# Poverty Dynamics in Europe. A Multilevel Discrete-Time Recurrent Hazard Analysis

**October 22, 2006**

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*Abstract*: In this paper we use multilevel discrete-time recurrent hazard analysis to simultaneously model the impact of life cycle events and structural processes on poverty entry and exit across European Regions. Research questions are, (i) what is the importance of life cycle events on the road to entry into and exit from poverty, (ii) are there any differences in poverty dynamics between European Regions and if so, how can we explain these differences. The analysis is based on individual and household panel data of the European Community Household Panel linked with a regional time series database. Main findings are that men's poverty dynamics is dominated by employment-related events, while for women demographic events also play a role. Regional structural factors only have a slight or no influence on poverty transitions, but the welfare regime turns out to be highly significant for poverty entry.

*Keywords:* Multilevel Analysis, Discrete-Time Hazard Analysis, Poverty Dynamics

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# 1 Introduction

The awareness that life cycle events are crucial to poverty dates back to the path-breaking study of worker's poverty by Rowntree (1901). Contrary to common-sense knowledge at the time, he discovered that their poverty was not inescapable, but related to specific life cycle phases such as one's own childhood, having dependent children and old age.

Ever since, dramatic changes in advanced industrial societies have occurred: the life course has been individualised (Mayer, 1997), the labour market has undergone important changes (Schmid, 1998) and the welfare state has expanded considerably (Goodin et al., 1999). As a result, in many countries, the kind of life-cycle poverty identified by Rowntree has flattened out, but large cross-national differences remain (Kangas and Palme, 2000).

Are we witnessing the beginning of the end of poverty life cycles in advanced industrialised countries? What is the impact of life-cycle events such as marrying or divorcing on falling in or moving out of poverty? In addition, what is the importance of structural factors such as welfare regimes or welfare growth?

Our aim is to unravel the relative importance of key institutional arrangements in explaining poverty dynamics: labour market, marriage market, welfare state and macro-economic conditions in a general cross-national context. Labour market and marriage market are viewed to operate at the individual level, while welfare state and macro-economic conditions operate at the structural level.

To answer these questions, we further elaborate the comparative analysis of poverty dynamics by integrating recent advances in comparative research methods such as multilevel modelling and by including the European Regions as an intermediate level of determinants.

We link eight years (1994-2001) of individual and household panel data of ten countries of the European Community Household Panel (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Spain, United Kingdom) with regional time series of the REGIO database, both provided by Eurostat, and estimate multilevel discrete-time recurrent hazard rate models of (re)entry into and (re)exit from poverty.

We find that the impact of individual changes on poverty transitions is most important. While employment related changes are important for women and (even more) for men, demographic events are only important for women. The impact of regional structural factors is more limited. But the welfare regime and regional gross domestic product growth turn out to be important factors for poverty entry and women's poverty exit respectively.

The paper is structured as follows: in the next Section, we review important individual and structural perspectives on poverty and state our research hypotheses. In Section three we describe the data used and some important concepts. The method of analysis, multilevel recurrent hazard analysis, is explained in Section four. The fifth Section presents the results of our analysis and discusses them. The final Section summarises the results.

# 2 Poverty Perspectives

## 2.1 A Changing Life Course

The study of family or life cycle changes (for example, leaving the parental home, getting married, having a child, divorcing, becoming widowed…) and the outcomes of such changes on poverty are important issues in social demography. The individual life course then is defined as a particular sequence of such changes.

During the last 50 years or so, this life course has been subject to profound changes such as the emergence of cohabitation, the postponement (and more often ultimately the cancel) of children, the growing instability of marriage... In addition, new family-types such as dual-earner couples and single households have become more widespread.

Concurrently, important shifts have occurred at the labour market. In the educational sphere, we have witnessed prolonged educational careers and sex equalisation. Labour market entries are delayed, women's labour market participation has increased and particularly for women, we see higher rates of job changes and occupational mobility.

At the same time, an important expansion and subsequently a restructuring of the welfare state took place, thereby redistributing the outcomes of the market. Consequently, more people are secured to live decently irrespective of their position in the labour market.

Research on the driving forces behind these changes refer to changes in values or norms, in industrial relations, in economy, in historical institutional macro-configurations, in implicit contracts in society (Mayer, 1997) but also to political intervention and welfare state arrangements (Leisering and Leibfried, 1999).

## 2.2 Poverty Perspectives

In reviewing theories that are used to explain poverty, McKernan and Ratcliffe (2002) conclude that the literature lacks a widely accepted general theory of poverty. Instead, many different perspectives on the causes of poverty have been put forward. Iceland (2003) classifies them as either individual or structural.

### *2.2.1. Individual Poverty Perspectives*

In the so-called individual perspective, the poor themselves create their poverty. Individualistic explanations for poverty refer to characteristics such as indolence, lack of intelligence and other negative personality traits, as well as to family or community characteristics such as inadequate parenting and lowered aspirations reproduced by disadvantaged families and communities (Alcock, 1997). Important predominantly individualistic perspectives are the life cycle hypothesis, the individualisation thesis, the persistence hypothesis and human capital theory. We briefly discuss these theories below.

According to the life cycle hypothesis, poverty risks are modulated by demographic changes across the individual life cycle. This approach of poverty goes back to Rowntree's classical study of poverty in the city of York (1901). Rowntree's major discovery was that workers typically were not poor during their whole life, but only during specific phases of their family life: when they were children themselves, when they had dependent children and during retirement. Poverty could then be explained

by referring to increased family needs or reduced earning power or inadequate pensions.

The individualisation thesis (Berger, 1994) puts forward that nowadays, individual biographies have become much more open and diverse and are increasingly dependent on individual decisions. Classical causes of poverty (labour market, family, welfare regimes) no longer dominate. Instead subjective competences become more important.

Central to the persistence hypothesis is that consequences of poverty also reinforce the causes of its persistence. For instance, living in poor neighbourhoods results in a subculture of poverty, which is transferred from one generation to the other by socialisation processes in the family (Lewis, 1966).

