In table 2 we show the percentages of couples in all possible labour supply choices for our initial sample. It is clear that there are households in all possible combinations of male and female labour supply. The highest numbers of households are located in the cells representing inactivity of both spouses (27% to 45%) and both spouses employed (20% to 40%); which may point to complementarities in leisure. There are however relatively many households where only one spouse is working, while the other is inactive. In Belgium and Germany there is a higher share of employed husbands with inactive wives than opposite. Remarkably Finland shows a higher share of working wives with inactive husbands. In general Finland has remarkable lower share of inactive wives (36%) compared to Belgium (69%) and Germany (55%).

Table 2: Couples labour supply choices (in percent)

Belgium		wife employed	wife unemployed	wife inactive	Total
husband	employed	**20**	3	21	45
	unemployed	1	**0 (0.3)**	3	4
	inactive	4	2	**45**	51
	Total	25	6	69	100
Finland		wife employed	wife unemployed	wife inactive	Total
husband	employed	**40**	4	8	52
	unemployed	3	**2**	1	6
	inactive	12	3	**27**	42
	Total	56	8	36	100
Germany		wife employed	wife unemployed	wife inactive	Total
husband	employed	**24**	4	19	46
	unemployed	3	**1**	4	8
	inactive	9	3	**33**	46
	Total	36	9	55	100

Further evidence of the labour force participation structure of the households is provided by tables 4 and 5. Most of the male and female transitions are out of the labour force. Flowing directly from employment to inactivity is most frequent for Belgian households. In all three countries the transition from unemployment to inactivity is frequently made. This shows that becoming inactive is in a significant number of cases reached via unemployment. This is especially true for German men and women where up to 30% of the unemployed flow into inactivity. This can partly be explained by the fact that German employed elderly men and women have the highest probability to become unemployed.

Table 3: Transition rates husband (in percent)

Belgium		Final state employed	Final state unemployed	Final state inactive
initial state	employed	**88,57**	1,00	10,43
	unemployed	6,25	**76,56**	17,19
	inactive	0,99	0,83	**98,18**
	Total	44,31	4,32	51,37
Finland		Final state employed	Final state unemployed	Final state inactive
initial state	employed	**90,17**	2,82	7,01
	unemployed	13,07	**60,30**	26,63
	inactive	2,97	0,61	**96,42**
	Total	51,43	5,37	43,2
Germany		Final state employed	Final state unemployed	Final state inactive
initial state	employed	**86,40**	5,16	8,44
	unemployed	11,61	**57,37**	31,02
	inactive	2,37	2,12	**95,51**
	Total	46,06	8,61	45,33

Important to note is that Belgium has the lowest probabilities in changing labour force states. There is a strong trend towards becoming and staying inactive, that shows the inflexibility of the Belgian labour market. In Finland more women than men become unemployed. It is also clear from the tables that non-participation is non-necessarily an absorbing state: there is a small probability of re-entering the labour market after an initial period of non-participation, this is especially true for Germany and Finland.

Table 4: Transition rates wives (in percent)

Belgium		Final state		
		employed	unemployed	inactive
initial state	employed	**85,67**	1,65	12,69
	unemployed	0,00	**81,17**	18,83
	inactive	0,86	1,02	**98,12**
	Total	20,45	5,88	73,67
Finland		Final state		
		employed	unemployed	inactive
initial state	employed	**89,59**	4,04	6,37
	unemployed	11,19	**64,93**	23,88
	inactive	2,78	1,02	**96,20**
	Total	52,08	8,31	39,61
Germany		Final state		
		employed	unemployed	inactive
initial state	employed	**84,49**	6,28	9,23
	unemployed	11,09	**62,28**	26,62
	inactive	2,40	1,74	**95,86**
	Total	31,40	8,91	59,69

In our analysis will only focus on the transitions from employment to non-employment, as they have the biggest negative impact on a country's production and budget. It is clear that a complementary approach could concentrate on transitions form unemployment to inactivity.

Data

The dataset used in this study is the European Community Household Panel (ECHP). This dataset contains 8 waves that have been released from 1994 to 2001 for up to 15 EU-countries. The same questionnaire is adopted by the national data collection units in each participating country. The advantage of these country data is their high comparability level. The survey is composed of a household and a personal file, and the same individuals and families are interviewed over time. In the first wave (in 1994) a sample of some 60500 nationally representative households – approximately 130000 adults aged over 16 years and over – were interviewed in the EU Member States. Austria (1995) and Finland (1996) have joined the project since then. For the fourth wave of the ECHP, in 1997, the original ECHP surveys were stopped in three countries, namely Germany, Luxembourg and the United Kingdom. In these countries, existing national panels were used and comparable data were derived from the GSOEP and BHPS – back from 1994 onwards. The ECHP covers 15 European countries and encompasses lots of socio-economic information like the respondents'

economic background, employment status, job history, income sources, health status and wealth.

Sample formation and descriptive statistics

This analysis focuses on members of two adult households. Our sample of Belgian, Finnish and German households includes men and women aged 50 to 69 with a spouse aged 45 to 70. As described earlier our sample consists only of employed individuals as our analysis studies the transitions from employment to non-employment. The sample selection is for employed individuals that belong to a 2 adult household with both members alive in each period. Table 1 presents the sample shares of 2 adult households by 7 economic types. The shares are fairly similar across countries although Finland has a higher share of households with 1 dependent child. After deleting observations with important missing information, we have a sample of maximum 2544 households that are observed in up to 8 consecutive periods. Summary statistics of these observations with respect to socio-demographic and economic variables can be found in Appendix A.

Table 5: Sample Shares per economic household type.

Household type (economical typology)	BE (%)	FI (%)	DE (%)
2 adults without dependent child with at least one person aged 65 or more	4.94	6.66	7.04
2 adults without dependent child with both under 65	41.07	54.64	49.88
Other household without dependent children	24.71	12.74	27.39
2 adults with 1 dependent child	10.86	14.37	5.87
2 adults with 2 dependent children	6.48	5.66	2.04
2 adults with 3 or more dependent children	1.63	0.95	0.30
Other household with dependent children	10.30	4.98	7.48

Of the final sample of the employed, between 15.5 (FI) percent and 35.6 (DE) percent of the individuals flow into non-employment (BE= 27.5 percent). We observe that 8.3% of individuals have a spouse that flows out of employment together with them within the sample timeframe. Important to note is that Finland has the highest percentage of couples flowing out of employment in the same year (14.23 %), whereas Belgium (11,7%) and Germany (8.69 %) lack behind in that respect. This can partly be explained by the smaller Finnish mean of the age difference between spouses in our sample. About two thirds of synchronised outflows are towards inactivity. The synchronised outflow to unemployment is most profound in Germany and very limited in Belgium. Of the individuals' spouses in the final sample: 61.9% are employed, 7.7% are unemployed and 30.4% are inactive. Having an inactive spouse is about two times less frequent in Finland than in Belgium and Germany.

A quick glance at the data reveals some interesting characteristics per country and gender. Tables A.1 and A.2 depict results for working males and females from age 50 till age 69. The sample consists out of 13027 observations for three countries: Belgium (2130), Finland (3984) and Germany (6913). The sample contains 60%

males and the average age is 54.5. More than 90% of the individuals are married. For obvious reasons the share of males with children is about three times higher for men than for women. The average net annual salary is about 25000 Euro for males and 15000 Euro for females. The average capital income is about 2000 Euro and minimum 58% of the individuals bought a house. Part time work has a typically high share for females (18%) compared to that of the males (3%). Germany has a very small share of self-employed what contributes to a lower labour supply. Self-employed males have a bigger sample share in Belgium (10%) and especially in Finland (15%). Public sector workers contribute about 25% to the male sample and as much as the double to the female sample.

If we turn to figures on transitions out of employment we note that numbers vary from 6,2% to 14,7 %. Transitions are more frequent for women than for men, except for Belgium. Especially Germany has high transition figures both for men (11,4%) and women (14,7%), whereas Finland displays with about 6% a more moderate frequency of transitions. Transitions to inactivity are very scarce for Belgians. In all cases transitions to unemployment are more often noted than transitions to inactivity. In Germany the unemployment channel seems to be most frequently used.

As health is an important determinant of labour supply behaviour of the elderly it is of interest to compare at this stage different health variables between our sub samples. The sample share of people with bad health varies between countries. Women report to be in bad health more often than men. Especially a high share (about 17%) of German men and women report to be in bad health. Belgium has a very small share of about 1% whereas Finland has about 4%. The share of people reporting a chronic physical or mental health problem is very high (about 38%) both in Finland and Germany but remarkably lower in Belgium (about 10%). A lot of Finns (about 25%) and Germans (about 35%) are also hampered in their daily activities by health problems although the problem is now clearly worse for Germans and again the weakest for Belgians (about 10%). The share of men and women being inpatient at a hospital during the last 12 months is the biggest for Finland but generally varies around 10% in all sub-samples. On average Germans stay the longest in the hospital (more than 1 night) whereas Finns and Belgians only stay about half a night. It should be noted that all results have to be interpreted conditional on each country's age structure. The age means are however very similar and are only for Germany about 1 year higher. There is however a concern that differences in health reports across countries may be both due to real health differences but also due to differences in reporting behaviour (Lindeboom and Van Doorslaer, 2003).

The probabilities of ending in various end states

In table 6 we have calculated the probabilities of transition to different states for each gender conditional on working. The probabilities of staying employed are decreasing over time. At the same time, the probability of ending in the states unemployed or inactive is increasing over time. This can be explained by the fact that individuals are getting older in our sample. We found some striking differences across gender. Women are more likely to end up as unemployed whereas men tend to have a higher probability to keep on working. Becoming inactive is higher for men in Finland and Belgium whereas smaller in Germany.

Table 6: Exit Probabilities (Percentage)

Females	Belgium			Finland			Germany		
year	UNEMP	INACT	EMP	UNEMP	INACT	EMP	UNEMP	INACT	EMP
1994	0,0	10,8	89,2				6,4	8,6	85,0
1995	2,5	9,9	87,7				6,5	10,4	83,1
1996	1,2	6,1	92,7	5,5	4,3	90,3	9,7	7,3	83,0
1997	2,5	8,8	88,8	3,5	6,7	89,8	5,4	10,2	84,4
1998	1,3	8,8	90,0	3,5	4,1	92,4	5,7	6,7	87,6
1999	1,3	9,0	87,7	2,9	2,9	94,1	5,2	6,8	88,0
2000	2,7	9,5	87,8	3,1	5,1	91,8	4,6	6,7	88,8
weighted probability	1,6	9,0	89,1	3,7	4,6	91,7	6,2	8,1	85,7
Males	Belgium			Finland			Germany		
year	UNEMP	INACT	EMP	UNEMP	INACT	EMP	UNEMP	INACT	EMP
1994	1,0	10,5	88,5				3,9	7,9	88,2
1995	1,0	6,2	92,8				5,0	9,9	85,1
1996	0,5	11,7	87,8	4,1	4,7	91,3	5,9	8,5	85,7
1997	0,5	10,4	89,1	2,0	8,7	89,3	6,2	6,6	87,2
1998	1,6	7,3	91,2	1,9	4,4	93,8	6,3	9,1	84,6
1999	0,5	10,3	89,1	3,4	4,7	92,0	4,8	7,4	87,9
2000	1,2	7,1	91,8	2,0	3,7	94,2	5,0	6,0	89,0
weighted probability	0,9	9,1	90,0	2,7	5,2	92,1	5,3	7,9	86,8

IV. ESTIMATION

We estimated reduced form models of labour force participation. The estimation results of the multinomial logit model are summarized by country and gender in tables a3 to a8. As the magnitudes for coefficients are difficult to interpret we computed partial effects. The tables show those marginal effects and the z-values. For continuous variables the latter are evaluated at the mean. The three possible outcomes are unemployed, inactive and employed. The base category is employed. The explanatory variables are individual characteristics and spouse characteristics.

