

# Does early retirement increase poverty among Belgian elderly?

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## Abstract

*A new administrative dataset on incomes(1991-2002) merged with the National Register and the Socio-economic survey of 2001 was used to study the poverty dynamics of Belgian elderly that are in the transition from work to retirement. It is shown that although the static poverty rates turn around 12% in a given year, 33% of Belgian elderly is once confronted with poverty over a period of 12 years. The estimation of a discrete-time hazard model showed that poverty transitions are strongly related to the entry in different retirement pathways and social security systems and to changes in household composition. It was found that 1)the social security system of the self-employed, that is financially unsustainable, is not effective neither in combating poverty nor in insuring social risks, 2) entering the system of elderly unemployed and early retirement schemes before the age of 57 is associated with a strong risk of poverty entry.*

## 1. Introduction

OECD studies<sup>1</sup> and other studies<sup>2</sup> argued several times that working is an effective means of staying out of poverty. At a first glance this seems difficult to reconcile with the fact that most OECD countries designed social security systems that strongly encourage elderly to stop working as soon as possible<sup>3</sup>. Given the fact that youth unemployment is left unaffected by early retirement of older workers<sup>4</sup> and that early retirement threatens the financial sustainability of social security systems, it becomes hard to understand why the Belgian government continues to encourage early retirement, especially if the latter increases the risk of poverty among elderly. A better understanding of the poverty experience of the Belgian elderly in transition from work to retirement is the explicit focus of this paper.

Most poverty studies refer to the elderly as those 65<sup>5</sup> and older while the rest of the population is associated to the working population or population of working age. The poverty experience of the age group 50 -65 is seldom studied in depth as far as we know<sup>6</sup>. In most OECD countries, the latter group includes those people that are in a transition period from work towards effective retirement from the labour market.

In addition to their focus on elderly above 65, poverty studies<sup>7</sup> mainly concentrate on the cross-sectional and static dimension rather than the dynamics of poverty. This is a bit surprising since

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<sup>1</sup> OECD(2007), OECD(2005a), OECD(2005b), Förster(2000), Casey- Yamada(2002).

<sup>2</sup> Jenkins-Rigg(2001).

<sup>3</sup> Gruber-Wise(2002), Fenge-Pestieau(2005), Blondal-Scarpetta(1998),...

<sup>4</sup> Boldrin et alii(1999), Fenge-Pestieau(2005)..

<sup>5</sup> Förster(2000), Engelhardt-Gruber(2004), Jäntti-Danziger(2000),Heinrich(2000),Smeeding(2007), ....

<sup>6</sup> Casey-Yamada(2002), Hauser(1997), Bonsang-Perelman-Delhause(2002), Dirven-Fouarge(1996), Makovec(2005).

<sup>7</sup> One exception is Bardasi-Jenkins-Rigg(2000).

flows into and out of poverty, its degree of persistence and recurrence are of particular interest for understanding the phenomenon of poverty and developing effective anti-poverty policies as shown by Bane-Ellwood(1986), Stevens(1999), Devicienti(2001), Jenkins(2000). As Ellwood(1998) noted: “Dynamic analysis gets us closer to treating causes, where static analysis often leads us towards treating symptoms...If for example, we ask who are the poor today, we are led to questions about the socioeconomic identity of the existing poverty population. Looking to policy, we then typically emphasize income supplementation strategies. The obvious static solution to poverty is to give the poor more money. If instead, we ask what leads people into poverty, we are drawn to events and structures, and our focus shifts for ways to ensure people escape poverty”<sup>8</sup>

Recently VanKerm(2004), Makovec(2005) and Dewilde(2004) modelled the dynamics of poverty in Belgium on the basis of the Panel Study of Belgian Households(=PSBH) but got contrasting results. The availability of a new longitudinal administrative dataset on income of the Belgian elderly complemented with socio-economic survey information at the individual level provides new opportunities. This paper aims therefore, on the basis of a new dataset, to shed a new light on the dynamics of poverty among Belgian elderly by relating poverty transitions to the entry in different retirement pathways and social security systems and to changes in household composition.

This paper is structured as follows. Section 2 explains the matching between the administrative dataset and socio-economic survey and how individuals out of the Income Tax Returns data could be integrated. Section 3 exploits the potential of our dataset for a dynamic analysis of poverty. The probability of poverty exit, entry and reentry among Belgian elderly is described and related to changes in employment and social security status and household composition. Since individuals may experience several events f.e. jobloss and divorce at the same time, this descriptive analysis is complemented by a multivariate analysis in section 4. In particular, one estimates a discrete-time hazard model to identify the employment and household related events that have the highest likelihood to be associated with a transition into and out of poverty, while controlling for other events that may occur at the same time and duration of (non)poverty spells.

## **2. Data Construction**

The results presented below are derived from a micro-dataset provided by the National Institute for Statistics that contains information on 30183 Belgian households<sup>9</sup> of which at least one member is between 55 and 75 years old on 31 December 2001 and that were randomly selected out of the National Register. Of these 30183 households, one keeps the individuals that are between 55-75 years old in 2001. This reduces the number of individuals of the final dataset from 60806 to 43726.

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<sup>8</sup> p.9.

<sup>9</sup> That is 60806 individuals. A household is defined as the number of persons having the same domicile, as registered in the National Register. It can thus be composed of the head, its spouse, children, parents, grand-parents or other relatives. This may correspond to several fiscal household units. For example, two widowers or divorced individuals between 55-75 in 2001 living together but filling in separate tax files are two fiscal households but will be considered as one household. However, one does not know whether before 2001 these widowers or divorced individuals are really living in the same house. We suppose it is from the first observed year in which they are both declarant in the Income Tax Returns data.