A central thesis in human capital theory is that people who invest in their education or skills can expect higher income (Becker, 1975). This theory also predicts that young adults and the elderly are expected to have lower wages. Other important factors are: the number of children in the household, health status and gender. A high number of children or a bad health status reduces the number of hours worked and therefore has a negative effect on income. Because of their discrimination in the labour market, women have a lower wage rate and thus are expected to have lower incomes.

Some major findings from the individualistic perspective are that both family and labour market events are important. Union and employment are positive events, whereas separation and unemployment have an adverse effect (Duncan et al., 1993). Empirical results also point to gender differences (Bourreau-Dubois, 2003). Men's vulnerability to poverty is linked more to labour market events, whereas women's poverty risk is largely due to their dependence on their partner's income.

At the individual level, we expect that marriage and employment will decrease the likelihood of poverty entry and increase the likelihood of poverty exit, while divorce and unemployment will have opposite effects (*Hypothesis 1*). Further, due to dependence on their partner's income, the impact of demographic events will be more pronounced for women compared to men (*Hypothesis 2*).

### *2.2.2. Structural Poverty Perspectives*

From a structural perspective, it is argued that individual models often overlook the impact of economic, social and political systems on poverty (Iceland, 2003). Key structural processes are economic growth and economic inequality. While economic growth determines the size of the pie, inequality affects the size of the slices. In a world of finite resources, different social strata will have different poverty levels. Poverty should be seen as the outcome of the functioning of a capitalist labour market. To combat such poverty, in modern welfare states, various antipoverty policies have been developed and implemented. But then, if poverty persists how effective have such policies been?

The market system, through economic growth, fosters overall standards of living. On the other hand, changes in the structure of the economy can also have a negative effect. For instance, the skills mismatch hypothesis (Kasarda, 1990), based on evidence from inequality in wages by level of education, puts forward that declining demand for workers at the lower end of the economic ladder compared to available supply has contributed to inequality. Important explanations for this hypothesis are deindustrialisation (Iceland, 1997a) and technological change (Danziger and Gottschalk, 1995). Deindustrialisation has disproportionately replaced higher-wage manual skill jobs by highly polarised service sector jobs. Technological change has raised the demand for highly skilled workers relative to those with lower skills.

We derive from the skills mismatch hypothesis, that de-industrialised (*Hypothesis 3a*) or technologically advanced regions (*Hypothesis 3b*) will exhibit increased poverty entry rates and decreased poverty exit rates.

Policy systems and market institutions in European Union (EU) countries might have a different impact on poverty. Esping-Andersen (1990, 1999) distinguishes four types of welfare state regimes. Each type shares a relatively similar set of social policy goals. Major differences are with respect to the relative role of state and market and the level and design of welfare benefits. In the social-democratic regime (*e.g.*, Denmark), emphasis is laid on the role of the state and on safeguarding equality. Welfare benefits are universal and not means-tested. In the liberal welfare regime (*e.g.*, United Kingdom), an important role is assigned to the market. Benefits are means-tested and reserved for the truly needy only. In the conservative countries (*e.g.*, Germany), next to state and market, corporate bodies such as the church, the family and classes also play a role. Here, welfare provisions are more generous compared

to the liberal states. In the southern countries (*e.g.*, Greece), public policy assumes that households carry the principal responsibility and benefits are low and selective.

While welfare regime theory has been relatively successful in explaining cross-sectional poverty, this is far less the case for poverty dynamics. Deriving hypothesis about poverty dynamics proves to be a difficult exercise (Fouarge and Layte, 2003). In previous work by Layte and Whelan on the impact of welfare regimes on poverty persistence (2003), it was found that social welfare and market incomes play different roles in poverty transitions.

In line with these findings by Layte and Whelan (2003), we have derived two competing hypothesis for welfare regime theory and poverty dynamics. If poverty transitions are dominated by income changes other than changes in labour income then the southern welfare regime should show the highest poverty dynamics, compared to the liberal type, and especially the conservative and social-democratic types (*Hypothesis 4a*). On the other hand, if poverty transitions are dominated by labour earning dynamics, then the ranking of welfare regime types is the opposite, with the social-democratic type being the most dynamic (*Hypothesis 4b*).

### *2.2.3. Multilevel Perspectives*

Much of the poverty research is single country and predominantly individualistic oriented (*e.g.*, Canada: Finnie, 2000; Sweden: Fritzell and Henz, 2001; Spain: Canto, 2003; United Kingdom: Jenkins et al., 2001; United States: Mc Kernan and Ratcliffe, 2002). Structural determinants, if any, are often introduced as control factors. The reversed research design, i.e. structural determinants as the primary focus controlled for by individual variables is far less common (*e.g.*, McCulloch, 2001).

Multi-country poverty studies often rely on separate regressions (*e.g.*, Muffels et al., 1999; Oxley et al., 2000; Jenkins & Schluter, 2003) or analysis of covariance (*e.g.*, Fouarge and Layte, 2003). Such research strategies are not very well suited for the inclusion of structural factors such as welfare state arrangements (*e.g.*, type of welfare benefits, level of welfare benefits, …) and macro-economic conditions (*e.g.*, economic growth, skills mismatch,…). For example, in analysis of covariance country level variables are confounded and in separate regressions, structural factors simply

cannot be included. In this paper, by introducing multilevel models, the problem of confounded structural determinants is largely resolved.

# 3 Data

In this paper, we have linked two cross-national longitudinal EU databases: the European Community Household Panel (ECHP: Eurostat, 1996) and the REGIO domain of New Cronos (REGIO: Eurostat, 2002a). ECHP is a harmonised cross-national longitudinal survey covering the living conditions of private households and individuals (income, poverty, employment status, housing, healthcare, and education…). REGIO contains aggregate time-series for the European Regions of the principal aspects of the economic and social life: demography, economic accounts, education, labour force, health, unemployment…

We use ECHP data from 1994 to 2001 for ten EU member States (Belgium, Denmark, Germany, Greece, Spain, France, Italy, Ireland, Portugal and the United Kingdom). In most countries, the harmonised ECHP questionnaire was used. For some countries (United Kingdom and Germany) ECHP data are derived from national data surveys.