We want to learn if men's and women's labour force participation decision is similarly influenced by their individual characteristics. The goal is to estimate the impact of each individual's characteristics and their spouse's characteristics on their own labour force decision. We will also check for possible asymmetries in the spousal spill over effects. Results have to be interpreted carefully. Spurious effects may occur if we don't control for all variables that likely have an independent influence on labour force participation. This is likely if we don't take into account pension incentives.

Results of the Wald-test and Likelihood-Ratio tests rejected the null-hypothesis that the coefficients equal zero across all equations. We also performed Wald and Likelihood-ratio tests of whether any pair of outcome categories can be combined. In addition we computed the Hausman test of the assumption of the independence of irrelevance alternatives (IIA) for each possible omitted category.

4.1 Individual characteristics

For Finland and Germany the results of the multinomial logit model are reported per gender as marginal effects with their corresponding z-values (see tables a3 to a6). As the number of transitions to unemployment was too small for Belgium we estimated a probit model (see table a8).

As expected the older the individual the higher the propensity to become inactive and the lower the propensity to keep on working. The linear age effect is positive and significant in all three countries for each gender. The effects are marginally stronger for men than for women and especially high in Belgium and Germany. In our sample age has no significant effect on becoming unemployed.

It is expected that a higher investment in human capital should lower the propensity to retire as higher educated people start their working life later and perform on average less physical demanding jobs than low educated. The propensity to stay in employed rises significantly for higher educated Belgian and Finnish women.

In Finland the number of children under the age of 14 has a negative effect on the propensity to become inactive for men whereas a positive effect for women (see Perrachi and Welch, 1994). The effect is significant for Finnish women becoming inactive. A negative effect for males suggests that this might have to do with the obligations of being the principle earner whereas women could have a higher propensity to retire to take care of the household. In Germany having dependent children has an insignificant negative effect of becoming inactive on both men and women. The difference in female behaviour between Finland and Germany could be explained by the fact that the expected period of the dependency of children is higher in Germany and by the fact that there are more housewives in Germany.

The results show that in Finland both married male and female members of two-person households have a higher propensity to become inactive and for males also unemployed. Opposite results were found for married Belgian men. Results for Germany are insignificant.

Health variables

The effect of health on the labour force transitions of elderly couples has the expected sign except in Belgium where there are very few observations of people in bad health. A first dummy variable gets the value 1 if individuals report to be in bad or very bad health. A second dummy variable refers to the stay in a hospital during the last 12 months. The decision to include both variables in the specification is based on the fact that both variables measure relative weak correlation between both variables and the robustness of results along alternative specifications. Along 2 definitions, gender and

countries (except Belgium), bad health has a significant positive effect on the propensity to retire. The opposite sign for Belgium has not much credibility as the average Belgian reports to be in better health than Germans and Finns so that there are very few observations left in the bad health category**.** The effect is stronger for men than for women. The biggest effects are seen for Finland. The effect of being hospitalised recently is also positive but not always significant. Although there should be no doubt about the significance of those positive effects of bad health, the strength of the effect should be interpreted with care and may be too strong or too weak because of endogeneity problems (Bound, 1991). Occupations: Sectors in which health risks are greater may be more likely to develop institutions (such as pensions or disability insurance) that allow for early retirement. Relatively few studies examine both men and women in the same framework. Loprest et al. (1995) observe that the effects of disabilities on labor force participation are greater for men and single women than for married women. Kreider (1996) finds that non-working blacks, high school dropouts, and former blue collar workers are more likely to over-report disabilities than white collar workers, and that men are more likely to over-report than women. This findings are consistent with the idea that workers in more physically demanding jobs may find disability a more compelling excuse for leaving the labor force than other workers, or alternatively, that white collar workers are less likely to feel that a given condition limits their ability to work. Ettner (1997) finds that among women, self-reported-measures of health are not affected by employment status (less reporting bias among women). The health measure was instrumented by the parents' health. She points out that women may be under less pressure socially to attribute non-employment to ill health.

Economic variables

The effects of the net annual real wages are in the expected direction: higher wages are associated with a stronger attachment to employment. A higher net wage motivates men and women to keep on working longer and not to become inactive or unemployed. High wages correlate naturally with higher responsibilities, education, and working satisfaction. The response to a given change in wages (and indirectly benefits) is generally between two (Finland and Belgium) to three (Germany) times larger for women than for men, consistent with the generally higher labour supply elasticities for women than men found in the literature. The elasticities are especially high for Belgium and Germany. It is important to note that in Finland wages are only significant in explaining the transition to employment and unemployment whereas in Germany it is also significant for the transition to inactivity.

Table 7: Inactivity elasticities of wages

	Belgium	Finland	Germany
Men	-0.053	-0.003	-0.38
Women	-0.105	-0.005	-0.099

Capital income is used as a proxy for wealth. A priori, the influence of own wealth on the retirement decision is not clear. On the one hand, increased wealth will improve the possibility of early retirement through increased ability of self-support. Our results are in line this view as the wealth proxy has almost always a positive impact on the probability to flow into inactivity, this is especially true for men. On the other hand,

wealth may be a proxy for both ability and social status. In that case we would expect a reduced probability of exit to early retirement. We don't find convincing evidence of the latter effect. People with capital income may be the ones that retire also at the earliest years of the age range 50-69 as the wealth variable becomes more significant if the people aged 50 to 55 are added to the sample.

Employment variables

An interesting result concerns the significant negative impact of the part time dummy on the probability to flow into unemployment and that both for men and women. Especially women that work part time have a smaller probability to use the unemployment channel. The effect is most significant for Germany and Finland and not for Belgium. The part-time dummy doesn't seem to play a significant role in the flow to inactivity.

Satisfaction with work is expected to have a negative impact on the propensity to leave work while satisfaction with leisure should thrive individuals to have more of it by leaving work. The negative impact of the work satisfaction and the positive impact of the satisfaction with leisure is seen both for men and women. Effects seem to be especially significant for the flow into unemployment. In that sense satisfaction with work and leisure is a good predictor of becoming unemployed. This two important variables may however have a significant correlation with other variables like bad health, income, education, working status and occupation.

The self-employed form a special group of individuals as they have mostly a particular pension system. Being self-employed has in most specifications a significant negative impact on the propensity to flow into unemployment and inactiveness. The effect is more significant and bigger for men than for women. One explanation for this negative overall effect has certainly to do with the particular pension schemes for the self-employed. In Belgium the self-employed have an own pension system that is less generous than the ones of the public and private sector. Belgian self-employed do not have access to the unemployment insurance system and there exists no other special regime they could use to retire early. Although there exists a public disability system, the more stringent criteria than in the private sector prevent it from becoming a "beloved" early retirement channel. The German self-employed are mainly self-insured although some of them also participate in the public retirement insurance system. Also the Finnish self-employed have less generous pension rules. A second explanation for the negative impact may however be independent of the institutional background. Self-employed may have common characteristics in that they are motivated, energetic people that like to work. Because the particular character of the pension system for self-employed and their characteristics they are sometimes excluded from the samples in retirement research although they certainly form an interesting category to focus on in future retirement research.

Being a civil servant has mostly a positive effect on the probability of entering retirement in Finland and Germany. In the case of Finland this can be explained by the fact that the accrual rate used to be higher (see appendix A). In the case of Germany this can be explained by the fact that civil servants have acquired pension claims that are very generous compared to workers in the private sector (see appendix

A). For Belgian men and women there is a negative impact. Also in Belgium the public sector has its own pension system. It differs from the private sector system in that the official retirement age for women (65) is still higher and equal to the one of men. The negative effect is especially significant for the broad retirement specification and signals that Belgian civil servants have more job security and don't use (collectively or individually) the unemployment channel as often as private sector workers.

We compared 3 occupational categories - managers and professionals, technicians, clerks and service workers - with as reference category the blue collar workers and expect all of the 3 to have a more negative impact on the propensity to retire. Blue collar workers have on average a more physically demanding job and start to work earlier in their life cycle. The negative impact for the three occupation dummies on the probability to flow out of employment is seen for Belgian men and women, in the other countries evidence is mixed. The negative impact is the strongest for clerks and service workers and technicians. For women the results are more dubious. In Finland female technicians and female clerks and service workers have a higher propensity to become unemployed. This shows that the Finnish unemployment channel may be used especially by women working in those occupations. There is similar but weaker evidence for German women whereas German male clerks and service workers have a smaller probability to become unemployed. This can be explained by the fact that employment of clerks and service workers is more protected for both women and men but that women use the unemployment channel more often to retire.

The evidence of the impact of working in a small company is mixed. For men it has a negative impact on a transition into inactiveness and it is significant for Germany and Belgium. The reason may be that in small companies the interpersonal connections are closer and the working atmosphere is better. As the social control is higher in smaller companies we may also see that unsatisfied workers may leave smaller companies faster and as such people that are left are on average more satisfied. The effect on the probability of unemployment is positive for Finnish women and negative for German women.

The year dummies (reference year 2000) are meant to take care of the timing and magnitude of the business cycles, as well as structural changes in the form of modifications and adjustments of the rules in force. The lack of gender coincidence could be explained by the fact that men and women work in different sectors. Institutional changes and the business cycles influence the sectors differently. This influence was not picked up fully by the occupational dummies.

4.2 Characteristics of the Spouse

For couples there are several sources of joint retirement behaviour, "added worker" versus "assortative mating" effects, and/or correlation in unobservables. The "added" worker effect describes behaviour where the labour supply increases when the spouse's income is reduced or disappears. The "assortative mating" effect describes behaviour where the partners have the same preferences, in other words where the labour supply of the two spouses are positively correlated.

To analyse this potential impact the list of explanatory variables is expanded with variables that refer to characteristics of the spouse of the individual. As spouse variables we include the following variables: (1) the age difference with the spouse (2) the capital income of the spouse, (3) the annual net wages of the spouse, (4) a sickness and invalidity benefit dummy, (5) a dummy for the spouse being inpatient at a hospital during the last 12 months, (6) a dummy for the spouse being inactive and finally (7) a dummy for the spouse being unemployed. The estimation with gender specific samples allows us to check if the spouse effects are symmetrical or asymmetrical by gender.

This analysis found mixed and scarse evidence of spousal spill-over effects. Although there is evidence both for the added worker effect and the assortative mating hypothesis the latter effect dominates. The assortative mating effect can possibly explained by complementarities of leisure. Further there is evidence of asymmetries in spousal effects as husbands seemed to be more influenced by their wives than opposite. Most significant results were obtained for the German sample.

One would expect that individuals that are older (younger) than their spouse ceteris paribus have a higher (lower) propensity to retire. In our sample the difference in age between individuals and their spouses has no sizable effect on the retirement behaviour. The non-significant impact is however mostly positive as expected: if the age difference with the spouse is higher so is the propensity to retire.

In order to capture the wealth effect of the spouse a capital income variable was included. For Finland differs across gender as it is positive for men and negative for women. In Germany it is positive for the male unemployment channel, negative for the female unemployment channel and positive for the female inactivity channel. For Belgium men and women it is not significant. For Finland that effect is larger for men and very small for women. The evidence suggests that Finnish women have a stronger influence on the retirement decisions of men. The wealth results for Finland bring some evidence of the added worker effect for the male specification.
A variable that correlates with the spouse being employed is the annual net wage of the spouse. The direction of the impact of that income variable clearly differs across country and sex. It is significant for the German male unemployment channel and has a negative impact what supports the assortative mating hypothesis. For Belgium the impact is not significant. For Germany Blau and Riphahn (1999) found a number of sizeable cross-spouse effects of the wage income. Having a high-wage husband generally increases the labour force mobility of wives, making them more likely to leave the labour force. Husbands of high –earning wives have increased probabilities of exiting employment. Finally as the above authors we found some evidence of cross-spouse wage effects that are asymmetric between the German spouses.

The health of an individual can influence his or her preferences and our results told that individuals with bad health have on average a higher propensity to retire. Health characteristics of a spouse may however also influence an individual retirement decision. Two opposite effects have to be listed: (1) health problems of the spouse can prevent the spouse of earning money and may force the individual to stay longer employed to financially compensate the loss of income (“added worker” effect). If the spouse with health problems receives sickness or disability benefits the individual may have an extra incentive to stay at home and take care of the spouse (“assortative

mating" effect). Important is certainly the category of health problem involved. To capture health problems that prevent a spouse to be at work, the inpatient at a hospital variable is used. As both effects work in opposite direction the composed effect depends on the stronger of the two.