These 30183 households have in the first place been connected to the Income Tax Returns data (1991 – 2002)<sup>10</sup> by means of the national identification number. This administrative dataset contains the yearly information necessary to calculate the income tax. The variables it includes are civil status, number and type of dependants in the household, gross capital income, the age and gross labour income of the household members, replacement incomes of the household members (old-age pension, early retirement, unemployment, illness or disability benefits, ...), housing wealth, pension benefits from the second and third pillar and employee contributions in the second and third pension pillars. Every year, about 87% of the individuals selected out of the National Register could be matched with the Income Tax Returns data. This means that in a given year about 13% of the Belgian civil population are not in the Income tax returns data.<sup>11</sup> However, only 4.2% of the individuals selected out of the National Register and between 55-75 years old in 2001 (that is 1844 of 43627) or 4.9% of the households (that is 1502 of 30183), do not appear in the Income tax returns data for any year 1991-2002. The stability over time in the percentage of individuals out of the Income tax returns masks thus considerable income mobility at the individual level in and out of the Income tax returns.

Interestingly the 30183 households selected out of the National Register could also be merged with the Socio-economic Survey of 2001 through the use of the national identification number. This survey has a response rate at the level of the individual of 98,7% and at the household<sup>12</sup> of 98,6%. It contains detailed information on education level, professional category (private sector employee, civil servant, self-employed,...), the sector the household member works or worked in (agriculture, banking, insurance, construction, transport, chemical industry,...) and also for the first time the health status.

<b>Table 1: Construction Dataset</b>		
	Number of households	Number of individuals
National Register	30183	60806
National register 55-75 years old	30183	43726
National Register 55-75 years old, matched with socio-economic survey of 2001	30183	43726
matched with Income Tax Returns	29760(matching: 98,6%)	43157(matching: 98,7%)
1991	25830 (matching:86,3%)	37423 (matching:86,7%)
1992	25515(matching: 84,5%)	37023 (matching: 84,67%)
1993	25559(matching: 84,6%)	37115 (matching: 84,88%)
1994	25326(matching: 83,9%)	36856 (matching: 84,29%)
1995	24778(matching: 82,0%)	36208 (matching: 82,80%)
1996	25566(matching: 84,7%)	37213 (matching: 85,10%)
1997	25727(matching: 85,2%)	37465 (matching: 85,68%)

<sup>10</sup> This implies that the individuals in our dataset are between 45 and 65 years old in 1992. Of all observations in the dataset, ages between 50-65 have thus the highest frequency. This sampling scheme also implies that individuals are sampled conditional on being alive in 2001.

<sup>11</sup> This confirms the finding of Perelman-Schleiper-Stewart(1998) that 13% of the Belgian population do not declare incomes.

<sup>12</sup> We consider a household as participating if at least one household member participates.

1998	25850(matching: 85,6%)	37651 (matching: 86,10%)
1999	25855(matching: 85,6%)	37677 (matching: 86,16%)
2000	25914(matching: 85,8%)	37764 (matching: 86,36%)
2001	25982(matching: 86,0%)	37819 (matching: 86,49%)
2002	26269(matching: 87,0%)	38213 (matching: 87,39%)
Number of individuals (households) that never appear in income tax returns data between 1992-2002: 1844 (1502 <sup>13</sup> )		
Number of individuals(households) that appear at least one year in income tax returns data between 1992-2002: 41882 (28681 <sup>14</sup> )		

As can be seen from table 1, the number of households is not for every year of the Income Tax Returns data the same: households may temporally or permanently drop out of the Income Tax Returns data. We included all households for each year they are present in the sample, even if they temporally or permanently drop out. In order to treat these unbalanced sample, one has to know the causes of these dropouts. According to Belgian fiscal law, are not obliged to declare incomes : 1° households without professional activity with an income below the minimum taxable income (except singles/widow(er)s with dependent children) and 2° households of which the income only consists of old-age pensions and housing wealth. It is unfortunately impossible to know whether a dropout is due to 1° or 2°. Individuals that drop out because of 1° may from the moment their income exceeds the minimum taxable income reappear in the income tax returns data. If that happens we qualify missing periods before the reappearance as periods in poverty. Table 2 shows how this correction reduces the number of unbalanced households. Individuals that drop out that do not reappear, will from that moment on never appear again in the income tax returns data. We treat these drop-outs as right-censored observations<sup>15</sup>.

Number of years observed	Number households after correction	% after correction	Number households before correction	% before correction
1	250	0.87	670	2.34
2	196	0.68	469	1.64
3	239	0.83	498	1.74
4	229	0.80	475	1.66
5	255	0.89	565	1.97
6	273	0.95	547	1.91
7	366	1.28	648	2.26
8	398	1.39	685	2.39
9	511	1.78	822	2.87
10	411	1.43	1166	4.07
11	796	2.78	2739	9.55
12	24757	86.32	19397	67.63
<i>TOTAL</i>	<i>28681</i>	<i>100.00</i>	<i>28681</i>	<i>100.00</i>

<sup>13</sup> 1635 households with a member that does not declare - 133 households where at least one member declares income.

<sup>14</sup> 28548 households where every member declares+133 households where at least one member declares income.

<sup>15</sup> However to the extent that the dropouts because of reason 1° cannot be considered as random censoring, the sample selection problem they might induce should be modeled explicitly. This is an issue for future research.

The correction reduces the missing observations thus from about 12% to 5.4% of total observations<sup>16</sup>.

The raw income data of the final dataset are adjusted in three steps to make them tell about the well-being of households. First, since net income is a better indicator of the living standard of the household than gross income, we calculate for every household its net income. Secondly, since all income data are nominal and the data is a time-series from 1992 to 2002, they were converted into real data<sup>17</sup> in order to represent purchasing power of households. In a third step we make net incomes comparable between households of different sizes and with different needs<sup>18</sup>. In order to allow for comparisons with other studies on poverty we chose the OECD scale that attributes 1 to the head of the household, 0.5 per additional adult and 0.3 per child.

In the next section, the focus of attention will be the head of the household<sup>19</sup> but the unit for calculating income is the household. This means the head of the household is qualified poor if the income of the household to which he pertains is below the poverty line. The latter is defined as 50% of median net<sup>20</sup> equivalised income of the whole economy.