In the first wave of the ECHP (1994) a sample of some 60,500 households was randomly selected. Response rates vary largely among countries: from a low under 50 % for Germany to a high of 85-90% in a number of southern countries (e.g.; Greece, Italy and Portugal). Although attrition rates are high in several countries, fears that attrition has undermined the representativeness of the ECHP samples are largely unfounded (Watson, 2003). Weights are available, taking into account the sample design and characteristics of persons and households. These weights are calibrated to reflect the structure of the population (Eurostat, 2001). Nevertheless, even in the absence of compensating attrition weights, attrition has only a minor impact on poverty rates (Watson, 2003).

In sum, the ECHP is a highly harmonised and comparable dataset across countries. This has been achieved through the implementation of common procedures at all surveys. Residual country heterogeneity will be taken into account by the introduction of random effects in a pooled analysis.

In REGIO, regions are classified according to NUTS (Nomenclature of Statistical Territorial Units), a hierarchical classification with three regional levels. Due to confidentiality constraints in ECHP, linking ECHP[2] and REGIO is restricted to NUTS level 1, i.e. the top-level of the NUTS classification. Some NUTS 1 regions (*e.g.*, in Belgium, Denmark, Germany[3], Ireland, Portugal and the United Kingdom[4]) follow boundaries of existing administrative units, others (*e.g.*, in France[5], Greece, Italy and Spain) are compiled by grouping together existing smaller administrative units. Average size of NUTS 1 regions is between 3 and 7 millions. Table 1 shows the number of NUTS 1 regions by country, as well as the corresponding sample sizes.

(Table 1, about here)

The working sample consists of 27102 individuals $i$, aged 16 and over in NUTS 1 regions that are present in each yearly ECHP wave from 1994 to 2001. Stratified simple random sampling has been used to restrict the working sample to one household member per household. Such a restriction eliminates dependencies between observations coming from the same household. Ignoring such dependencies would lead to grossly overestimated variances at the regional level (Moerbeek, 2004).

The outcome variable of interest is individual change in poverty status from one year to another. *Poverty entry* is a change from non-poor to poor and *poverty exit* is the opposite transition, from poor to non-poor. A person may become poor or non-poor several times. In ECHP 94-01, for a given person, at most four poverty entries(exits) can be observed. A first poverty entry(exit) cannot be observed before 1995, the second ECHP wave. A poverty re-entry(re-exit), if any, cannot be observed before 1997. A period between two poverty entries(exits) is called a spell. First observed events are preceded by left-truncated spells, i.e. spells for which the onset occurred before 1994 and is unknown. On the other hand for most last observed spells in 2001 no information about the duration of the event is available, i.e. they are right-censored. Data for wave 1994 and for the year immediately after an event are excluded from the analysis of that type of event.

[2] To link ECHP and REGIO, we have converted region codes in ECHP (in NUTS-95 format) to REGIO region codes (in NUTS-99 format) by means of a NUTS conversion scheme (Eurostat, 2002b: 74-95).
[3] Rheinland-Pfalz and Saarland, representing ca. 5% of the German population, could not be included due to differences in region coding between ECHP (NUTS-95) and REGIO (NUTS-99).
[4] Northern Ireland is not included in the BHPS version of ECHP.
[5] Départements D'Outremer is not included in ECHP.

To assess the poverty status of a person in a specific year, household equivalised individual income $I^P$ is compared with a relative poverty threshold $R$, below(above) which a person is considered poor(non-poor). Following official EU guidelines, for a given calendar year and country, poverty thresholds $R$ are set at 60% of the median equivalised income per capita. For person $i$ at wave $t = 1994,...,2001$ equivalised individual income $I_{it}^P$ is derived from an income-to-needs ratio: household income $I_{it}^H$ over equivalised household size $S_{it}^H$,

$$I_{it}^P = \frac{I_{it}^H}{S_{it}^H}. \quad (1)$$

The total net monetary annual household income $I_{it}^H$, is the sum of all monetary income sources $k$ (including income from work, private income and net social transfers, i.e. benefits less taxes) of all household members aged 16 or more and refers principally to the year prior to the survey. Equivalised household size $S_{it}^H$ is calculated according to the modified OECD scale. This scale assigns a weight of 1.0 to the first person of the household, 0.5 to each subsequent person aged 14 or more, and 0.3 to each person under 14.

Note that we are not taking household equivalised income as dependent variable, since we want to measure income relative to incomes in the same country. One measure of relative household income, although quite crude, is the binary poverty measure defined above. This measure is also used by policy makers within Europe.

To test for *Hypothesis 1*, four time-varying change indicators at the individual level are introduced *Marriage* (change from never married to married), *Divorce* (change from married to separated or divorced), *Employment* (change from unemployed to employed) and *Unemployment* (change from employed to unemployed). Note that *employed* and *unemployed* are derived from self-defined main activity status. *Employed* refers to normally working more than 15 hours. *Hypothesis 2* is put to a test by estimating separately similar models for men and women and comparing the coefficients. For these change indicators and key poverty measures, overall rates (1995-2001) by country are presented in Table 2.

(Table 2 about here)

For *hypothesis 3a* and *3b*, we use two regional variables, *Service Sector* and *Research and Development* respectively. *Service sector* measures regional service sector employment rate in 1997 (as a percentage of the employment in all NACE branches relative to Denmark), while *Research and Development* is time-varying and represents regional R&D employment rate in the business enterprise sector (as percentage of the labour force relative to Denmark).

Structural *hypotheses 4a* and *4b* are tested by including the time-invariant regional covariate, *Welfare Regime*, a four-level categorical variable representing Esping-Andersen's extended typology of welfare state regimes. The four levels are Social Democratic (Denmark), Conservative (Belgium, France and Germany), Liberal (Ireland and the United Kingdom) and Southern (Greece, Italy, Portugal and Spain).