Results were most convincing for Germany. Only for German men we found evidence of spousal health effects. Particular for German men is that the probability to become inactive declines if their spouse is receiving sickness or disability benefits. This supports the idea that the reduction in the female income has to be compensated by a prolongation of the working career of the male spouse, a result in favour of the added worker effect. This seems to depend however on the kind of the health problems. The health problems causing a recent hospital visit raise the probability of the men to become inactive. The latter weaker effect supports the idea that men stop working to take care of their hospitalised wife, a result in favour of the "assortative mating" effect. In no other cases we found spousal health effects. That those mixed results are only valid for Germany is most probable connected to the different health care institutions in those countries. For Germany Blau and Riphahn (1999) found that wives are less likely to exit the labour force if the husband has a chronic condition and is still working and more likely to exit if the husband has left the labour force. They also found that the same pattern does not hold for men. Husbands are less likely to stop employment if the wife has a health condition. The latter result is in line with our findings. For a sample of EU countries Jiménez-Martín et al. (1999) found that own poor health is important and forms a positive incentive to withdraw from the labour force. The magnitude of this health effects depends on the labour force status of the spouse suggesting either complementarities in leisure or correlation in the unobservables of both spouses. Additionally they find important and asymmetric cross effects. It is striking that their results are opposite to ours in that the husbands health status is crucial in explaining joint retirement in their results.

Two other variables refer to the spouse being unemployed or inactive. The labour market state of the spouse definitely matters for the transition probabilities of men. In Finland men are less likely to keep on working if their spouse is inactive. For women the results are less strong. In the German case women are more likely to become unemployed if their spouse is inactive. In Belgium the probability of men staying employed falls if the spouse is inactive, for women the same effect holds if the spouse is unemployed. This results support the view that couples want to spend their leisure time together by tuning their labour market states, a result in favour of the "assortative mating" effect.

V. CONCLUSION

This analysis found evidence of spousal spill over effects although it varies across countries. Especially for the German sample spill over effects turned out to be significant. Additional evidence supports the existence of asymmetries of spousal effects across gender. There was more support for women having an effect on the labour force participation transitions of their elderly spouses than for men. Effects work mostly via wealth and participation variables of the spouse. Only for German men spousal health effects were found. Although there is both evidence for the added worker effect and the assortative mating effect the overall conclusion is that the latter

hypothesis dominates. The importance of the assortative mating effect may be explained by the existence of complementarities in leisure. Spousal health effects were found to be significant for German men. The strongest effect supports the added worker effect. A weaker effect shows however that if your wife has been hospitalised the probability of quitting work rises as this may be connected to taking care. That those results are only valid for Germany may have to do with the health care institutions in the different countries.

The distinction between transitions from employment to different states has been important as different channels out of employment exist. Certain determinants of labour supply seem to play different roles in different channels. The unemployment channel is at first sight not important in Belgium. It can be concluded that women use the unemployment channel more whereas men use the disability channel more.

Transitions of members of elderly two-adult households to inactivity are influenced by important individual characteristics. Age plays a significant role explaining the transitions as it is a crucial component for their eligibility and computation of benefits during different categories of inactivity. Age effects are up to two times stronger for men than for women. Age seems to play a much less important role on becoming unemployed. A second individual characteristic that has a significant impact on the probability of becoming inactive is the health status of an individual. The people that become inactive consist partly out of people using the disability path to retirement. Having a bad health condition has a big positive impact on the probability of becoming inactive. The effect of bad health is especially significant for men and bigger for men than for women. The bad health effect is insignificant for the transition to unemployment. We found indirect evidence that men retire more via the disability channel whereas women flow more often true the unemployment channel. A further very significant and robust result is that self-employed men and women have a higher probability to stay employed and a lower probability to become both unemployed and inactive. Ceteris paribus it is good for the labour force to encourage self-employment. A policy conclusion is here that it may be worth to stimulate self-employment for older two-adult households. The higher amount of working experience is valuable to make a successful switch to self-employment. The more flexible working hours are also more appreciated by elderly couples. In the near future we will study the labour force participation of elderly self-employed in more detail.

In line with the recent strain of literature concentrating on the labour supply of couples, this study concludes that it is crucial to take into account the influence that spouses can have on the retirement decisions of each other as not doing so may bias estimates of the determinants of retirement that can be used in policy simulation exercises. Useful extensions for future research can concentrate on the modelling of pension incentives and the endogeneity problems concerning health.

REFERENCES

Blau, D.M and R.T., Riphahn, 1999, ‘Labor Force Transitions of Older Married Couples in Germany’, *Labour Economics*, 6, p. 229-252.

Börsch-Supan, Axel, 2000a, 'Data and Research on Retirement in Germany', *Mannheim Research Institute for the Economics of Aging,* Universität Mannheim, *Discussion Paper Series, nr.00-20,* 18 p.

Börsch-Supan, Axel and Christina B., Wilke, 2003, "The German Public Pension System: How it Was, How it Will Be", *Mannheim Research Institute for the Economics of Aging, Universität Mannheim, Discussion Paper Series, nr.03-34,* 49 p.

Bound, John, 1991, 'Self-Reported versus Objective Measures of Health in Retirement Models', *The Journal of Human Ressources, 26-1,* p.106-138.

Bound, John; Schoenbaum, Michael; Stinebrickner, Todd R.; Waidmann, Timothy, 1999, 'The dynamic effects of health on the labor force transitions of older workers', *Labour Economics,* 6, p.179-202.

Browning, M.; Bourgignon, F.; Chiappori, P.A.; Lechene, V., 1994, "Incomes and Outcomes: A Structural Model of Intra-household Allocation", *Journal of Political Economy*, 102, 1067-1096.

Coile, Courtney, 2003, 'Retirement Incentives and Couple's Retirement Decisions', Centre for Retirement Research at Boston College Working Paper 2003-04, March 2003.

Coile, Courtney, 2003, 'Health Shocks and Couples' Labor Supply Decisions', Centre for Retirement Research at Boston College Working Paper 2003-08, May 2003.

Coile, Courtney. and Gruber, Jonathan (2000). Social Security Incentives for Retirement, in David A. Wise (ed.) Themes in the Economics of Aging. Chicago: University of Chicago Press.

Dahl, Svenn-Age; Nilsen, Qivind Anti; Vaage, Kjell, 2002, "Gender Differences in Early Retirement Behaviour", *IZA Discussion Paper Series*, No. 522, 31 p.

Dellis, Arnaud; Jousten, Alain, Perelman, Sergio, 2001, "Micro-modelling of retirement in Belgium", *Centre for Economic Policy Research, Discussion Paper No. 2795*, May 2001, 37 p.

Dwyer, Debra Sabatini; Mitchell, Olivia S., 1999, 'Health Problems as Determinants of Retirement: Are Self-rated Measures Endogeneous?', *Journal of Health Economics, 18,* p. 173-193.

European Commission, 2000, "*Study on Pension Schemes of the Member States of the European Union*", May 2000.

European Commission, 2004, Social Protection in the EU Member States and the European Economic Area:
http://europa.eu.int/comm/employment_social/missoc/index_en.html

Gruber, Jonathan and Wise, David A. (1999). *Social Security and Retirement Around the World*. Chicago: University of Chicago Press.

Gruber, Jonathan and Wise, David A. (2002). Social Security and Retirement Around the World: Microestimation. *National Bureau of Economic Research Working Papers No. 9407.*

Gustman, Alan L. and Thomas L. Steinmeier, 2000, "Retirement in a Family Context: A Structural Model", *Journal of Labor Economics*, 18(3), 503-545

Gustman, Alan L. and Thomas L. Steinmeier, 2002, "Social Security , Pensions, and Retirement Behaviour Within the Family", *National Bureau of Economic Research, Working Paper Series*, no. 8772.

Hakola, Tuulia, 2000, "Navigating Through The Finnish Pension System", *Vatt-Discussion Papers*, no. 224, 48p.

Hakola Tuulia, 2002, 'Economic Incentives and Labour Market Transitions of the Aged Finnish Workforce', *VATT-Research Reports, 89,* 193 p.

Hakola Tuulia, 2002, 'Alternative Approaches to Model Withdrawals from the Labour Market – A literature Review', *Working Paper Series, Department of Economics, Uppsala University, No. 2003:4*, 39 p .

Hurd, M.D., 1990, "The joint retirment decisions of husbands and wives", In: *Issues in the Economics of Aging*, edited by D.A. Wise, Chicago, University of Chicago Press for the NBER, 231-54.

Jiménez-Martín, Sergi; Labeaga, José M.; Martínez Granado, Maite, 1999, 'Health Status and Retirement Decisions for Older European Couples', *Iriss working paper series*, no. 1999-01, 34 p.

Kerkhofs, Marcel; Lindeboom, Maarten; Theeuws, Jules, 1999, 'Retirement, Financial incentives and Health', *Labour Economics, 6*, p. 203-227.

Kerkhofs, Marcel; Lindeboom, Maarten, 2002, 'Health and Work of the Elderly: Subjective Health Measures, Reporting Errors and the Endogenous Relationship between Health and Work', IZA Discussion Paper, no. 457, March 2002, 40 p.

Lindeboom, Maarten and Eddy, van Doorslaer, 2003, 'Cut-point Shift and Index Shift in Self-reported Health', *Tinbergen Institute Discussion Paper,* no. 042/3, June 2003, 24 p.

Lilja, R., 1996, "Microeconomic Analysis of Early Retirement in Finland. In: Wadensjö, E. (ed.) *Leaving the Labour Market Early in the Welfare State* (pp. 157-173). Amsterdam, Elsevier Science Publishers.

Mastrogiacomo, Mauro; Alessie, Rob; Lindeboom, Maarten, 2002, 'Retirement Behaviour of Dutch Elderly Households: Diversity in Retirement Patterns Across different Household Types', Tinbergen Institute Discussion Paper, TI2002-073/03 may 24-2002, 35p.

McGarry, Kathleen, 2002, 'Health and Retirement: Do Changes in Health Affect Retirement Expectations?', *NBER Working Papers, nr. 9317*, November 2002.

OECD, 2003, *Vieillissement et politiques de l'emploi, Belgique*, 145 p.

OECD, 2004, *Ageing and Employment Policies, Finland*, 127 p.

Peracchi, F. and Welch, F., 1994, "Trends in labour force transitions of older men and women" *Journal of Labour Economics*, 12, p. 210-242.

Sickles, Robin C.; Taubman, Paul, 1986, 'An Analysis of the Health and Retirement Status of the Elderly', *Econometrica, Volume 54, Issue 6*, p. 1339-1356.

Stock, J.H.; Wise, D.A., 1990, 'Pensions, the Option Value of Work and Retirement, *Econometrica* 58, p. 1151-1180.

Zweimüller, J., Winter-Ebmer, R., Falkinger, J., 1996, "Retirement of spouses and social security reform", *European Economic Review*, 40, p. 449-472.

Appendix A: The pension system in Belgium, Finland and Germany

Pension systems are dynamic. The summary of the pension systems of our sample countries concentrates on a brief description of the systems during the sample period years 1994 to 2000. Since 1994 different pension reforms have taken place, also after the year 2000. For a more detailed description and updates of the most recent changes we refer to the above list of references.

A.1. The pension system in Belgium

1. Structure

The Belgian pension system consists out of three pillars[3]. The **first pillar** unites social security pensions and is compulsory for all employees, civil servants and self-employed persons. It is financed by current income (pay-as-you-go). The **second pillar** is employer-employee funded and embraces non-compulsory occupational schemes covering in 1997 about 31% of the working population of the private sector (European Commission, 1997). The **third pillar** includes private funded pension schemes and was in 2000 used by 44% of the Flemish private sector workers (OECD, 2003). Further description of the system concentrates on this most important first pillar. Civil servants are covered by a special State scheme, and private sector employees and self-employed by two different social-security schemes. Private sector employees account for 58 % of all compulsory schemes whereas civil servants for 32 %, self-employed for 9% and a guaranteed minimum pension system for the elderly for 1%. All three major groups have their own pension rules. A brief description of basic characteristics per group follows.