### 3. Descriptive analysis of the dynamics of poverty<sup>21</sup>

The extensive longitudinal dataset, presented in the previous section, is well suited to exploit the dynamics of poverty. In this section, one will start with a description of the flows into and out of poverty, the distribution of periods spent in poverty, its persistence and recurrence. In addition we will analyze what changes in employment status and in household composition are most likely to be associated with poverty transitions. The results will be compared with Deleek-Cantillon(1992) that, to our knowledge, are the only to describe the dynamics of poverty on the basis of the SEP (Socio-Economic Panel) for the whole population<sup>22</sup>.

3.1. To start, table 3 shows the distribution of the total number of years spent in poverty.

Number of years in poverty	Number of households	% of those who are at least once poor	% of population
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<sup>16</sup> The number of missing observations (41096 out of a total of 344172(=12years times 28681 households) observations) consists of 18661 that never appear again and 22442 that reappear.

<sup>17</sup> With year 2002 as reference year for all individuals.

<sup>18</sup> For two widowers or divorced living together, net incomes are calculated separately for each fiscal household. Then the net income of all fiscal households is summed and in a last step the equivalence scale is applied on this sum.

<sup>19</sup> The head of the household is the individual that declares income. For married individuals, the fiscal legislation says it is the man. In cases with two fiscal households living together and of the same gender (766 of 28681households), the head is the member that is most years in the Income Tax Returns data. If the head of the fiscal household is not between 55-75 years old in 2001, but the partner of the head is, we take the partner as head of the household (1983 of 28681 households).

<sup>20</sup> That were kindly provided by the National Institute for Statistics, for the years 1992-2002 and for different equivalence scales. However equivalence scales taking into account the number of disabled in a household are not at our disposal.

<sup>21</sup> Excluding the 1844 individuals that are in the Socio-Economic Survey but not in the income tax returns data.

<sup>22</sup> VanKerm(2004), Dewilde(2004), Makovec(2005) are multivariate analyses that will be discussed later.

<sup>23</sup> Including left-censored spells

0	19100	/	0.67
1	1591	0.166	0.055
2	1027	0.107	0.035
3	838	0.087	0.029
4	688	0.071	0.024
5	732	0.076	0.025
6	605	0.063	0.021
7	542	0.056	0.018
8	516	0.053	0.018
9	529	0.055	0.018
10	582	0.060	0.020
11	697	0.072	0.024
12	1234	0.128	0.043
Number of households that are at least 1 year in poverty: 9581			
Number of households: 28681			

The fact that 67% of the households is never poor implies that 33% of the households is once confronted with poverty. This is much higher than the “static” poverty rates that turn around 12% for Belgian elderly. Deleeck-Cantillon(1992) find similarly on the basis of two waves of the SEP that of the whole population 10.8% is poor<sup>24</sup> in 1988 and 1985, 73% is not poor in 1988 and neither in 1985 while 16.2% is once poor during that period.

For our data, the transitory poor, that are poor for exactly one year, account for 5.5% of all households. Those that are poor for at least 3 years make up 70% of those who ever have been poor and 24% of all households. In general, this is the same finding as in the literature: most people that slip into poverty are quite successful in getting out. But precisely because this is true the transitory poor are a small fraction of the poor at any point in time and those with longer poverty spells account for the bulk of all poverty.

**3.2.** The degree of persistence of poverty and the recurrent poor cannot be read from table 3. It is not because households are in total 3 years poor that these are three consecutive years in poverty. The persistently poor are poor for at least three consecutive years. The recurrent poor are poor for at least one year but never longer than two consecutive years. It is thus possible that a recurrent poor is for example poor for 5 years in total but is not persistently poor. Table 4 shows that more than 60% of those who once have been poor are persistently poor.

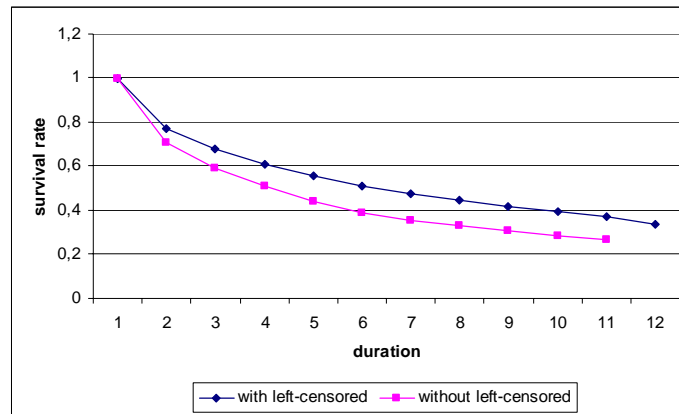
<b>Table 4: Persistent and recurrent poverty among elderly<sup>25</sup></b>			
	Number of households	% of population	% of those who are poor at least once
Persistent	6380	0.22	0.66
Recurrent poor	3201	0.11	0.33
Number of households that at least one year in poverty: 9581			
Number of households: 28681			

<sup>24</sup> Poverty line is 50% of average income.

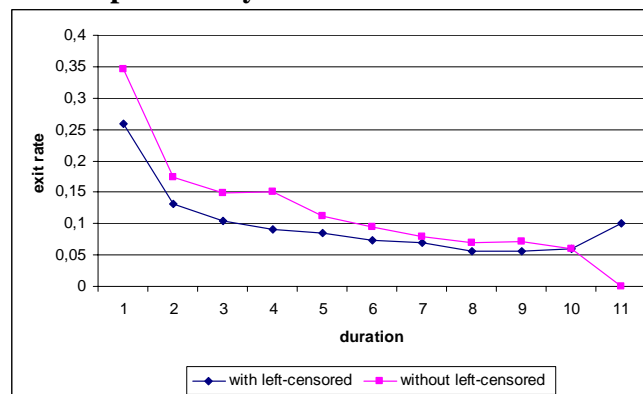
<sup>25</sup> Including left-censored spells.