A set of control variables measured at the individual level will be added to the model. *Education* is a time-constant covariate referring to the situation in 1994 with three-categories (less than secondary, secondary level and third level). Time-varying control variables at the individual level are, *Age* (16-40, 41-50, 51-60, 60+) *Civil status* (married, separated or divorced, widowed, never married), *Cohabiting status* (no, yes), *Activity status* (inactive, unemployed, employed) and *Health status* ("very bad and bad" versus "fair to very good"). Household differences are controlled for by *Household Type* (single without children, single with children, couple without children, couple with children and other).

Control variables at the regional level are: *employment rate*, *unemployment rate*, *relative gdp* and *gdp growth*. *Employment rate* is the percentage of the working population in relation to the total population. *Unemployment rate*[6] is the percentage unemployed persons in the total economically active population. *Relative gdp*[7] is expressed in Purchasing Power Standard per inhabitant as percentage of the EU15 average. *Gdp growth* is taken as gdp in log differences. All regional control variables, except *gdp growth* are expressed in terms of deviation from Denmark. Regional control variables are time-varying, except *Employment rate,* which is only available for 1997.

[6] We have imputed data for 1994-'95 in UK Regions North East, North West, East of England, South East and for 1994-'97 in London, based on national data.

7 Regional GDP data in REGIO are calculated in accordance to the rules of the European system of integrated economic accounts (ESA95). We have imputed wave 1 data on the basis of ESA78 data.

Finally, there is the variable *Duration,* measuring for each type of spell (i.e., first, second, third and fourth spell) separately duration of non-occurrence of the event of interest relative to onset of risk as a time-varying covariate (in years). In *Duration* timescales for first, second, third and fourth spell are combined in a single categorical variable with 16 levels (7 levels for first spell and 5, 3, 1 levels for respectively second, third and fourth spell). For the *first spell*, onset of risk is unknown and duration is coded as $-j$ for a first event occurring in the year $2001-j$. So events observed in, for example, 1995, have value -7 for the duration variable. Duration for *subsequent spells* is measured as time elapsed since the previous event of that type minus two. This specification of the Duration variable has the advantage to allow for different estimates of the baseline hazard for both types of spells, and to control for left-truncation (see Section 4.2). Finally, to control for dependencies between multiple spells, a variable *Timebetween,* measuring the time between the two last events, is included.

# 4 Method of Analysis

## 4.1 Discrete-Time Hazard Modelling

Individual income in the ECHP is defined and measured at a yearly scale. Thus, poverty entries and exits can only be calculated to occur from one yearly survey to another. Clearly, continuous-time survival models, relying on the assumption of time being a continuous random variable are inappropriate here and it is necessary to apply discrete-time analysis methods. A well-known and frequently used discrete-time model is the discrete logit model (Cox, 1972; Allison, 1982; Singer and Willet, 1993).

Let a sample consist of $n$ independent individuals $i=1,...,n$ with corresponding event times $T_i$, relative to a known common start time $t=0$, and assumed to be i.i.d. non-negative discrete random variables. At the event time $T_i$ individual $i$ transfers from the non-poverty to the poverty status (*poverty entry*). In a second analysis, the event to be studied is a transition from poverty to non-poverty status (*poverty exit*). Then, the discrete-time hazard rate $p_{it}$ is defined as the conditional probability that a person $i$ experiences an event at discrete time $t$, given the event has not already occurred to that individual before $t$:

$$p_{it} = \Pr(T_{i=t} \mid T_i \geq t)\,. \tag{2}$$

This hazard rate can be specified to depend on time $t$ and a vector of possibly time-varying explanatory variables $x_{it}$ by means of a logistic regression specification:

$$p_{it} = 1/[1+\exp(-\alpha_t - \beta x_{it})]. \tag{3}$$

We can reformulate (3) to yield the discrete logit model:

$$\log(p_{it}/(1-p_{it})) = \alpha_t + \beta x_{it}. \tag{4}$$

In this model, the $\alpha_t$ form a set of $t$ intercepts, one for each value of the duration variable. Together they form the *baseline hazard*.

We are unaware of software for directly fitting the discrete-time hazard model. A well-known workaround is based on the mathematical equivalence of the log-likelihood of the discrete-time logit model to the log-likelihood of person-time indicators of event occurrence (Allison, 1982). Thus, in practice, model (4) can be estimated by using any maximum likelihood based logistic regression program. Estimation methods rely on the standard assumption of non-informative right-censoring.

## 4.2 Discrete-time Recurrent Hazard Modelling

In ECHP 94-01, a single individual may experience up to four (non-)poverty spells. The case of multiple spells can be modelled by the class of recurrent hazard models (Allison, 1982; Willett and Singer, 1995; Kelly and Lim, 2000). In discrete time, we now have $k = 1,2,3,4$ random variables $T_{ik}$ representing the time at which the $k^{th}$ event occurs to individual $i$. The onset of risk for event $k$ is defined as the first time point after occurrence of event $k-1$ where a transition of status can take place. Hence we use the gap time formulation (Kelly and Lim, 2000), where the occurrence of event $k$ is modelled on a time scale relative to the occurrence to the prior event and not relative to the actual time of observation. The discrete-time hazard rate for individual $i$ for the first event $k = 1$ and subsequent events $k = 2,3,4$ is then defined respectively as

$$p_{i1t} = P[T_{i1} = t \mid T_{i1} \geq t] \tag{5}$$

and

$$p_{ikt} = P[T_{ik} = t \mid T_{ik} \geq t, T_{i(k-1)} = t_{i(k-1)}]. \tag{6}$$

The next step is to specify, in analogy to (4), how the logit transformed hazard depends on time and explanatory variables:

$$\log(p_{ikt} / (1 - p_{ikt})) = \alpha_t + \beta x_{ikt} \tag{7}$$

for $i = 1,...,n$, $k = 1,2,3,4$ and $t$ takes on all possible values of the duration variable for the $k^{th}$ spell.

The baseline hazard in model (7) is taken differently for the $k^{th}$ event . Note that a large number of spells are left-truncated, complicating the estimation procedure (Hamerle, 1991; Guo, 1993; Stevens, 2000). Since omitting the left-truncated cases would lead to serious selection bias in poverty studies (Iceland, 1997b), we have kept them in the analysis. Due to the specification of the duration variable, separate baseline hazards are estimated for left-truncated (i.e., first) and subsequent spells, hereby controlling for left-truncation and allowing for event specificity of the baseline hazard.