2. Employees (private sector)

The conditions for obtaining a full pension for men is being minimum 65 and having a working career of at least 45 years. Women can obtain a full pension after a career of 42 years from the age of 62 on. Men and women can go on pension from age 60 on if their career reached a minimum of 20 years in 1997. Informative may be that the gross replacement rate of the average worker in the private sector amounted to 29.9% in 2000.

The calculation of the pension benefits is based on the following formula:

Benefit = r*average wage*min[d/(42 or 45),1]

and consequently depends on: (1) replacement rate r depending on the reported type of household: 0.6 for singles and 0.75 for a one earner couple, (2) average earnings based on periods of affiliation (3) the share of years completed of the full career (42 years for women and 45 years for men). The average wage corresponds to the price indexed average wages over the period of affiliation. An important characteristic of this scheme is that periods spent in unemployment, inactivity due to sickness and disability and early retirement also count as affiliation years in the computation of the average wage and hence of the pension benefit. All benefits in this scheme are consumer price indexed.

In this system pension benefits are limited at both ends: for a complete career the minimum annual pension was 11794 Euro for a one-earner couple or 9438 Euro for individuals in February 2002 (about 56% of average net wages). The earnings entering the above pension formula had a ceiling of 38678 Euro (120% of the average

[3] The three pillars are (still) very unequal. The first pillar is the most important and represents pension entitlements of over 250% of GDP whereas the third pillar only amounts to 10% of GDP (Dellis et al., 2001, p.3).

gross wage) in 2001. If the ceiling is adapted for the whole career the maximum annual pension amounted to 20894 Euro for a one-earner couple and 16715 Euro for an individual in 2001.

Unemployment pension: Next to the official wage earner scheme, several forms of early retirement programs have recently developed, some being official early retirement schemes, others (unemployment, disability, sickness) being unofficial. Those schemes can be broadly divided into two groups, mandatory collective retirement and individual retirement. Individual early retirement differentiates itself from its collective counterpart by the fact that it is based on an individual's decisions to retire from work. The most prevalent way is to pass through the unemployment system in which people aged 50 or more are considered "aged unemployed" not being required to seek actively work.

Disability pension: Some people also attempt to proceed retirement through the disability insurance scheme. In the Belgian context this channel is not very prominent for private sector workers as control is fierce and benefits are rather limited.

3. Civil servants (public sector)

The conditions for obtaining a full pension for male and female civil servants is being minimum 65 and having a working career of at least 45 years. Men and women can obtain a pension from the age of 60 on if they contributed at least 5 years to the pension system. The gross replacement rate of the average worker in the public sector is 65.4% in 2000. Benefits are computed according to a rather complicated formula:

Benefit = average gross wage over last five years of career*min[fraction,0.75]

Pension benefits are based on the average gross wages of last 5 years of the career and can never exceed 75% of that average wage. The "fraction" variable in the benefit formula has a numerator consisting of a number of years the person worked in the public service, and a denominator being a benefit accrual factor. This latter benefit accrual factor, also called "tantième", depends on the rank occupied in the hierarchie.

For a complete career the minimum annual pension is 14344 Euro for one earner couples (70% of average wages) or 11475 Euro for individuals (56% of average wages) in February 2002. The maximum pension amounts to 75% of the 5-year average wage. The annual ceiling of gross pension is 61000 Euro in 2002 (about three times the average gross wage in the economy). Public pensions are indexed to the average wages ("prérequation").

Aside from the official route of retirement, public servants can quit work early through disability protection. This early retirement route seems to be much more plausible for employees from the public sector than for those of the private sector as the screening is less stringent. The calculation of invalidity pension is based on foregone earnings with a ceiling of 2480 Euro per month (January 2001) and a rate of 65% for a one-earner couple and 45% for an individual and 40% for a cohabitant.

4. Self-employed

The self-employed retirement scheme is less generous than the ones of the public and private sector. The conditions for obtaining a full pension are the same as in the private sector. Men and women can go on pension from age 60 on if their career reached 20 years in 1997. The pension is reduced however by 5% for each year of anticipation. The net replacement rate of an average self-employed is 23.6 % in 2000.

Since 1984 the pension depends on net profits and the duration of the career. Full career is the same as in the private sector. For a complete career the minimum annual pension is 9401 Euro for one-earner couples or 7051 Euro for individuals in February 2002. The annual ceiling of income that enters the benefit formula is 49077 Euro for 2001.

Self-employed do not have access to the unemployment insurance system and there exists no other special regime they could use to retire early. Although there exists a public disability system, the more stringent criteria than in the private sector prevent it from becoming a "beloved" early retirement channel. As Dellis et al. (2001) note self-employed wishing to retire early are somehow forced to transit through some private transit retirement income arrangement.

A.2. The pension system in Finland

1. Structure

The three pillars of the Finnish pension system include the following: **Pillar 1**: Every citizen resident in Finland is compulsorily insured under the basic state pension scheme (the so-called national pension) from the age 16. This pension is means tested against occupational pension. In Finland the first pillar consists both out of the statuary occupational scheme and the national pension scheme. **Pillar 2**: It is possible for the employer to set up voluntary occupational pension schemes. As regards voluntary pensions, the employer is responsible for at least 50% of contributions. The additional pension systems play a minor role in Finland. Voluntary occupational schemes may be arranged in pension funds and foundations and in life insurance companies. An employer may set up a fund of its own if the scheme has at least 300 members and a foundation if the scheme has at least 30 members. **Pillar 3**: Individuals can arrange for private pensions. Insurance companies administer these. Private pensions schemes are operated on a funded basis. In what follows we concentrate on pillar 1, first on the state pension scheme but mainly on the compulsory occupational scheme.

2. The state pension scheme

The state pension scheme is funded on a pay-as-you-go basis. As of 2000 the employer contributes from 2.4% to 4.9% of the salary. There is no maximum salary up to which contributions must be paid. The retirement age for men and women is 65. If the pension is deferred the pension is increased by 0.6% per month. Early retirement is possible from the age of 60. The pension is reduced by 0.4% per month before the age of 65. Full pension is received when the pensioner has been resident for 40 years. The pension will be reduced for every year of residence less than 40 years. The amount of pension does not only depend on the years of residence, but also on the place of residence, family status and income from occupational pension schemes.

3. The compulsory occupational scheme

The compulsory occupational pension system is a defined benefit scheme. Different schemes apply for different categories of persons. There are occupational pension schemes on both pay-as-you-go and funded basis. The financing of the occupational scheme for employees is a mixture of pay-as-you-go and funded. Occupational pensions for self-employed and agricultural workers are financed on a pay-as-you-go basis. As of 2000, the total contribution of the employee and the employer for the compulsory pension was on average 21.5% of the salary. The employee contributes 4.7% of the salary. There is no maximum up to which contributions must be paid. The retirement age for men and women is 65. Early retirement is possible. The pension is reduced accordingly. In voluntary occupational schemes the employer may reduce the retirement age from 65 to 55. Compulsory occupational schemes (pillar1) must be arranged in one of the following pension institutions: pension insurance companies (6), pension funds (8), and pension foundations (about 40).

3.1. Employees (private sector)

Old-age pensions: Earning related pension depend on accrued pension rights during (self) employment: benefits are based on: (1) number of years in employment, (2) accrual rate: the pension starts growing from the age of 23. For the years before 1.7.1962 an employee acquires a pension rate of 0.5% per year. For the years following 1.7.1962 the pension rate is 1.5% per year. From the age of 60 on an employee acquires a pension rate of 2.5%. Thus, the maximum pension is 60% of the highest wage. (3) Pensionable salary: is the gross income net of employee's pension contributions and corresponds to the average salary of the last 10 years of occupation. Although the maximum pension is 60% of the highest income during the career, there is no upper limit for the amount of pension received. Indexation to the current date of the pension rights at the end of the career: 50% wages, 50% inflation. If you work beyond age 65: no pension rights can be accrued on this income but this gives only rise to an increase of pension entitlements of 0.6% per month. It is possible to retire completely from the age of 60. Than the level of pension payments is subject to an actuarial reduction of 0.4% for every month below age 65.

Benefit= pensionable salary*years of employment*accrual rate

For the average Finnish income worker incentives to continue working are low and the net replacement rates are flat[4]. From the age of 63 the replacement rate of 62% increases only 2 percentage points at the age of 65 and 3 percentage points at the age of 70. So working the 7 years longer brings only a rise of 5 percentage points. Similarly the Finnish pension wealth accrual turns negative at age 63 (-20%) and stabilized after -70%. For the average Finnish income worker the net replacement rates for the disability pension are very flat at around 65%. For the average Finnish income worker the net replacement rates for the unemployment benefits have a similar flat pattern as the ones of disability pensions at around 65%.

[4] Replacement rates of average Finnish income worker: 52% at age 60, 56% at age 61, 59% at age 62, 62% at age 63, 63% at age 64, 64% at age 65, 65% at age 69, 67% at age 70.

Unemployment pension: In Finland (2001) the unemployment pension (20%) is together with disability pension (33%) the most common way to exit the labour market for the age category 60 to 64. Basic unemployment allowance was 115 Euro a week in 2003 and is means tested against spouse income over a certain limit. Earnings related unemployment allowance equals 45% (+ 20%) of the difference between former income up to a ceiling (over the ceiling) and the basic allowance. We see much higher unemployment rates for people over age 55 in the administrative data than in the labour force survey this is an effect of the so-called unemployment tunnel which leads to the unemployment pension at the age of 60 persons in the age group 60-64 who have received unemployment allowances for max. 500 days and have been employed at least 5 years during the previous 15 years are eligible for the "unemployment pension. This pension is received up till age 65 when an old age pension is received. In practice: People of age 57, after being on ordinary unemployment benefits for 2 years, can have extended their benefits to age 60. Thus the unemployment pension effectively starts at age 55. This explains the sharp drop in unemployment rates between ages 59 and 61. Recipients of unemployment pensions (% of pop 60-64) vary from 18% in 1994 to 21% in 2000.

Disability pension: Ordinary disability pensions in Finland can be applied for by people between 16 and 65 and can be granted for long or shorter periods. A special pension in this category is called the "individual early retirement pension" and is payable to people aged 60 to 64 who's capacity has been permanently reduced (rewarded on less strict medical criteria). In 2001 of the age group 50-54, 11% received a disability pension, of the age group 55-59, 20 % received a disability pension, of the age group 50-54, 33 % received a disability pension. Finland has one of the highest incidences of disability among older people. Therefore it seems plausible that this is partly an unofficial retirement channel

3.2. Public sector

To their main points the public-sector pension acts conform to the private-sector TEL scheme. In 1993–1995 major changes to the pension acts were implemented in all public-sector pension schemes, with the aim of harmonizing the pension legislation with the private-sector TEL scheme. The full effect of the changes only concerns persons who came or who come for the first time into public-sector employment after 1992. The changes take effect gradually. Before the reform the public sector pension accrual has been clearly faster than in the private sector. A pension has accrued at a rate of 2.2 per cent of the wage, when the target level of 66 per cent can be achieved in 30 years. Also the retirement age (63 years) has been lower than in the private sector. In addition the public sector has had numerous industry and occupation-specific lower retirement ages. Thus the insured who were in public sector employment before the legislative changes, depending on their age and the duration of the employment contract, either retained all or part of their previous pension benefits (2.2 per cent accrual rate, lower retirement age and maximum level of 66 per cent) or at least their higher accrual rates up to the legislative changes.

3.3. Self-employed

The national pension scheme is valid for the self-employed in the same way as the as for all other population groups. For the earnings related pension scheme special

pension provisions apply to self-employed persons (Self-employed Persons' Pensions Act: YEL) and farmers (MYEL: The Farmers' Pensions Act). The insured are self-employed persons aged 18–64. The higher age limit for self-employed persons is due to the fact that only a person who has come of age can take out self-employed person's pension insurance. Other entrepreneurs than farmers can choose with which pension provider they take out pension insurance. Personal pension schemes are typically more frequent among self-employed persons than among employees. According to a study carried out in 2001, one fourth of the self-employed persons had a personal pension scheme, whereas not quite 10 per cent of the employees had such insurance.