**3.3.** From the moment that the data are arranged such that with each household one associates the length of one(or more) spells, on can calculate exit and re-entry rates. The exit rate associated with a given length of a spell is the number of households that exit at that length of the spell divided by the population at risk of exiting. Spells that are right-censored are included in all but the censored year. Figures 1 and 2 plot the poverty exit rates and survival function with and without left-censored spells but as can be seen they do not differ a lot from each other.

**Figure 1: Survival function with and without left-censored spells**



**Figure 2: Exit probability with and without left-censored spells**

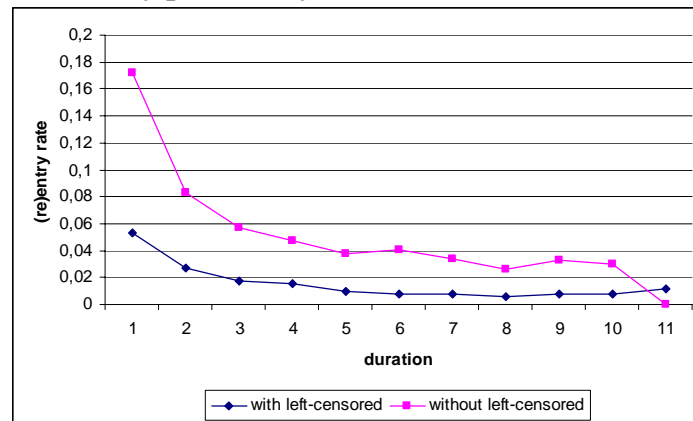


The exit rate is high for the transitory poor and low for those that are long-term poor. The survival function decreases sharply in the first years but after some years it seems to stabilize. This means that the longer somebody is poor, the more difficult it becomes to leave poverty. The obvious question that arises is why this may be so. If it is because individual characteristics persist over time that individuals persist in poverty over time, one might think that after controlling for individual characteristics duration dependence loses its significance and becomes spurious. The alternative possibility is that poverty experience has a genuine causal impact on future poverty such that after controlling for individual characteristics, duration dependence remains significant. This may be because low income may be associated with adverse work incentives (the poverty trap) or due to loss of motivation or depreciation of human capital<sup>26</sup>.

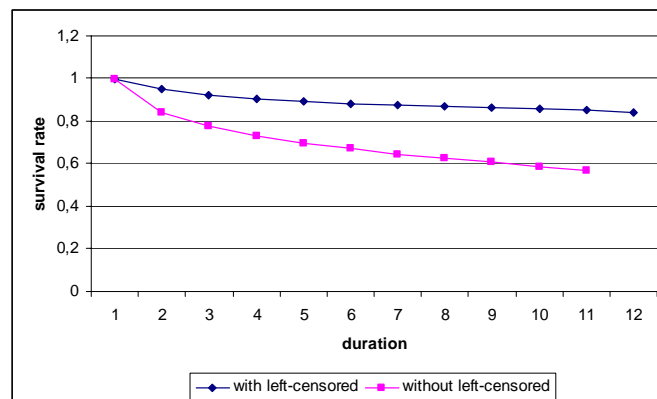
<sup>26</sup> This issue is analyzed in another paper "Duration dependence in poverty among belgian elderly: true or spurious?".

On this issue Deleeck-Cantillon(1992) find that the probability of escaping poverty between 1985 and 1988 is 90% for individuals younger than 25 but only 20% for elderly older than 65. This implies that persistent poverty is much higher among the elderly. They also find that “a person in poverty is much more likely to leave poverty than a non-poor is to enter it. This is indeed confirmed by the (re)entry probabilities. To find the (re)entry probabilities, one calculates for each of the households at risk of (re)entering poverty the length of the spell that they are out of poverty. Then for each possible length of the spell the number of individuals that enter poverty is divided by the population at risk of (re)entering. The results, with and without left-censored spells, in figures 3 and 4, differ quite a lot. The reentry rates with left-censored spells are commonly called entry rates. Probabilities of entering poverty are very low and around 1-2%: they are based on households that may or may not have been poor once. Re-entry rates are up to 4-6 times higher than the entry rates indicating that the probability of becoming poor is much higher for households who have been poor than for those who have not.

**Figure 3: (re)entry probability with and without left-censored spells**



**Figure 4: survival function with and without left-censored spells**



Survival functions represent a cumulative risk of slipping back into poverty after a previous exit. Of those qui quite poverty, about 60% are still out of poverty after 12 years. Thus 40% of those who quit poverty will fall back into poverty.

**3.4.** To end this section, one will determine the main events associated with spell beginnings and spell endings. Table 4 shows how the transition from the labour market to effective retirement is

associated with poverty transitions<sup>27</sup>. Certain events are rare but often associated with poverty transitions while other events are more common but seldom associated with poverty transitions.

**Table 4: employment related events of the head of the household and poverty transitions**<sup>28</sup>

Event	% of all events <sup>29</sup>	% of events associated with poverty (re)entry	% of events associated with poverty exit
Self-employed → disabled	1.6	30.0	6.0
Self-employed → old-age	8.3	28.0	7.8
Employed → unemployed	8.1	11.4	2.7
Employed → disabled	6.2	3.1	1.8
Employed → old-age	22.3	3.4	3.7
Employed → early retired	13.9	2.1	0.6
Old-age → self-employed	1.2	7.5	25.2
Unemployed → disabled	1.1	3.3	9.2
Unemployed → old-age	5.2	4.9	7.1
Unemployed → employed	2.1	6.0	14.8
Disabled → old-age	7.8	8.5	3.3
Disabled → employed	1.0	8.7	7.1
Disabled → self-employed	1.0	11.1	26.3
Early retired → old-age	14.4	2.6	1.0