### 4.3 Multilevel Discrete-Time Recurrent Hazard Modelling

Our comparative analysis of poverty dynamics is based on a multilevel extension of the discrete-time recurrent hazard regression model (7). Our data belong to two different levels of a hierarchy: individuals nested within regions. A natural way to analyse such a hierarchical data structure is to use contextual regression models. Contextual regression models integrate variables at several levels of a hierarchy in one analysis. Kreft and de Leeuw (1998) notice three different approaches in contextual regression modelling: traditional non-hierarchical extensions (*e.g.*, separate regressions), classical contextual models (*e.g.*, analysis of covariance) and modern multilevel models (random components).

Traditionally, in non-hierarchical models, the nested nature of the data has been ignored completely. In classical contextual models and in modern multilevel models, individual and regional variables can be introduced simultaneously. These methods adequately can split the variation into a between individual level and a within regional

level, but each in their own way. Classical contextual models let the intercept and/or the coefficients vary in a fixed way, while modern multilevel models allow the intercept and/or the coefficients to vary randomly.

We prefer to model the nesting of individuals $i$ within regions $r$ in the random effects tradition. Random effects will be denoted in bold. The set of intercepts $\boldsymbol{\alpha}_{rt}$ are now random variables, assumed to follow a normal distribution (Bryk and Raudenbush, 2002; Goldstein, 2003 and Snijders and Bosker, 1999). Model (7) for the logit transformed hazard rate for event $k$ of individual $i$ belonging to region $r$ becomes accordingly:

$$\log(p_{irkt}/(1-p_{irkt})) = \boldsymbol{\alpha}_{rt} + \beta x_{irkt}\,. \tag{8}$$

The intercept in (8) can be split into a fixed part and an unknown region-specific random deviation:

$$\boldsymbol{\alpha}_{rt} = \alpha_t + \mathbf{u}_{0r}\,. \tag{9}$$

The random deviations $\mathbf{u}_{0r}$ have intercept variance $\sigma_0{}^2$. This variance $\sigma_0{}^2$ is an extra parameter to be estimated. If it is significantly different from zero, then we can say that regional effects are present.

In this paper, we use three reduced versions of (8), a null random model (*A*), a random intercept model (*B*) and an extended random intercept model (*C*). The null random intercept model A is given by:

$$\log(p_{irkt}/(1-p_{irkt})) = \alpha_t + \mathbf{u}_{0r}\,, \tag{10}$$

where $\alpha_t$ is now the expected value for the baseline hazard and $\mathbf{u}_{0r}$ the random deviation from this expectation for region *r*. This model does not consider explanatory variables. It provides an estimate for the expected baseline hazard and the regional level variance $\sigma_0{}^2$ .

Let us divide the vector of covariates $x_{irkt}$ in a first part containing only the individual specific (or level one) variables $x^1_{irkt}$ and a set containing the regional (or level two)

variables $x^2_{irkt}$ . In the random intercept model B, only individual level explanatory variable are introduced:

$$\log(p_{irkt}/(1-p_{irkt})) = (\alpha_t + \mathbf{u}_{0r}) + \beta^1 x^1_{irkt}. \quad (11)$$

This model contains three types of parameters: the intercepts $\alpha_t$, the individual regression coefficients $\beta^1$, and regional level intercept variance $\sigma_0{}^2$. If the latter variance is zero, then the regional level is not relevant. Then we could drop the random deviation term $\mathbf{u}_{0r}$ in (11) and arrive at model (7), with fixed effects only.

The random intercept model (11) can be further extended by introducing the regional level explanatory variables, resulting in Model C:

$$\log(p_{irkt}/(1-p_{irkt})) = (\alpha_t + \mathbf{u}_{0r}) + \beta^1 x^1_{irkt} + \beta^2 x^2_{rkt}. \quad (12)$$

If the intercept variation among regions shrinks to zero, then it is said that the regional level variables capture the regional variation and there is no significant regional heterogeneity left.

# 5 Results

In Tables 3 to 6, we present results for modelling the probability of becoming poor (poverty entry) and the probability of escaping poverty (poverty exit) for men and women separately. The tables contain estimates for the three models discussed in the previous Section. Models A include the main effect of *Duration*. Models B also include the main effects of individual level covariates, while models C in addition include the main effects of regional covariates. All models incorporate a random intercept for region.

The models yield estimates for three types of parameters: $\alpha$'s, $\beta$'s and the intercept variance $\sigma_0{}^2$. The collection of $\alpha$'s provides an estimate of the baseline hazard and they will be expressed as probabilities. They can be interpreted as the probability to enter (exit) poverty for the baseline group. In model A, the corresponding baseline group is the entire sample, while in models B and C this baseline group corresponds

to a reference group. The $\beta$'s assess the effects of covariates on the probabilities of poverty entry (exit) and are expressed as odds ratios. As the possibility of reversed causation cannot completely be ruled out, one should be cautious in interpreting these coefficients as strict causal effects. The estimate for the intercept variance $\sigma_0^2$ measures the amount of unexplained variance at the regional level. Significance of model parameters will be tested for by likelihood ratio tests.

We first describe results for the individual level variables. The presentation starts by discussing female entry, followed by male entry, female exit, male exit and a comparison by gender. We then discuss in a second subsection the results for the different covariates at the regional level.

## 5.1 Individual Level

In Table 3, the results for women's poverty entry are presented. From the null model (A) one observes that every year about 7% of the women being in their first spell of non-poverty will enter poverty. For those being already in their second spell this probability further increases to about 12%. Adding individual covariates results in model (B), nested in model (C). The estimated coefficients in (B) are close to those of (C), indicating robustness of the estimation procedure.

For women, divorce is the event which has the strongest effect on the probability of becoming poor. Women who divorce have odds of becoming poor about 5 times higher as women who not divorce. A marriage significantly reduces the risk of becoming poor, as expected.