A.3. The pension system in Germany

1. Structure

The German pension system consists out of three pillars:(1) public retirement insurance, (2) occupational schemes, and (3) individual provisions. The German system is very dependent on the first pillar and 2001 pension reforms aimed at expanding pillar 2 and 3. Another major pension reform occurred in 1992, a minor one in 1999. In 1995 the benefit shares per pillar of the total benefits were as follows: first pillar 71%, second pillar 7%, third pillar 22%. We briefly describe the three pillars and go than into more detail about the first pillar. **Pillar 1**: The *public retirement insurance* is pay-as-you go funded and compulsory for a vast majority of the people (except for self-employed and until 1998 for workers with earnings below the official minimum earnings threshold: 15% of average monthly gross wage). This first pillar covers about 85% of the German workforce. Most of these work in the private sector, some are public sector workers who are not civil servants. Civil servants about 7% of the workforce, have their own pension system. The self-employed, about 9% of the work force, are mainly self-insured although some of them participate in the public retirement insurance system. **Pillar 2**: In Germany there are four different forms of *occupational pension provision*: (1) direct entitlements, (2) pension funds, (3) support funds and (4) direct insurance. Direct entitlements – a form of direct benefit schemes - are the main way for financing pension schemes in big firms. Direct insurance is becoming popular in small firms. About 50% of the labor force is covered by occupational pension schemes. As far as employees are concerned the larger the company, the more likely you are to receive a supplementary pension.
Pillar 3: *Individual provisions*: In principle any form of private assets may be used to secure a reasonable standard of living in old age. Property is by far the most important form of private provision. Real estate represents two thirds of private assets, compared with life insurance, for example, which represents only 7% (European Commission, 2000).

2. Employees (private sector)

Old-age pensions: The legal retirement age is 65. However, the German public retirement insurance provides old-age pensions for workers aged 60 and older (the law allows certain groups of people to draw a pension early: women, unemployed, the seriously disabled, people who have paid contributions for many years), disability benefits for workers below age 60 which are converted to old-age pensions latest at

age 65, and survivor benefits for spouses and children. In addition, pre retirement (retirement before age 60) is possible through several mechanisms using the public transfer system, mainly unemployment compensation. A reduction in the pension if it is drawn early is being gradually introduced. The possibility of early retirement is being standardized for men and women in the long term.

Eligibility for benefits and the minimum retirement age depend on which type of pension the worker chooses. The German public retirement insurance distinguishes 5 types of old-age pensions, corresponding to normal retirement and 4 types of early retirement: (1) *normal retirement* is possible at age 65 after 5 years of service, (2) *flexible retirement* is possible at age 63 if at least 35 years of service, (3) *Women* can retire at age 60 if they worked at least 15 years, (4) *Older disabled* can retire at age 60 if they worked at least 35 years. (5) *Unemployed* can retire at age 60 if they worked at least 15 years and have been 1.5 to 3 years unemployed. As opposed to the disability insurance for workers below age 60, full benefits are paid in all 5 of the above pension schemes.

Disability pension: Disability pension benefits can be received if passing a strict earnings test (full benefits) or a weaker earnings test (before age 60: 60% of applicable old-age pension). Survivor pensions are 60% of the husband's applicable pension for spouses that are 45 and over or if children are in the household, otherwise 25%. Survivor benefits are a large part of the public pension budget and of total pension wealth. In addition to the above benefits, transfer payments enable what is referred to as "pre-retirement". Labor force exit before age 60 is frequent: about 45% of all men call themselves retired at age 59. Only half about them retire because of disability; the other half made use of the many official and unofficial pre-retirement schemes.

Unemployment pension: Unemployment compensation has been used as pre-retirement income in an unofficial scheme that induced very early retirement from age 56 onwards as unemployment compensation is paid up to three years for elderly workers and is followed by the lower unemployment aid before an unemployment pension could start at age 60. In addition early retirement at age 58 was made possible in an official (less popular) pre-retirement scheme, in which the employer received a subsidy if a younger employee was hired.

For the average German income worker the net replacement rates are 68% at age 63, 73% at age 64, 78% at age 65, 82% at age 66, 86% at age 67, 91% at age 68, 96% at age 69 and 100% at age 70. For the average German income worker the net replacement rates for the disability pension: are 60% at age 55 and rise stepwise to 76% at age 64. For the average German income worker the net replacement rates for the unemployment benefits are 60% till age 63, 68% at age 63, 72% at age 64 (OECD, 2004). The fraction of those who enter retirement through a disability pension has declined and was 29% in 1998. Only about 20% of all entrants used the normal pathway of an old-age pension at age 65. The most popular retirement age is 60.

Benefits are strictly work-related. The German system does not have benefits for spouses like in the U.S. but has survivor benefits. Benefits are computed on a lifetime basis and adjusted according to the type of pension and retirement age. They are the

product of 4 elements: (1) The earnings point (EP): the employee's relative earnings position, (2) the years of service life (YS), (3) adjustment factors for pension type and (since the 1992 reform) retirement age (AF), and (4) a reference pension value, the "current pension value" (PV). The first 3 factors make up the "personal pension base" while the fourth factor determines the income distribution between workers and pensioners in general.

Benefit = EP*YS*AF*PV

The employee's relative contribution position (EP) is computed by averaging her or his annual relative contribution positions over the entire earnings history. In each year, the relative contribution position is expressed as a multiple (minimum 75%) of the average annual contribution (roughly speaking, the relative income position).

Years of service life (YS) are years of active contributions plus years of contribution on behalf of the employee and years that are counted as service years even when no contribution were made at all like years of unemployment, years of military service, three years for each child's education for one of the parents, some allowance for advanced education. The official government computations such as the official replacement rate assume a 45 years contribution history for what is deemed a "normal earnings history". In fact, the average number of contributions is about 38 years. There is neither an upper bound of years entering the benefit calculation, nor can workers choose certain years in their earnings history and drop others.

Depending on the pension type different adjustment factors (AF) with values between 0.25 and 1 apply. Between 1992 and 1998, the pension value (PV) was determined by indexation to the average net wages, before it was indexed to gross wages. In 1999 and 2000 pensions were indexed to the respective previous year's rate of inflation.

The average pension has provided a generous pension system for middle-income earnings. The net replacement rate for a worker with a 45-year contribution history was 70.5% in 1998. For an average worker with 38 years of contributions, it is reduced in proportion to 59.5%.

The 1992 social security reform and its subsequent modifications decided to raise the age limits of the early retirement types gradually to age 65. Before 1992 adjustment of benefits to retirement age was only implicit via years of service. With a constant income profile and 40 years of service, each year of earlier retirement decreased pension benefits by 2.5 percent. By the year 2004 age 65 will act as the pivotal age for benefit computations. For each year of earlier retirement (up to five years) benefits will be reduced by 3.6 percent (in addition to the effect of fewer service years). Rewards for later retirement increase the pension by 6 percent in addition to the increase by the number of service years.

3. Public sector

There are two types of workers in the public sector: civil servants and other public sector workers (see infra). Civil servants do not pay explicit contributions for their pensions. Civil servants acquire pension rights that are very generous compared to

workers in the private sector and receive about 75% of their last contributory gross salary.

There are three pathways to retirement for civil servants: (1) standard retirement at age 65, (2) early retirement before 1 July 1997 from age 62 on (63 after 1 July 1997). Discount factors for early retirement are phasing in linearly between 1998 and 2003 and will reach 0.3 percentage points per month of early retirement like in the private sector. (3) Disability pension that is based on the previous salary is a third possibility for civil servants. The replacement rate depends on the number of service years reached before disability retirement and the number of service years that could potentially have been accumulated by the age of 60. By those who did not reach the maximum replacement rate before disability, one additional year of service raises the replacement rate by only 0.33 percentage points per year.

Benefit = r(service years)*last gross wage*adjustment factors if not retiring at age 65

The standard pension for civil servants is the product of three elements: (1) the last gross earnings level, (2) the replacement rate as a function of service years (includes also high school and college education (3 years after 1997), military service), and (3) the new adjustment factors for early retirement. The three important differences with private sector benefits are: (1) benefit base is gross, not net income as it was in the private sector between 1992 and 1998, (2) civil servants' pensions are taxed like any other income, and (3) the benefit base is the last salary, not the life-time average.

For persons retiring after January 1, 1992 the replacement rate grows by 1.875 percentage points for each year of service. Maximum value is reached after 40 years of service. However there are transitional modifications to that simple rule. Benefits are indexed to the growth rate of the net earnings of active civil servants. Due to the difference in the benefit base, gross pensions of civil servants are ceteris paribus about 25 % higher than in the private sector. The maximum replacement rate is 75% (higher than 75%) of gross-earnings (of net-earnings) which is considerably higher than the official replacement rate of the private sector system, which is around 70% of net earnings. Te average retirement age in the public sector is about one year lower than in the private sector. Disability is the most important pathway to retirement for civil servants (about 40% in 1993). About one third used the early retirement channel at age 62. Only about 20% retired at the regular retirement age of 65.

4. Self-employed

The self-employed, about 9% of the work force, are mainly self-insured, although some of them participate voluntary in the public retirement insurance system.

Table a1. Summary statistics- male sample of working individuals aged 50 to 69

male sample (age 50- age 69)	Belgium		Finland		Germany	
	1497	obs.	2064	obs.	4273	obs.
	Mean	st-dev.	Mean	st-dev.	Mean	st-dev.
Outflow from employment	9,52 %	0,93 %	6,25 %	0,68 %	11,47 %	0,68 %
Transition to inactivity	0,71 %	0,22 %	2,46 %	0,45 %	3,59 %	0,38 %
Transition to unemployment	8,69 %	0,90 %	3,83 %	0,52 %	7,68 %	0,57 %
Age	54,68	0,10	54,29	0,10	55,78	0,09
Primary education	28,29 %	1,33 %	33,45 %	1,45 %	10,93 %	0,62 %
Secondary education	32,66 %	1,43 %	36,92 %	1,44 %	52,79 %	1,10 %
Tertiary education	36,06 %	1,43 %	29,23 %	1,22 %	36,08 %	1,05 %
Married	97,62 %	0,40 %	92,96 %	0,84 %	98,09 %	0,22 %
Cohabitation	99,79 %	0,16 %	99,89 %	0,08 %	99,92 %	0,06 %
Separation/divorce /widowhood	1,91 %	0,34 %	3,98 %	0,68 %	1,37 %	0,19 %
Children 0-13	3,75 %	0,53 %	10,01 %	2,34 %	9,87 %	0,83 %
Children 0-15	8,50 %	0,80 %	24,35 %	3,69 %	17,56 %	1,10 %
Household size	3,06	0,03	2,68	0,05	2,94	0,03
Non-national	4,87 %	0,56 %	1,17 %	0,31 %	9,35 %	0,67 %
Net annual salary/wage (10000 Euro's)	2,26	0,04	2,75	0,06	2,50	0,04
Gross annual salary/wage (10000 Euro's)	4,24	0,09	4,39	0,10	4,42	0,10
Capital income (10000 Euro's)	0,24	0,04	0,23	0,06	0,26	0,02
Owner occupied	92,55 %	0,74 %	86,76 %	0,97 %	66,58 %	0,96 %
Satisfaction with work (rising scale: 1 to 6)	4,57	0,04	3,99	0,06		
Satisfaction with leisure (rising scale: 1to 6)	4,19	0,04	3,80	0,06		
Low work status	40,57 %	1,46 %	47,83 %	1,48 %		
High work status	22,08 %	1,23 %	23,25 %	1,14 %		
Working experience	30,80	0,12	30,71	0,11	31,39	0,09
Hours (total, weekly)	42,52	0,30	41,59	0,31	42,90	0,21
Hours (main job, weekly)	41,93	0,30	41,00	0,31	42,56	0,21
Part time	2,27 %	0,48 %	5,66 %	0,67 %	0,30 %	0,09 %
Self employment	9,13 %	0,86 %	14,99 %	0,96 %	0,94 %	0,19 %
Public employment	25,18 %	1,24 %	28,60 %	1,25 %	26,23 %	0,89 %
Firm size < 20	14,46 %	1,03 %	33,80 %	1,34 %	13,00 %	0,72 %
Managers, professionals	26,53 %	1,28 %	26,01 %	1,15 %	27,40 %	0,99 %
Technicians	13,26 %	1,03 %	19,44 %	1,08 %	17,75 %	0,89 %
Clerks, service workers	15,22 %	1,06 %	6,77 %	0,73 %	10,13 %	0,61 %
Blue-collar worker	19,13 %	1,17 %	36,71 %	1,51 %	39,15 %	1,05 %
Health (declining scale: 1 to 5)	1,85	0,04	0,98	0,11	2,74	0,02
Bad health	1,19 %	0,28 %	3,77 %	0,56 %	16,74 %	0,92 %
Good health	81,44 %	1,08 %	49,62 %	1,47 %	39,33 %	1,06 %
Chronic physical/mental health problem	11,67 %	0,92 %	36,75 %	1,36 %	39,54 %	1,10 %
Limitation	10,70 %	0,87 %	22,81 %	1,19 %	36,70 %	1,09 %
Inpatient at a hospital	9,52 %	0,83 %	10,22 %	0,75 %	9,63 %	0,65 %
Hospital nights	0,60	0,13	0,54	0,06	1,50	0,14
1-5 visits to the doctor	55,44 %	1,48 %	63,15 %	1,38 %		
6+ visits to the doctor	35,58 %	1,42 %	25,28 %	1,22 %		
Spouse age difference	1,82	0,10	2,03	0,11	2,60	0,08
Spouse capital income (10000 Euro's)	0,10	0,01	0,09	0,02	0,02	0,00
Spouse annual net wages (10000 Euro's)	0,52	0,03	1,52	0,04	0,59	0,02
Spouse Old-age benefit receiver	8,07 %	0,75 %	7,21 %	0,66 %	4,65 %	0,45 %
Spouse Sickness-invalidity benefit receiver	6,80 %	0,71 %	18,19 %	1,08 %	2,47 %	0,27 %
Spouse inpatient at hospital	10,76 %	1,00 %	11,87 %	1,03 %	11,12 %	0,70 %
Spouse inactive	49,68 %	1,50 %	14,69 %	1,22 %	47,65 %	1,11 %
Spouse unemployed	8,67 %	0,88 %	7,59 %	0,74 %	7,04 %	0,51 %