The first column shows that 50 % of the events concern transitions to the old-age pension. Also frequent are transitions from employed to early retirement (13.9%), unemployment (8.1%) or disability benefits(6.2%). The second and third column calculate, if an event occurs, what is the relative frequency that is associated with a poverty transition. Leaving unemployment means in 7-15% of the cases exiting poverty while entering unemployment (from disability or employed) means in 11-15% entering poverty. The transition from a self-employed, although a rare event, to disability benefits is associated in 30% of the cases with poverty entry. Their transition to old-age pension leads also in 28.6% of the cases to poverty. Also impressive is that of the 1.2% of old-age beneficiaries that get self-employed 25.2% are lifted out of poverty<sup>30</sup>. This suggests that the social security system for the self-employed has low effective replacement ratios but in addition the benefit amounts are insufficient to lift people out of poverty. This means that the social security system of the self-employed, that is essentially designed in order to insure social risks, is not effective. On the contrary, the transition from employed to early retired/old-age pension, accounting for 13.9%/22.3% of events, is only in 2.1/3.4% of the cases associated with poverty entry. The effective replacement ratio appears to be higher than for the self-employed. Since these results do not control for the simultaneous occurrence of other events and individual variables a multivariate analysis is necessary.

Finally, table 5 shows what changes in household composition occur and are most likely associated with poverty transitions.

<sup>27</sup>It happens that individuals are f.e. unemployed until June and retired from July on. Every household head is labelled in a given year with the employment status that provides the largest source of income during that year.

<sup>28</sup> excluding left-censored spells.

<sup>29</sup> Only are plotted the events that represent at least 1% of all events.

<sup>30</sup> There is an earnings test in old-age pension system that reduces pension benefits proportionally for pension beneficiaries that earn labour income.

<b>Table 5: household related events and poverty transitions<sup>31</sup></b>			
Events	% of all events	% of events associated with poverty (re)entry	% of events associated with poverty exit
Single → married	4.2	3.0	24.0
married → single	27.7	18.0	6.0
Children → without children	60.5	1.8	8.5
Without children → children	7.6	18.8	6.4

Although only 4.2% of all events concern singles that get married, it leads in 24% of the cases to poverty exit. The arrival of children leads in 18.8% of the cases to poverty while if they leave the household it is associated with poverty exit in 6.4% of the cases.

The simple frequency counts presented up to now, do not allow to unravel the separate effects of events that occur simultaneously like jobloss and divorce. Therefore a multivariate analysis is necessary to which we turn now.

#### **4. Multivariate analysis**

The purpose of this section is a multivariate analysis that identifies the events that, if they would happen, have the highest likelihood of being associated with a poverty transition, while controlling for other events and individual characteristics and duration of spells. The discrete-time hazard model we consider, and that estimates poverty exit and re-entry rates separately, does not necessarily identify a causal relationship to the extent that the change in employment status and household size may itself be endogenous<sup>32</sup>. Although this analysis provides useful insights in the dynamics of poverty, this is not a structural model of labour and household behaviour underlying poverty transitions. Before the estimation results are discussed (4.3.), one briefly presents the model that is used (4.2.) and what models have been estimated on Belgian data (4.1.).

##### **4.1. Previous research for Belgium**

For Belgium, to our knowledge, few multivariate analysis on poverty are available. Van Kerm(2004) finds, through the estimation of a Markov transition model, on the PSBH on a population between 16 and 65 years old that poverty entry depends on household and employment status. In particular being unemployed, self-employed or single increases the risk of poverty entry. He controls for the endogeneity of the initial poverty status by estimating jointly with the poverty transition equation an initial condition equation while allowing the unobserved effects of these equations to be correlated. He ignores the possibility that household and employment status that are included as explanatory variables might be endogenous. Dewilde (2004) finds through the separate estimation of a transition probability model on the PSBH for the whole population that poverty entry and exit depend on household and employment related events. In particular entry into unemployment, disability, (early)retirement is associated with

<sup>31</sup> excluding left-censored spells.

<sup>32</sup> Aassve-Burgess-Dickson-Propper(2006) jointly estimate endogenous demographic (fertility, union formation, union dissolution) and employment transitions underlying poverty transitions in an economic analysis of explaining poverty.

entry into poverty. Makovec(2005) uses a discrete-time hazard model to estimate separately poverty entry and exit equations for those above 55 years old in the ECHP, taking into account unobserved heterogeneity. For the entry model, he finds that accounting for unobserved effects leads to spurious dependence. Like Vankerm(2004), Makovec(2005) includes household and employment status as explanatory variables, ignoring possible endogeneity. He includes a dummy for employed versus non-employed, for aged above or below 65, for receipt of disability and old age benefits. None of the above dummies is significant except that the receipt of disability benefits increases poverty exit. That is the opposite result of Dewilde(2004) although the dataset in the ECHP for Belgium is also the PSBH. Dewilde(2004) though does not control for duration effects, nor for unobserved effects that are highly significant in Makovec(2005). On the other hand, Makovec(2005) used a very small sample limited to those above 55 years old. Makovec(2005) nor Dewilde(2004) address the issue of left-censored spells. .

## 4.2. The model

We choose the discrete-time hazard model to estimate poverty transitions, given our interest in the impact of events, duration dependence and the long panel nature of our data. Although in the real world poverty transitions can occur at any time, the model is in discrete time since the unit of time is one calendar year. There are two types of spells: poverty spells ( $k=p$ ) and non-poverty spells ( $k=np$ ). Left-censored spells are excluded. We assume that the probability that an individual  $i=1, \dots, N$  leaves the spell of type  $k$  in the calendar year  $t=1, \dots, T$  at a duration  $d$  is defined as  $P_{it}^k = \text{Pr ob}(y_{it}^{*k} > 0)$  that results from the latent

model  $y_{it}^{*k} = f^k(d) + \beta^k x_{it} + u_{it}^k$  where  $y_{it}^{*k}$  denotes the unobservable propensity to be in a spell of type  $k$ ,  $f^k(d)$  is a function of duration dependence that represents the baseline hazard and where  $d=1, \dots, D$  denotes the duration of the current spell and  $D$  is the maximum<sup>33</sup> duration of a spell. We adopt a flexible specification for the baseline hazard where

$f^k(d) = \alpha_1^k DU_1 + \alpha_2^k DU_2 + \dots + \alpha_d^k DU_d$  and  $DU_d$  are dummies corresponding to a duration  $d$ .