Becoming employed, quite surprisingly, increases the odds for women of becoming poor by 56%. Finally, becoming unemployed seems to increase the odds of becoming poor, but the effect found is not statistically significant. We see two possible explanations for this unexpected effect of employment. First, part of the new jobs may be part-time and/or low-paid and therefore might insufficiently replace eventual loss of social benefits. Second, women may already anticipate their future income position by getting a job before they actually become poor. For example, women who are in the process of divorcing may already get a job before they actually divorce.

(Table 3, about here)

Let us quickly describe the effect of the control variables on female poverty entry. Compared to young age and low education, older age and higher education decrease the odds of becoming poor significantly. Activity status is also important: compared to inactive women, being at work reduces the odds of women's poverty entry, while being unemployed increases entry risk. Finally, poverty entry risks are also modulated by household type. Living in a couple nearly halves entry risk compared to living as a single, irrespective of the presence of children. Civil status, cohabiting status and - surprisingly - health status seem to have no impact at all. The absence of any noticeable effect of health status might be related to cross-national comparability issues in relation to the health-scale used.

The results for men's poverty entry are presented in Table 4. For men, the most important individual event associated with poverty entry is unemployment. Unemployment raises the odds of becoming poor by 61%. Becoming employed, again quite surprisingly, increases the odds for men of becoming poor by 47%. The other thwo events all seem to slightly increase the odds for men's poverty entry. But, these findings are not statistically significant.

(Table 4, about here)

We restrict the presentation of the effect of men's control covariates to a comparison with the effects found for women. In general, significance, direction and even effect size are quite similar. Though, in contrast to the female results, we now also notice a significant effect for cohabiting men and men in good health.

We now turn to the results for female poverty exit, reported in Table 5. A marriage almost doubles the risk of poverty exit, while a divorce more than halves the risk of women's poverty exit. Economic events also show, as expected, opposite effects: whereas employment increases the odds of poverty exit by 168%, unemployment seems to decrease the odds of poverty exit. However, the latter effect is not statistically significant.

(Table 5, about here)

We again compare control covariate effects with the results for female poverty entry. Opposed to female poverty entry, Civil status, Cohabiting status and single household with children now also have an effect.

Finally, in Table 6, the results for men's poverty exit are shown. Marriage has no significant effect, while divorce seems to increase men's poverty exit, but this effect is also not significant. The impact of men's economic changes is more pronounced. Finding a job increases the odds of poverty exit by 350%; whereas losing a job seems to decrease the odds of poverty exit by 17%.

(Table 6, about here)

Compared with women's results for poverty exit, men's control covariates again show many similarities. An important difference however is that for male exit, age does not seems to be important.

We conclude the presentation of the effect of individual covariates by comparing the effect of the life cycle events on poverty entry and exit across gender. The estimates of the $\beta$'s are expressed as log odds ratios to make numerical comparison between positive and negative effects easier. From Table 7, we can derive that marriage and divorce have an opposite impact on women's poverty dynamics. As to poverty entry, divorce has a strong increasing effect while marriage decreases the likelihood of becoming poor. For poverty exit, this pattern is reversed. Divorce now has a decreasing and marriage an increasing effect. For men however, demographic events seem to be of little or no importance.

(Table 7, about here)

Part of this sex-specific pattern can be explained by the relatively low income position of women. In income terms, marriage then means a gain for women, but a loss for men. The opposite is true for divorce, in income terms a loss for women but a gain for men. The larger impact of divorce can be explained by changing needs due to the presence of children. Divorcing usually means that children stay in the mother's household. Consequently, on top of income losses, divorcing women face a larger proportion of the burden of household needs. Overall, these findings confirm hypothesis 2.

We now compare poverty consequences of employment and unemployment transitions. From Table 7, we derive that the employment and unemployment event have opposite effects on poverty exit: while finding a job increases the likelihood of poverty

exit, unemployment has the reversed effect. On the other hand, for poverty entry unemployment increases the likelihood of poverty entering. Moreover, also employment–especially for women- seems to increase the likelihood of entering poverty. As already mentioned this result for employment might be explained as an anticipation of the negative consequences of events like a future divorce. Compared to unemployment, employment effects have a greater impact on poverty exit, both for men and women. As to gender differences, except for employment in relation to poverty entry, the effects of becoming unemployed and employed are strongest for men. We may conclude that hypothesis 1 is confirmed. Furthermore, the impact of demographic events (marriage/divorce) is more important for women, while economic events (becoming employed/unemployed) are more pertinent for men.

The greater impact of employment over unemployment on poverty exit may be explained by the fact that income gains related to employment on average exceed income losses associated with unemployment. This can be easily understood as unemployment allowances are generally lower before a change from unemployment to employment as after a change from employment to unemployment. Explanations for gender differentials may be related to labour income differentials by gender due to overrepresentation of women in low-paid and part-time jobs.

## 5.2 Regional Level

First of all note that the regional intercept variances are relatively small, but all significant for all considered models. Hence, even after introducing regional level explicative variables, there is still a significant part of the unexplained variance due to the regional differences which is being picked up by the random effects. Now what are the effects of the regional covariates?

Research and development seems to increase the likelihood of poverty entry and to decrease the likelihood of poverty exit, as expected by hypothesis 3a. These results could support the hypothesis that technological change contributes to inequality in Europe, but the effects are not statistically significant. For service sector and the associated deindustrialisation version of the skills mismatch hypothesis (hypothesis 3b), no support is present in the data. However, such findings should be handled with

caution, as the indicators we were able to construct were only remote proxies for the concepts of deindustrialisation and technological change.

Welfare regime has an impact on the likelihood of poverty entry but not on the likelihood of poverty exit. In the conservative and the southern type, the probability of becoming poor is only about half the risk of becoming poor in the liberal and social-democratic regimes. In countries of these types there are less poverty dynamics. These findings confirm neither hypothesis 4a nor hypothesis 4b. Such results point to a weakness inherent to using broad classifications of countries such as Esping-Andersen's typology of welfare regimes. This typology is based on a mix of several underlying dimensions, such that if any effects are found, they tend to be theoretically ambiguous.