Table a2. Summary statistics- female sample of working individuals aged 50 to 69

female sample (age 50- age 69)	Belgium		Finland		Germany	
	633	obs.	1920	obs.	2640	obs.
	Mean	st-dev.	Mean	st-dev.	Mean	st-dev.
Outflow from employment	8,61 %	1,27 %	6,42 %	0,63 %	14,73 %	1,30 %
Transition to inactivity	1,95 %	0,67 %	3,00 %	0,44 %	5,19 %	1,02 %
Transition to unemployment	7,40 %	1,15 %	3,44 %	0,46 %	8,99 %	0,91 %
Age	53,38	0,13	54,29	0,10	54,87	0,13
Primary education	20,10 %	1,70 %	36,00 %	1,38 %	26,34 %	1,41 %
Secondary education	35,95 %	2,19 %	32,91 %	1,37 %	58,15 %	1,56 %
Tertiary education	38,84 %	2,18 %	30,93 %	1,23 %	15,36 %	0,97 %
Married	95,88 %	0,80 %	93,47 %	0,74 %	96,95 %	0,39 %
Cohabitation	100,00 %	0,00 %	99,94 %	0,05 %	99,91 %	0,06 %
Separation/divorce /widowhood	2,46 %	0,60 %	4,18 %	0,60 %	2,84 %	0,38 %
Children 0-13	0,41 %	0,24 %	3,91 %	0,56 %	3,71 %	0,69 %
Children 0-15	3,19 %	0,70 %	9,67 %	0,87 %	4,63 %	0,72 %
Household size	2,74	0,04	2,47	0,02	2,56	0,04
Non-national	2,86 %	0,69 %	0,73 %	0,23 %	7,16 %	0,59 %
Net annual salary/wage (10000 Euro's)	1,43	0,04	2,04	0,03	1,21	0,03
Gross annual salary/wage (10000 Euro's)	2,68	0,07	3,08	0,05	2,07	0,04
Capital income (10000 Euro's)	0,19	0,04	0,10	0,02	0,03	0,01
Owner occupied	91,06 %	1,34 %	88,00 %	1,00 %	58,50 %	1,54 %
Satisfaction with work (rising scale: 1 to 6)	4,56	0,06	4,43	0,04		
Satisfaction with leisure (rising scale: 1to 6)	4,02	0,06	4,24	0,04		
Low work status	65,74 %	2,12 %	67,84 %	1,28 %		
High work status	8,00 %	1,34 %	8,27 %	0,75 %		
Working experience	29,22	0,17	30,76	0,11	31,36	0,15
Hours (total, weekly)	33,04	0,51	37,94	0,28	32,68	0,35
Hours (main job, weekly)	32,93	0,50	37,07	0,25	32,40	0,34
Part time	26,45 %	2,03 %	11,63 %	0,88 %	19,84 %	1,31 %
Self employment	4,90 %	0,81 %	5,33 %	0,53 %	0,37 %	0,12 %
Public employment	40,17 %	2,15 %	57,09 %	1,40 %	33,49 %	1,34 %
Firm size < 20	14,92 %	1,66 %	40,51 %	1,42 %	26,69 %	1,48 %
Managers, professionals	25,26 %	1,96 %	21,63 %	1,05 %	10,06 %	0,75 %
Technicians	11,44 %	1,28 %	16,42 %	1,05 %	21,83 %	1,23 %
Clerks, service workers	32,01 %	2,13 %	40,63 %	1,41 %	37,36 %	1,67 %
Blue-collar worker	7,27 %	1,08 %	14,31 %	1,07 %	22,96 %	1,35 %
Health (declining scale: 1 to 5)	1,92	0,05	1,82	0,07	2,75	0,03
Bad health	0,95 %	0,47 %	4,68 %	0,55 %	17,20 %	1,03 %
Good health	78,87 %	1,75 %	53,06 %	1,41 %	40,31 %	1,68 %
Chronic physical/mental health problem	8,94 %	1,32 %	38,86 %	1,38 %	38,64 %	1,47 %
Limitation	8,31 %	1,23 %	25,52 %	1,24 %	37,30 %	1,45 %
Inpatient at a hospital	10,13 %	1,38 %	11,78 %	0,97 %	9,38 %	0,83 %
Hospital nights	0,48	0,13	0,50	0,06	1,09	0,13
1-5 visits to the doctor	44,62 %	2,21 %	55,48 %	1,41 %		
6+ visits to the doctor	50,94 %	2,23 %	38,16 %	1,38 %		
Spouse age difference	-1,64	0,14	-1,76	0,12	-2,92	0,10
Spouse capital income (10000 Euro's)	0,73	0,25	0,27	0,07	0,18	0,03
Spouse annual net wages (10000 Euro's)	1,79	0,09	1,75	0,06	1,11	0,05
Spouse Old-age benefit receiver	15,02 %	1,61 %	16,36 %	0,98 %	22,98 %	1,67 %
Spouse Sickness-invalidity benefit receiver	7,09 %	1,22 %	24,92 %	1,26 %	5,74 %	0,57 %
Spouse inpatient at hospital	11,49 %	1,46 %	11,70 %	0,84 %	10,72 %	0,79 %
Spouse inactive	16,24 %	1,65 %	26,80 %	1,28 %	33,95 %	1,75 %
Spouse unemployed	3,51 %	0,75 %	6,54 %	0,65 %	7,74 %	0,71 %

Table a3. Multinomial logit model estimates for male members of elderly two-adult households in Finland.

	Men					
	unemployed		inactive		employed	
	M.E.	z-value	M.E.	z-value	M.E.	z-value
Age	0.0013346	1.47	0.0047257	5.13	-0.0060603	-4.55
Married	0.0174714	3.49	0.0111841	2.63	-0.0286555	-4.24
Number of children 0-13	-0.0003347	-0.06	-0.0129073	-1.43	0.013242	1.25
Tertiary education	0.0036656	0.38	-0.0053085	-0.86	0.0016429	0.14
Inpatient at hospital	0.0090499	0.95	0.0000957	0.01	-0.0091456	-0.79
Bad health	0.0013173	0.08	0.1281217	2.41	-0.1294389	-2.40
Annual net wages	-0.0103675	-3.07	-0.0026507	-0.81	0.0130182	2.73
Capital income	0.0036755	2.52	0.0004175	0.26	-0.0040931	-1.77
Satisfaction with work	-0.0047472	-1.86	0.000641	0.26	0.0041062	1.09
Satisfaction with leisure	0.0049897	1.92	-0.0008456	-0.35	-0.004144	-1.15
Supervisory job status	-0.0056911	-0.88	-0.0088991	-1.55	0.0145902	1.63
Part time	-0.0137071	-2.86	0.0197593	1.18	-0.0060522	-0.33
Self employment status	-0.0170636	-2.60	-0.0124557	-2.57	0.0295194	3.52
Public employment	-0.0036107	-0.53	0.0104222	1.62	-0.0068115	-0.71
Firm size < 20	0.0026077	0.39	0.0016282	0.31	-0.004236	-0.47
Managers, professionals	0.0023867	0.16	-0.0036584	-0.44	0.0012717	0.07
Technicians	-0.0025928	-0.37	-0.0047753	-0.93	0.0073681	0.82
Clerks, service workers	-0.003407	-0.35	0.0047159	0.41	-0.001309	-0.09
Spouse age difference	-0.0005852	-0.79	0.0005131	0.72	0.0000722	0.07
Spouse capital income	-0.0024529	-0.36	0.0017553	3.27	0.0006975	0.10
Spouse annual net wages	0.004003	1.26	0.000786	0.28	-0.0047889	-1.10
Sickness-invalidity benefit receiver	0.0083112	0.92	0.001457	0.23	-0.0097681	-0.88
Spouse inpatient at hospital	0.006243	0.55	-0.0012251	-0.20	-0.0050179	-0.39
Spouse inactive	0.0316789	1.58	0.0183483	1.14	-0.0500272	-1.89
Spouse unemployed	0.0369563	1.19	0.0231289	1.15	-0.0600852	-1.59
Year 1996	0.0261038	1.30	0.0022157	0.26	-0.0283196	-1.31
Year 1997	0.0157445	0.94	0.017127	1.50	-0.0328715	-1.65
Year 1998	0.0136193	0.84	0.0109535	0.98	-0.0245728	-1.25
Year 1999	0.0365331	1.43	0.0124622	1.03	-0.0489953	-1.72
Observations	1541	47		92		1402
Percent correctly predicted	91.48					
Log likelihood	-383.93					
Pseudo R-squared	0.2766					

Table a4. Multinomial logit model estimates for female members of elderly two-adult households in Finland.