We assume that individuals enter a spell at  $d=0$  and are at risk of leaving the spell at  $d=1, \dots, D$ .  $x_{it}$  is a vector of observable characteristics,  $\beta^k$  the vector of coefficients associated with  $x_{it}$ . May include lagged values  $x_{it-1}$  or events  $\Delta x_{it}$ . We are thus estimating a binary response model where the dependent variable

$$y_{it} \begin{cases} = 1 & \text{if } y_{it}^{*k} > 0 \\ = 0 & \text{else} \end{cases} . \text{ This is in fact equivalent to discrete-time hazard models, as shown by}$$

Allison(1984) and Jenkins(1995). If the random error term  $u_{it}^k$  is logistically distributed, te

$$\text{probability of leaving a spell of type } k \text{ is } P_{it}^k = \frac{\exp(f^k(d) + \beta^k x_{it})}{1 + \exp(f^k(d) + \beta^k x_{it})} .$$

## 4.3. Results

<sup>33</sup> Alternatively one can drop one duration dummy to use it as a reference and fit an overall intercept term of the model.

Explanatory variables include the same employment and household related events as in tables 4 and 5 and dummies for household head characteristics measured by the socio-economic survey of 2001<sup>34</sup>. They also include age dummies of the household head, year dummies, presence of female single household head, member of a second pillar and the observed duration of an ongoing spell. The estimated coefficients with their standard errors between parentheses (and partial effects<sup>35</sup> **in bold**) are in table 6. Standard errors are adjusted to account for the fact that observations are dependent at the level of the household.

<b>Table 6: Discrete-time hazard model of poverty transitions and events</b>		
Independent variable	Exit Estimate (standard error)	Reentry Estimate (standard error)
Duration 1 year	2.433** <b>0.42</b> (0.04)	1.852** <b>0.23</b> (0.04)
Duration 2 years	1.520** <b>0.259</b> (0.05)	1.175** <b>0.14</b> (0.05)
Duration 3 years	1.226** <b>0.20</b> (0.06)	0.855** <b>0.09</b> (0.06)
Duration 4 years	1.097** <b>0.17</b> (0.06)	0.609** <b>0.06</b> (0.08)
Duration 5 years	0.907** <b>0.14</b> (0.08)	0.371** <b>0.04</b> (0.09)
Duration 6 years	0.959** <b>0.15</b> (0.10)	0.698** <b>0.07</b> (0.11)
Duration 7 years	0.689** <b>0.10</b> (0.12)	0.591** <b>0.06</b> (0.14)
Duration 8 years	0.613** <b>0.09</b> (0.14)	0.336* <b>0.04</b> (0.18)
Duration 9 years	0.466** <b>0.06</b> (0.18)	0.632* <b>0.06</b> (0.24)
Duration 10 years	0.400** <b>0.06</b> (0.30)	0.632 <b>0.06</b> (0.39)
Age 55-59	-0.334** (0.05)	-0.415** (0.05)
Age 60-64	-0.196** (0.05)	-0.510** (0.05)
Age 65-69	-0.474** (0.05)	-0.662** (0.05)
Age 70-74	-0.592** (0.07)	-0.951** (0.08)
Age >75	-0.458	-1.434**

<sup>34</sup> Estimation results for province and year are not displayed.

<sup>35</sup> These cannot be directly be compared with the relative frequencies of table 7 and 8 since the latter are unconditional on poverty status while the partial effects are conditional on being in a poverty or non-poverty spell.

	(0.17)	(0.25)
Member second pillar	-0.069** (0.04)	-0.478** (0.05)
Health status household head		
Very good	-0.149* (0.07)	-0.446** (0.09)
Good	-0.175** (0.05)	-0.366** (0.06)
More or less ok	-0.271** (0.05)	-0.213* (0.06)
Bad	-0.255** (0.07)	-0.234* (0.08)
Education household head		
Low secondary general	-0.112 (0.07)	0.071 (0.08)
Low secondary technical	0.146* (0.07)	-0.187* (0.09)
Low secondary professional	0.097 (0.06)	-0.161* (0.08)
High secondary general	-0.131 (0.09)	-0.262* (0.11)
High secondary technical	-0.068 (0.09)	-0.201 (0.11)
High secondary professional	-0.107 (0.10)	-0.147 (0.11)
High school or university	0.112* (0.07)	-0.148 (0.09)
Professional status household head		
Statutory public sector	-0.054 (0.12)	-0.777** (0.18)
Contractual public sector	-0.040 (0.16)	-0.284 (0.19)
Private sector white collar (manager)	0.224 (0.19)	-0.474 (0.26)
Private sector white collar	0.153 (0.07)	-0.216** (0.09)
Private sector blue collar	0.168 (0.06)	-0.135 (0.08)
Self-employed (manager)	-0.606** (0.12)	0.308** (0.14)
Self-employed (owner)	-0.369** (0.07)	0.311** (0.09)
Liberal profession	-0.361** (0.06)	0.479** (0.07)
Helper self-employed	-0.284* (0.14)	0.114 (0.16)
Household help	-0.104 (0.28)	0.231 (0.31)
Sectoral activity household head		
Agriculture	-0.219** (0.08)	0.429** (0.09)
Traditional industry	0.237** (0.07)	-0.154 (0.09)
Construction	0.165** (0.07)	-0.147 (0.09)