As to the control covariates, regional employment rate and relative gdp have a weak to insignificant negative effect on poverty dynamics. Gdp growth tends to decrease the probability of poverty exit. However, only the effect for female exit is really statistically significant.

# 6 Discussion

In this paper, we have contributed to the literature of poverty dynamics by explicitly adding a structural dimension to the predominantly individually oriented study field of poverty entry and exit. To facilitate an integrated approach of individual and structural dimensions we have enriched individual ECHP panel data with regional time series for 63 European regions. Our analysis method took advantage of multilevel techniques especially suited for the analysis of such mixed-level data.

The results of the individually oriented hypothesis largely confirm what was expected. For marriage and divorce a sex-specific pattern was found. While marriage and divorce have a strong, but opposite impact on poverty dynamics for women, these events are of little of no importance for men. The effects for employment and unemployment were found to be stronger for men. Evidence for the structurally oriented hypothesis was less convincing. Welfare regimes have an impact on poverty entry, but this was not detected for poverty exit. No decisive evidence was found for the skills mismatch hypothesis.

A limitation of the present study is that the number of time periods for which data were available is rather limited, making it difficult to find significant drivers of poverty dynamics. The proposed methodology, a multilevel discrete-time recurrent hazard analysis, will be even more appropriate when applying it to individual panel data and regional time series with longer time spans.

## Acknowledgements

This research was supported by a FWO grant *Bijzondere doctoraatsbeurs 2002-2003.* Part of this research was conducted at CBGS Brussels. Data from the European Community Household Panel Survey are used with the permission of Eurostat, who bear no responsibility for the analysis or presentations presented here.

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*Table 1. Number of Regions and Sample Size by Country*

| *Country* | *Region* | *Sample Size* |
|---|---|---|
| *Belgium* | 3 | 1635 |
| *Denmark* | 1 | 1445 |
| *France* | 8 | 3401 |
| *Germany* | 14 | 3428 |
| *Greece* | 4 | 2867 |
| *Ireland* | 1 | 1115 |
| *Italy* | 11 | 3683 |
| *Portugal* | 3 | 3073 |
| *Spain* | 7 | 3274 |
| *United Kingdom* | 11 | 3181 |
| *Total* | 63 | 27102 |

*Table 2. Key dependent and independent variables by Country (overall rates, 1995-2001).*

| *Country* | *Poverty* | *Poverty Entry* | *Povertry Exit* | *Marriage* | *Divorce* | *Employ-ment* | *Unem-ployment* |
|---|---|---|---|---|---|---|---|
| *Belgium* | 14.02 | 4.85 | 4.64 | 0.48 | 0.59 | 0.86 | 0.87 |
| *Denmark* | 11.54 | 4.84 | 4.24 | 1.59 | 0.63 | 1.93 | 1.73 |
| *France* | 14.24 | 4.71 | 4.70 | 0.73 | 0.47 | 1.31 | 1.23 |
| *Germany* | 10.05 | 3.53 | 4.10 | 0.80 | 0.66 | 1.86 | 2.28 |
| *Greece* | 24.44 | 6.81 | 7.20 | 0.60 | 0.16 | 1.26 | 0.99 |
| *Ireland* | 26.80 | 6.70 | 5.88 | 0.61 | 0.27 | 1.27 | 0.94 |
| *Italy* | 17.02 | 6.02 | 6.52 | 0.82 | 0.27 | 1.25 | 0.80 |
| *Portugal* | 24.92 | 5.66 | 5.94 | 0.86 | 0.41 | 1.11 | 1.03 |
| *Spain* | 18.27 | 7.00 | 6.60 | 0.76 | 0.28 | 2.12 | 1.72 |
| *United Kingdom* | 19.10 | 5.80 | 5.75 | 0.79 | 0.95 | 0.84 | 0.71 |
| *Total* | 17.79 | 5.57 | 5.65 | 0.79 | 0.47 | 1.39 | 1.25 |

*Table 3. Female Poverty Entry in 63 European Regions (1994-2001). Estimation Results for a Discrete-Time Recurrent Hazard Model with Random Effects and No Covariates (A), only Individual Level Covariates (B) and the Multilevel Model (C)*

| | | MODEL A | MODEL B | MODEL C |
|---|---|---|---|---|
| | | Coef[†] p | Coef[†] p | Coef[†] p |
| *SPELL* | | | | |
| *Duration* | *First spell, -7* | 0.067 | 0.221 | 0.256 |
| | *First spell, -6* | 0.064 | 0.218 | 0.252 |
| | *First spell, -5* | 0.064 | 0.216 | 0.257 |
| | *First spell, -4* | 0.059 | 0.206 | 0.247 |
| | *First spell, -3* | 0.049 | 0.171 | 0.201 |
| | *First spell, -2* | 0.045 | 0.161 | 0.187 |
| | *First spell, -1* | 0.052 | 0.190 | 0.216 |
| | *Sec. spell, 0* | 0.115 | 0.314 | 0.386 |
| | *Sec. spell, 1* | 0.133 | 0.371 | 0.453 |
| | *Sec. spell, 2* | 0.135 | 0.386 | 0.465 |
| | *Sec. spell, 3* | 0.115 | 0.330 | 0.393 |
| | *Sec. spell, 4* | 0.132 | 0.384 | 0.449 |
| | *Third spell, 0* | 0.128 | 0.332 | 0.393 |
| | *Third spell, 1* | 0.144 | 0.385 | 0.451 |
| | *Third spell, 2* | 0.149 | 0.410 | 0.476 |
| | *Fourth spell, 0* | 0.126 | 0.431 | 0.533 |
| *PERSON* | | | | |
| *Marriage* | *Yes* | | 0.636* | 0.633* |
| *Divorce* | *Yes* | | 5.403*** | 5.397*** |
| *Employment* | *Yes* | | 1.560** | 1.560*** |
| *Unemployment* | *Yes* | | 1.065 | 1.074 |
| *Education* | *Secondary* | | 0.630*** | 0.634*** |
| *Low (Ref)* | *High* | | 0.338*** | 0.342*** |
| *Age* | *41-50* | | 0.805*** | 0.807*** |
| *16-40 (Ref)* | *51-60* | | 0.703*** | 0.706*** |
| | *60+* | | 0.596*** | 0.600*** |
| *Civil status* | *Never Married* | | 0.842* | 0.848* |
| *Married (Ref )* | *Divorced/separated* | | 0.962 | 0.973 |
| | *Widowed* | | 0.833* | 0.838 * |
| *Cohabiting status* | *Yes* | | 0.960 | 1.050 |
| *Activity status* | *Working* | | 0.461*** | 0.464*** |
| *Inactive (Ref)* | *Unemployed* | | 1.327*** | 1.329*** |
| *Health status* | *Good* | | 0.951 | 0.951 |
| *Household Type* | *Couple with child* | | 0.500*** | 0.495*** |
| *Single, no child (Ref)* | *Couple, no child* | | 0,532*** | 0,529*** |
| | *Other* | | 0.641*** | 0.634*** |
| | *Single, with child* | | 0.942 | 0.936 |
| *REGION* | | | | |
| *Welfare regime* | *Conservative* | | | 0.454*** |
| *Social-dem (Ref)* | *Liberal* | | | 0.696 |
| | *Southern* | | | 0.411*** |
| *Service sector* | | | | 1.000 |
| *Research & Devel.* | | | | 1.042 |
| *Employment rate* | | | | 0.967*** |
| *Unemployment rate* | | | | 0.972*** |
| *Gdp, relative* | | | | 0.994*** |
| *Gdp, growth* | | | | 0.885 |
| *VARIANCE(Intercept)* | | 0.048*** | 0.037 *** | 0.021*** |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [†] *duration* in probability scale, *other covariates* in odds-ratio's