	Women					
	unemployed		inactive		employed	
	M.E.	z-value	M.E.	z-value	M.E.	z-value
Age	0.0004662	0.81	0.0034576	4.01	-.0039238	-3.69
Married	0.0063802	1.19	0.0071139	2.36	-0.0134941	-2.18
Number of children 0-13	-0.0003315	-0.05	0.015237	2.34	-0.0149055	-1.24
Tertiary education	-0.0061538	-1.10	-0.0078526	-2.14	-.0140064	2.00
Inpatient at hospital	0.0008543	0.16	0.0057264	0.99	-0.0065807	-0.84
Bad health	0.0039042	0.41	0.025735	1.59	-0.0296392	-1.71
Annual net wages	-0.0206373	-3.92	-0.0048009	-1.14	0.0254382	3.91
Capital income	-0.005272	-0.45	0.001205	2.61	0.0040671	0.35
Satisfaction with work	-0.0023923	-1.32	0.0011699	0.79	0.0012224	0.51
Satisfaction with leisure	0.0028176	1.69	0.0013096	0.97	-0.0041273	-1.86
Supervisory job status	-0.0068643	-1.09	0.0007707	0.12	0.0060936	0.71
Part time	-0.0075088	-2.35	0.0001465	0.03	0.0073622	1.38
Self employment status	-0.0130526	-2.91	-0.0070019	-2.33	0.0200545	3.70
Public employment	-0.006093	-1.40	0.0033129	1.09	0.0027801	0.52
Firm size < 20	0.0080796	1.76	-0.0017694	-0.60	-0.0063102	-1.13
Managers, professionals	0.0250863	0.91	0.0246661	1.23	-0.0497523	-1.54
Technicians	0.0577785	1.81	0.0025032	0.43	-0.0602817	-1.86
Clerks, service workers	0.0181498	1.82	-0.0021636	-0.57	-0.0159862	-1.47
Spouse age difference	0.000214	0.41	0.0002458	0.67	-0.0004598	-0.72
Spouse capital income	0.0010006	0.60	-0.0006591	-1.47	-0.0003415	-0.20
Spouse annual net wages	-0.0008912	-0.59	-0.0007672	-0.58	0.0016585	0.81
Sickness-invalidity benefit receiver	-0.0013499	-0.31	0.0029552	0.67	-0.0016053	-0.25
Spouse inpatient at hospital	-0.0043124	-1.12	-0.0009207	-0.29	0.0052331	1.06
Spouse inactive	-0.0022948	-0.42	0.0039157	0.71	-0.0016209	-0.20
Spouse unemployed	-0.0104079	1.02	-0.0013419	-0.33	-0.009066	-0.83
Year 1996	0.0058375	0.83	-0.0041841	-1.51	-0.0016534	-0.22
Year 1997	-0.0024725	-0.51	0.0024083	0.50	0.0000642	0.01
Year 1998	0.0035325	0.63	-0.0013132	-0.33	-0.0022193	-0.32
Year 1999	-0.003217	-0.67	-0.0030803	-0.93	0.0062973	1.12
Observations	1470	60		75		1335
Percent correctly predicted	92.14					
Log likelihood	-332.63468					
Pseudo R-squared	0.3175					

Table a5. Multinomial logit model estimates for male members of elderly two-adult households in Germany.

	Men					
	unemployed		inactive		employed	
	M.E.	z-value	M.E.	z-value	M.E.	z-value
Age	0.0004536	0.92	0.0094001	5.24	-0.0098537	-5.33
Married	-0.0193902	-1.59	-0.0332984	-0.66	0.0526886	0.96
Number of children 0-13	0.0056198	1.12	-0.0307417	-1.40	0.0251219	1.12
Tertiary education	0.0108298	1.88	0.0075139	0.71	-0.0183437	-1.47
Inpatient at hospital	-0.0022896	-0.66	0.0292056	1.99	-0.026916	-1.76
Bad health	0.001839	0.55	0.0390211	2.72	-0.0408601	-2.72
Annual net wages	-0.0184659	-7.61	-0.0377942	-5.67	0.0562601	7.57
Capital income	0.0010685	0.75	0.0065242	4.90	-0.0075927	-3.74
Part time	-0.0144425	-4.80	-0.0096802	-0.21	0.0241227	0.52
Self employment status	-0.0129103	-4.90	-0.0384198	-4.98	0.0513302	6.15
Public employment	-0.0054964	-1.75	0.0019119	0.21	0.0035845	0.36
Firm size < 20	0.0024129	0.51	-0.0157704	-1.80	0.0133576	1.32
Managers, professionals	-0.002827	-0.68	0.0233218	1.59	-0.0204948	-1.29
Technicians	-0.0027092	-0.66	0.0032807	0.26	-0.0005716	-0.04
Clerks, service workers	-0.0071886	-2.29	0.0221194	1.34	-0.0149308	-0.86
Spouse age difference	-0.0000722	-0.17	0.0004074	0.38	-0.0003353	-0.27
Spouse capital income	0.0045654	2.07	-0.0302107	-0.52	0.0256452	0.45
Spouse annual net wages	-0.0067104	-2.46	-0.004854	-0.50	0.0115644	1.11
Sickness-invalidity benefit receiver	0.0115463	1.16	-0.02188	-2.47	0.0103337	0.84
Spouse inpatient at hospital	0.0016662	0.44	0.0232261	1.73	-0.0248923	-1.76
Spouse inactive	-0.0006873	-0.15	0.0162398	1.00	-0.0155525	-0.87
Spouse unemployed	0.004478	0.72	0.0041498	0.23	-0.0086278	-0.43
Year 1994	-0.0088694	-2.40	0.03412	1.45	-0.0252507	-1.07
Year 1995	-0.0069201	-1.68	0.039249	1.80	-0.0323289	-1.44
Year 1996	-0.0032755	-0.66	0.0057169	0.37	-0.0024415	-0.15
Year 1997	-0.0051058	-1.15	-0.0097715	-0.77	0.0148773	1.07
Year 1998	-0.0034706	-0.67	0.0219758	1.15	-0.0185053	-0.92
Year 1999	-0.0056961	-1.15	0.000006	0.00	0.0056899	0.37
Observations	3632	198		299		3135
Percent correctly predicted	87.44					
Log likelihood	-1322.2668					
Pseudo R-squared	0.2223					

Table a6. Multinomial logit model estimates for female members of elderly two-adult households in Germany.

	Women					
	unemployed		inactive		employed	
	M.E.	z-value	M.E.	z-value	M.E.	z-value
Age	-0.0006239	-0.64	0.0044312	2.16	-0.0038074	-1.47
Married	0.0030548	0.29	-0.0469918	-0.88	0.043937	0.82
Number of children 0-13	-0.0007902	-0.07	-0.0123368	-0.55	0.013127	0.44
Tertiary education	0.0142608	1.26	0.0128787	0.99	-0.0271394	-1.51
Inpatient at hospital	0.0011507	0.16	0.023257	1.36	-0.0244077	-1.24
Bad health	0.0067005	0.73	0.0336701	2.39	-0.0403706	-2.28
Annual net wages	-0.0608455	-3.91	-0.0995314	-6.09	0.160377	6.34
Capital income	0.0180243	1.13	0.0666898	1.78	-0.0847141	-1.75
Part time	-0.0261276	-3.02	-0.0013075	-0.13	0.0274351	1.95
Self employment status	-0.0176863	-2.46	-0.0112088	-0.40	0.0288951	0.97
Public employment	0.0163432	1.92	0.0178503	1.72	-0.0341935	-2.63
Firm size < 20	-0.0129495	-2.42	-0.00563	-0.46	0.0185795	1.25
Managers, professionals	0.0272733	1.31	0.0093263	0.31	-0.0365996	-0.87
Technicians	0.0034596	0.40	0.0432573	1.81	-0.046717	-1.75
Clerks, service workers	0.0059465	0.87	0.0216843	1.32	-0.0276308	-1.51
Spouse age difference	0.0005986	0.66	-0.0001056	-0.07	-0.000493	-0.26
Spouse capital income	-0.0452474	-1.85	0.0052376	1.81	0.0400098	1.61
Spouse annual net wages	0.0002226	0.06	-0.0021522	-0.58	0.0019296	0.43
Sickness-invalidity benefit receiver	0.0122339	0.88	-0.0140121	-0.97	0.0017782	0.09
Spouse inpatient at hospital	0.0019609	0.24	0.006558	0.43	-0.0085189	-0.47
Spouse inactive	0.0212058	1.83	0.0031933	0.23	-0.0243991	-1.21
Spouse unemployed	0.0200562	1.20	0.0002273	0.02	-0.0202835	-0.90
Year 1994	-0.0074483	-0.94	0.0105412	0.50	-0.0030929	-0.13
Year 1995	-0.0116749	-1.92	0.0262476	1.11	-0.0145727	-0.59
Year 1996	-0.0076368	-0.85	0.0092326	0.51	-0.0015958	-0.08
Year 1997	-0.0147547	-2.47	0.0113084	0.60	0.0034463	0.17
Year 1998	-0.0131342	-2.05	0.0048918	0.32	0.0082424	0.45
Year 1999	-0.0157989	-2.21	0.0146234	0.72	0.0011754	0.05
Observations	2217	143		185		1889
Percent correctly predicted	86.94					
Log likelihood	-864.92889					
Pseudo R-squared	0.2847					

Table a7. Probit model estimates of the determinants of the outflow from employment of male and female members of elderly two-adult households in Belgium.

	Men		Women	
	M.E.	z-value	M.E.	z-value
Age	0.0157052	8.60	0.0116195	3.32
Married	-0.1074019	-2.23	-0.0530992	-0.72
Number of children 0-13	-0.0090597	-0.27		
Tertiary education	-0.0006404	-0.04	0.0937736	2.44
Inpatient at hospital	-0.0019337	-0.11	0.0619283	1.29
Bad health	-0.0033712	-0.06	-0.041541	-0.82
Annual net wages	-0.0529514	-2.93	-0.105082	-3.91
Capital income	0.0123591	2.22	-0.0001296	-0.01
Satisfaction with work	-0.0123736	-2.41	-0.0191479	-2.93
Satisfaction with leisure	0.0051204	0.97	0.0118374	1.57
Supervisory job status	0.0053513	0.25	0.1236832	1.58
Part time	0.0136584	0.33	-0.0270052	-1.21
Self employment status	-0.0732105	-4.78	-0.0235071	-0.59
Public employment	-0.0163961	-1.14	-0.0357231	-1.53
Firm size < 20	-0.0302968	-1.88	-0.0001182	-0.00
Managers, professionals	-0.0186661	-1.00	-0.0405894	-1.25
Technicians	-0.017942	-0.90	-0.0581662	-2.36
Clerks, service workers	-0.031151	-1.83	-0.0512308	-2.10
Spouse age difference	-0.0014225	-0.61	-0.0031216	-0.84
Spouse capital income	-0.0207268	-0.87	-0.0099949	-1.40
Spouse annual net wages	0.0017559	0.14	0.001104	0.13
Sickness-invalidity benefit receiver	0.0030577	0.12	-0.0067334	-0.21
Spouse inpatient at hospital	0.0020888	0.10	0.0320663	0.91
Spouse inactive	0.0433715	2.16	-0.0149681	-0.42
Spouse unemployed	0-.0088371	-0.31	0.1280286	1.99
Year 1994	0.020296	0.60	0.0886269	1.32
Year 1995	-0.0018015	-0.08	0.0879575	1.26
Year 1996	0.0323635	0.96	0.0644971	0.99
Year 1997	0.0648588	1.67	0.0609431	0.98
Year 1998	0.0502341	1.28	0.1544637	1.91
Year 1999	0.0180968	0.51	-0.0271042	-0.83
Observations	1186		493	
Percent correctly predicted	89.93		86.96	
Log likelihood	-308.38704		-131.87271	
Pseudo R-squared	0.2685		0.2290	

Figure 1: Age profile of the outflow and synchronised outflow from employment per country (left) and age profile from the outflow to inactivity and unemployment