Retail -wholesale	-0.135 (0.07)	0.038 (0.08)
Horeca	-0.189 (0.10)	-0.158 (0.11)
Financial institutions	0.228 (0.13)	-0.694** (0.23)
Public services	0.351** (0.14)	-0.040 (0.20)
Education - training	-0.319* (0.15)	-0.346 (0.23)
Employment related events household head		
From employment to inactive		
Self-employed → disabled	-0.428 <b>-0.044</b> (0.30)	1.544** <b>0.22</b> (0.24)
Self-employed → old-age pension before 65	-0.751** <b>-0.07</b> (0.22)	1.297** <b>0.18</b> (0.16)
Self-employed → old-age pension after 65	-0.025 <b>-0.003</b> (0.21)	1.721** <b>0.26</b> (0.16)
Employed → unemployed	-0.379 <b>-0.039</b> (0.22)	0.807** <b>0.09</b> (0.21)
Employed → disabled	0.433 <b>0.06</b> (0.30)	-0.272 <b>-0.02</b> (0.38)
Employed → old-age pension before 65	1.138** <b>0.195</b> (0.15)	0.428 <b>0.04</b> (0.25)
Employed → old-age pension after 65	0.517 <b>0.075</b> (0.43)	1.194** <b>0.16</b> (0.48)
Employed → early retired before 57	-0.284 <b>-0.031</b> (0.54)	2.220** <b>0.39</b> (0.65)
Employed → early retired after 57	1.122** <b>0.193</b> (0.38)	-0.341 <b>-0.02</b> (0.66)
from inactive to employment		
Old-age pension → self-employed	1.983** <b>0.40</b> <b>(0.26)</b>	-0.847** <b>-0.05</b> (0.41)
Unemployed → employed	1.263** <b>0.22</b> <b>(0.23)</b>	-0.846* <b>-0.04</b> (0.38)
Disabled → self-employed	1.285** <b>0.23</b> <b>(0.46)</b>	-1.883* <b>-0.07</b> (1.09)
Disabled → employed	0.584 <b>0.08</b> <b>(0.42)</b>	-1.357 <b>-0.06</b> (0.94)
from inactive to inactive		
Unemployed → disabled	0.781 <b>0.12</b>	-0.435 <b>-0.03</b>

	<b>(0.46)</b>	(0.48)
Unemployed → old-age pension before 65	1.175** <b>0.20</b> <b>(0.24)</b>	-0.727** <b>-0.043</b> <b>(0.31)</b>
Unemployed → old-age pension after 65	0.629 <b>0.09</b> <b>(0.35)</b>	0.091 <b>0.001</b> <b>(0.34)</b>
Disabled → old-age pension	-0.050 <b>-0.005</b> <b>(0.22)</b>	0.941** <b>0.11</b> <b>(0.19)</b>
Early retired → old-age pension	0.209 <b>0.027</b> <b>(0.27)</b>	-0.291 <b>(0.27)</b>
Family related events and characteristics		
Single → married	1.737** <b>0.33</b> <b>(0.25)</b>	-1.234** <b>-0.06</b> <b>(0.36)</b>
Married → >single	-0.340** <b>-0.03</b> <b>(0.09)</b>	1.550** <b>0.22</b> <b>(0.11)</b>
children → without children	1.626** <b>0.30</b> <b>(0.08)</b>	-1.342** <b>-0.05</b> <b>(0.14)</b>
without children → children	-0.395** <b>-0.04</b> <b>(0.21)</b>	1.617** <b>0.24</b> <b>(0.16)</b>
Single women	-0.606** <b>(0.05)</b>	-0.229** <b>(0.06)</b>
Household size	-0.428** <b>(0.02)</b>	-0.340** <b>(0.02)</b>
Goodness of fit tests		
Likelihood ratio statistic	8046**	15391**
Score statistic	7656**	27979**
Wald statistic	4123**	13154**
<p>** : denotes significance at 1% level, * denotes significance at 5% level, Standard errors in parentheses  The reference person lives in Walloon Brabant, with primary school education, is less than 55 years old, very bad or unknown health, has experienced no changes in employment nor household status.</p>		

For most individual characteristics that are significant, the sign of the coefficient in the exit regression is the opposite as the sign in the reentry regression. The following individual characteristics significantly increases poverty exit and/or decreases poverty reentry: having a very good or a good health; having a high school or university degree or having a technical degree in secondary school; having worked or working as civil servant or white-collar in the private sector; having worked or working in public services or the traditional industry, construction and financial services. On the other hand, having a low secondary general school achievement, having worked as self-employed, in the agricultural<sup>36</sup> sector considerably increases the risk of poverty reentry and decreases poverty exit. The latter risk thus to be persistently poor. For those that are poor, getting older decreases significantly the risk of exiting poverty but at the same time

<sup>36</sup> Dewilde(2004) notes that “27.5% of the self-employed and the farmers enter poverty upon retirement. This can be linked to the fact that these professional groups reside under a less generous social security system. On the other hand, this group might be prone to the underreporting of income”, p.19.

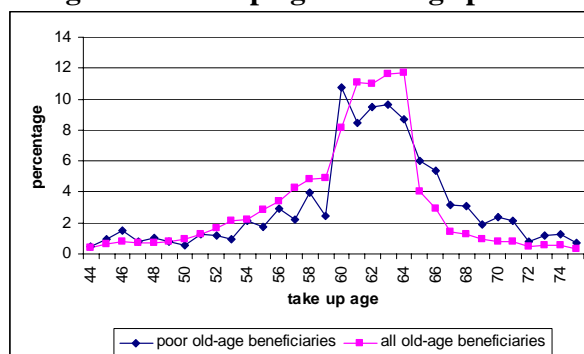
for those that are non-poor, it decreases the risk of entering poverty. The older one gets, the lower the chance of a poverty transition, thus the higher the chance to persist in the actual state<sup>37</sup>.

When considering family related events and characteristics, the arrival of children<sup>38</sup>, becoming widow or divorced significantly decreases the likelihood of poverty exit and increases the likelihood of poverty entry. Getting married significantly increases poverty exit.

Most transitions from work to inactivity are significantly related to poverty entry while all transitions from inactivity to work are significantly related to poverty exit. F.e. unemployed that find a job have 22% chance of leaving poverty. Employed that get unemployed have a higher risk of becoming poor. For Dewilde(2004) the transition from inactivity to employment is also significantly related to poverty exit. Dewilde(2004) confirms that transitions from employment to disability/unemployment increases poverty entry while Makovec(2005) finds on the same dataset that a positive change in disability benefits increases poverty exit. We find that by distinguishing between self-employed and employed, this apparently ambiguous result is solved: self-employed that rely on disability significantly risk to become poor while employed that get disabled instead leave poverty. The type of social security system one belongs to (civil servant, self-employed, employed) apparently matters. Self-employed that rely on old-age pension incur 19-26% chance of falling into poverty while it decreases the chance of poverty exit.

Also the effective retirement age may play a role. Figures 5 and 6 show the distribution of effective retirement ages for poor and all old-age pension beneficiaries.

**Figure 5: take up age of old-age pension**



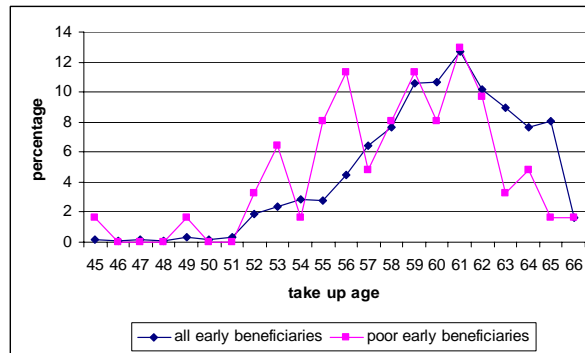
Of the poor old-age pension beneficiaries 20% took up their old-age pension after age 65 while for all old-age beneficiaries this is only 10%. Since in our case, of the poor beneficiaries that retire after age 65, 51% are self-employed, 27% private sector employees and 3% public sector

<sup>37</sup> A priori it could be interesting to divide the population in homogenous age groups, like younger than 60, older than 65 since one may expect different results. However the question raises how to divide the age groups. According to the old-age pension system, the cut-off ages are the age of eligibility of 60 and the normal retirement of 65. In addition, in 1996 a pension reform was introduced that gradually raised the normal retirement age and age of eligibility for means-tested benefits of 60 for women to 65. For the early retirement schemes however, the normal retirement ages are rather 58 and 55. In unemployment schemes, specific increases are foreseen at age 58. But beyond the practical difficulty of deciding reasonable cut-off ages, it is exactly at these cut-off ages that events take place and that a subdivision in age groups (55-60,61-65,>65) could not capture. The estimations on different age groups that were tried did not lead to better results. Nonetheless distinctions according to the *effective retirement age* at which one enters a specific retirement scheme (old-age, early, unemployment,...) did produce different results.

<sup>38</sup> Dewilde(2004) finds similar results.

employees, these differences in effective retirement ages have probably to do with the type of old-age pension system one belongs to. Analogously to figure 5, figure 6 gives the distribution of effective retirement ages for poor and non-poor early retirement beneficiaries.

**Figure 6: take up age of early retirement pension**



Of the poor who retired through a conventional early retirement scheme, 38% took up their early retirement pension before the age of 57 and 80% before the age of 60 while for the early retired in general only 18% took up their early pension before the age of 57 and 40% before the age of 60. In the estimation, the transition from employed to early retirement leads only to poverty exit if it is taken up after the age of 57 while receipt before the age of 57 significantly increases poverty entry.

## Conclusion

The matching of the National Register with the Income tax returns and socio-economic survey provided evidence of strong income mobility. 1) Every year about 13% of the Belgian civil population is out of the Income Tax Returns, while only 4.9% of households do not appear for any year 1991-2002 in the Income Tax Returns. 2) The proportion of the population that ever experience poverty is much larger than the proportion that is poor in a given year.

Indeed, although the static poverty rates turn around 12% in a given year, 33% of the Belgian elderly is once confronted with poverty over a period of 12 years. About 30% of those who become poor leave poverty already after one year and are only transitory poor. The bulk of the elderly poor are however persistently poor. Also those elderly who escape poverty incur a risk of 40% of returning to poverty within 12 years. Reentry rates are much higher than entry rates in poverty indicating that the probability of becoming poor is higher for elderly who have been poor than for those who haven't.

A discrete-time hazard models showed that poverty transitions are significantly associated with entry in different retirement pathways and social security systems, while controlling for observed individual characteristics and the duration in a poverty or non-poverty state. Some individual characteristics are significantly associated with a high risk of entering and a low risk of exiting poverty and thus a high poverty persistence: low education level or uncompleted degree; health problems; the presence or arrival of children or additional household members, being a single female; working or having worked as self-employed; in the agricultural sector.

Two salient groups of poor early retired retained our attention: 1) the social security system of the self-employed and 2) those who retire early before the age of 57 and the elderly unemployed. Concerning 1), it appears that non-poor self-employed that enter disability or old-age pension have a risk of entering poverty while poor old-age beneficiaries that become self-employed again have a high risk of leaving poverty. This suggests that the social security system for the self-employed has low effective replacement ratios but in addition the benefit amounts are insufficient to lift people out of poverty. The social security system of the self-employed is not effective neither in combating poverty nor in insuring social risks. At the same time, it is well known that the Belgian social security system for the self-employed is financially unsustainable. Indeed, since the self-employed declare low incomes, they pay low social contributions. The system has to be heavily subsidized by the federal government (that is by taxpayers that do declare their incomes). Since it is difficult to find out whether declaration of low incomes is due to low incomes or non-declaration of part of incomes, it is difficult to tag the truly needed among the self-employed and to allocate resources to them.

Concerning 2), it was found that entering the system of elderly unemployed (exempted from the search for a job) and conventional early retirement schemes before the age of 57 is associated with a strong risk of poverty entry. This may illustrate the poverty trap: people may be given a financial incentive not to work while at the same time they slip into poverty. Low income may be associated with adverse work incentives that make it not worthwhile to take up a job if unemployed or to keep a low paid job. Some elderly might be given “an offer they cannot refuse” not only by employers that are reluctant to invest in the human capital of older workers but also by the government that explicitly designed this kind of early retirement policies, naively thinking this would free jobs for the young unemployed.

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