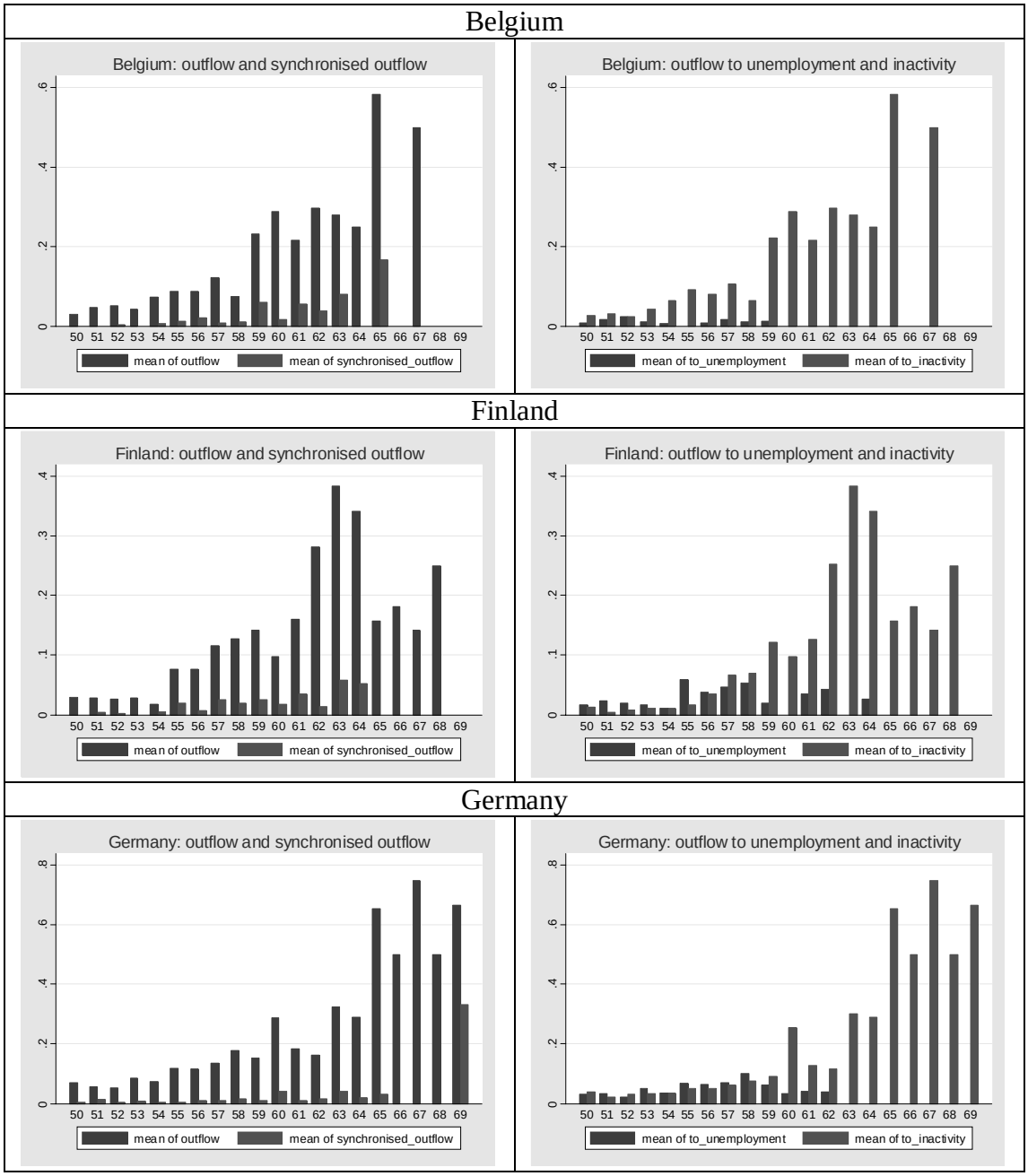
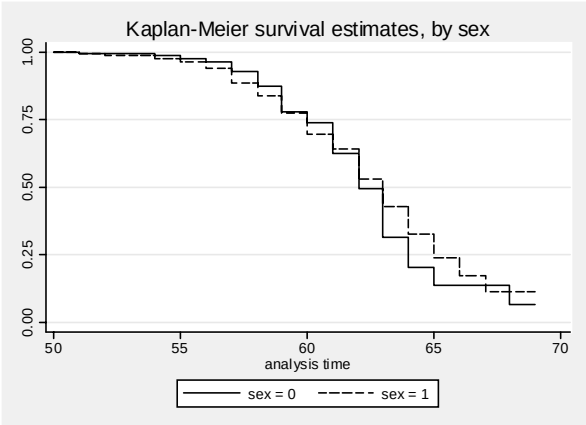
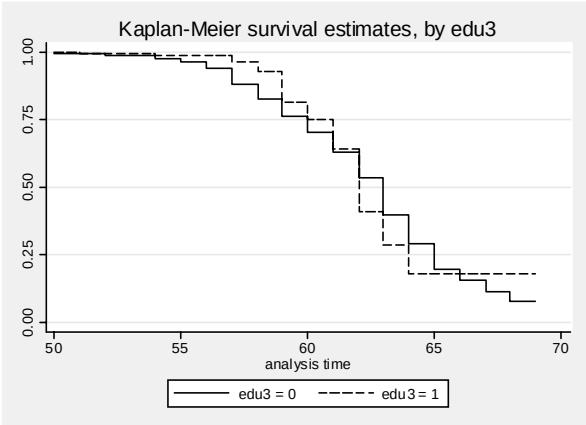


Figure 2: Kaplan-Meier survivor functions per country comparing men and women and tertiary education versus lower education levels.

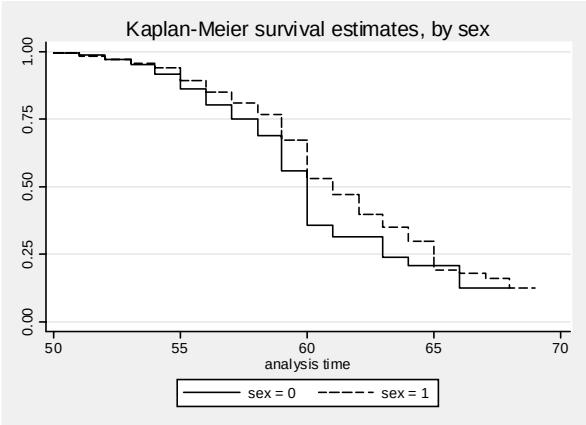
Finland (men versus women)



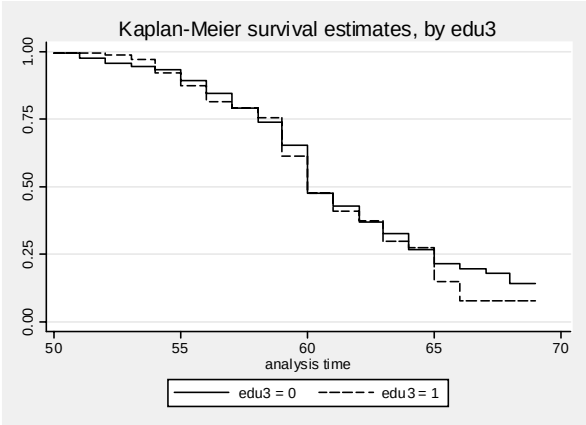
Finland (tertiary education)



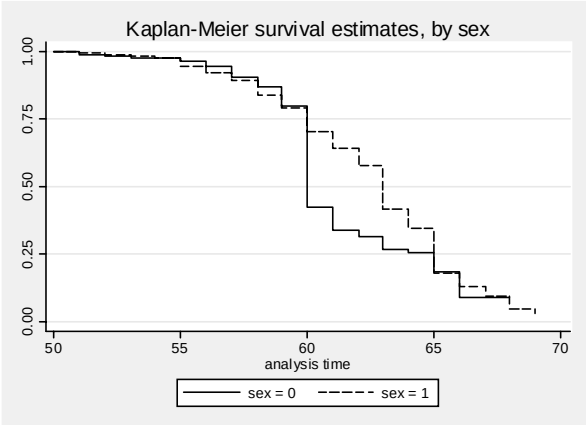
Belgium (men versus women)



Belgium (tertiary education)



Germany (men versus women)



Germany (tertiary education)

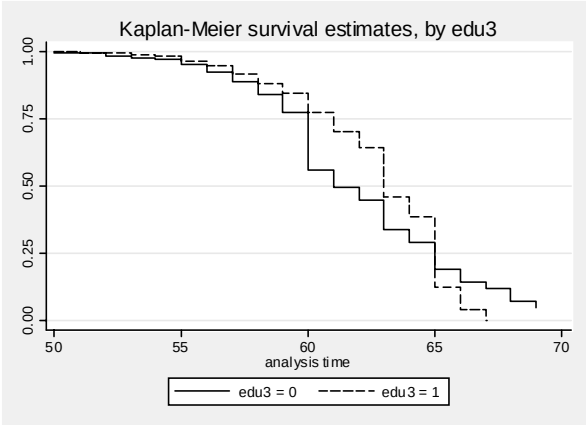


Figure 3: Kaplan-Meier survivor functions per country comparing bad health versus good and fair health and limitation versus non-limitation.

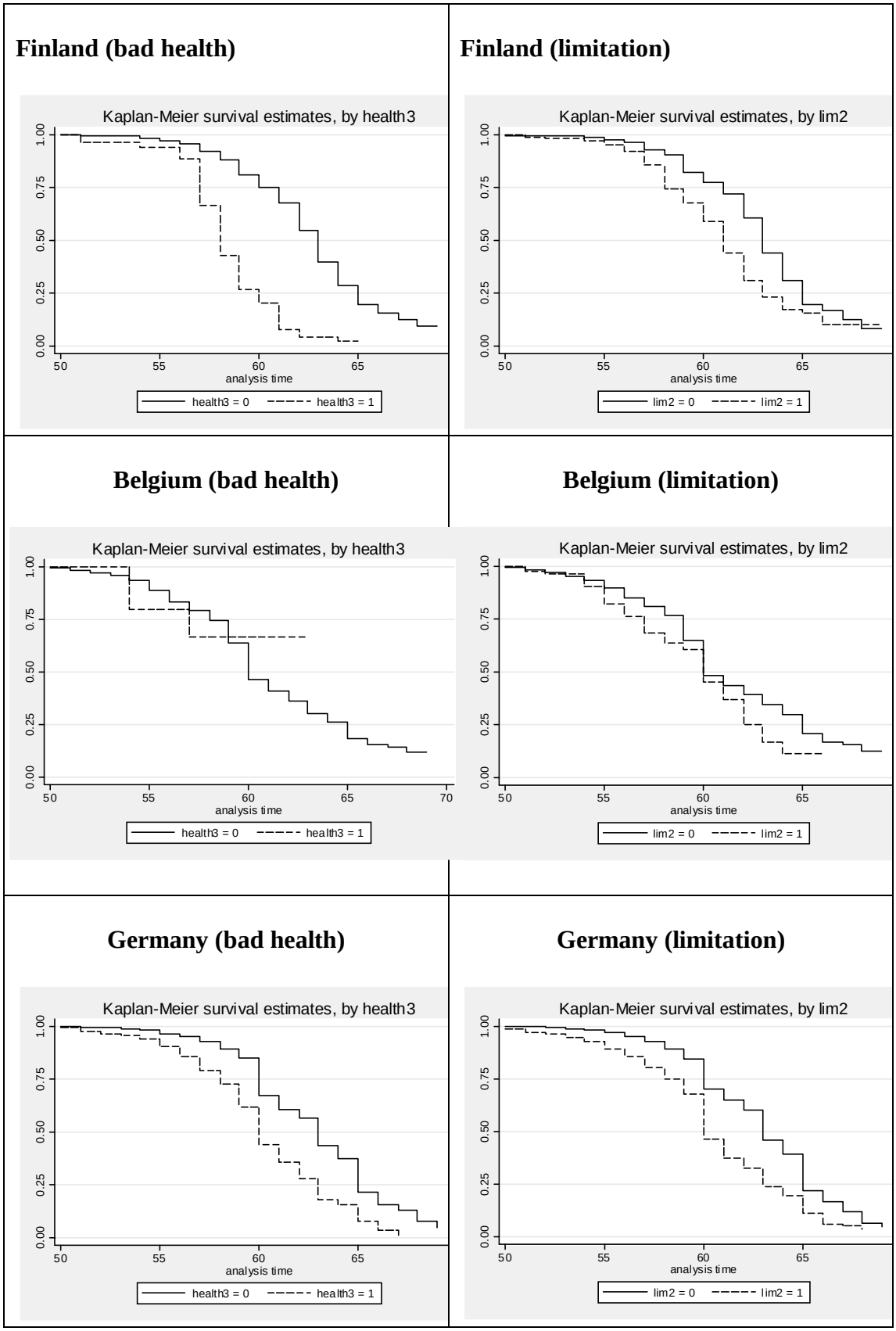


Figure 4: Kaplan-Meier survivor functions per country comparing men and women and tertiary education versus lower education levels.