*Table 4. Male Poverty Entry in 63 European Regions (1994-2001). Estimation Results for a Discrete-Time Recurrent Hazard Model with Random Effects and No Covariates (A), only Individual Level Covariates (B) and the Multilevel Model (C)*

| | | MODEL A | MODEL B | MODEL C |
|---|---|---|---|---|
| | | Coef† p | Coef† P | Coef† p |
| *SPELL* | | | | |
| *Duration* | *First spell, -7* | 0.056 | 0.173 | 0.200 |
| | *First spell, -6* | 0.053 | 0.167 | 0.191 |
| | *First spell, -5* | 0.049 | 0.158 | 0.183 |
| | *First spell, -4* | 0.047 | 0.150 | 0.177 |
| | *First spell, -3* | 0.037 | 0.119 | 0.139 |
| | *First spell, -2* | 0.038 | 0.127 | 0.148 |
| | *First spell, -1* | 0.033 | 0.110 | 0.128 |
| | *Sec. spell, 0* | 0.127 | 0.317 | 0.374 |
| | *Sec. spell, 1* | 0.132 | 0.339 | 0.400 |
| | *Sec. spell, 2* | 0.138 | 0.367 | 0.431 |
| | *Sec. spell, 3* | 0.117 | 0.315 | 0.369 |
| | *Sec. spell, 4* | 0.074 | 0.199 | 0.234 |
| | *Third spell, 0* | 0.098 | 0.236 | 0.278 |
| | *Third spell, 1* | 0.152 | 0.393 | 0.462 |
| | *Third spell, 2* | 0.155 | 0.419 | 0.494 |
| | *Fourth spell, 0* | 0.381 | 1.067 | 1.244 |
| *PERSON* | | | | |
| ***Marriage*** | ***Yes*** | | **1.244** | **1.239** |
| ***Divorce*** | ***Yes*** | | **1.055** | **1.046** |
| ***Employment*** | ***Yes*** | | **1.471*** ** | **1.463*** ** |
| ***Unemployment*** | ***Yes*** | | **1.608*** ** | **1.619*** ** |
| *Education* | *Secondary* | | 0.610*** | 0.617*** |
| *Low (Ref)* | *High* | | 0.322*** | 0.327*** |
| *Age* | *41-50* | | 0.917 | 0.918 |
| *16-40 (Ref)* | *51-60* | | 0.824*** | 0.826*** |
| | *60+* | | 0.797*** | 0.795*** |
| *Civil status* | *Never Married* | | 0.880 | 0.888 |
| *Married (Ref)* | *Divorced/separated* | | 0.807 | 0.820 |
| | *Widowed* | | 0.671*** | 0.675** |
| *Cohabiting status* | *Yes* | | 1.273* | 1.291* |
| *Activity status* | *Working* | | 0.600*** | 0.600*** |
| *Inactive (Ref)* | *Unemployed* | | 1.579*** | 1.569*** |
| *Health* | *Good* | | 0.828*** | 0.833 *** |
| *Household Type* | *Couple with child* | | 0.611*** | 0.600*** |
| *Single, no child (Ref)* | *Couple, no child* | | 0.488*** | 0.484*** |
| | *Other* | | 0.703*** | 0.692*** |
| | *Single, with child* | | 0.748** | 0.739*** |
| *REGION* | | | | |
| ***Welfare regime*** | ***Conservative*** | | | **0.447*** ** |
| ***Social-democr. (Ref)*** | ***Liberal*** | | | **0.634*** |
| | ***Southern*** | | | **0.426*** ** |
| ***Service sector*** | | | | **0.998** |
| ***Research & Devel.*** | | | | **1.156** |
| *Employment rate* | | | | 0.974*** |
| *Unemployment rate* | | | | 0.992 |
| *Gdp, relative* | | | | 0.993*** |
| *Gdp, growth* | | | | 1.110 |
| *VARIANCE(Intercept)* | | 0.098 *** | 0.063*** | 0.023*** |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; † *duration* in probability scale, *other covariates* in odds-ratio's

*Table 5. Female Poverty Exit in 63 European Regions (1994-2001). Estimation Results for a Discrete-Time Recurrent Hazard Model with Random Effects and No Covariates (A), only Individual Level Covariates (B) and the Multilevel Model (C)*

| | | MODEL A | | MODEL B | | MODEL C | |
|---|---|---|---|---|---|---|---|
| | | Coef† | p | Coef† | P | Coef† | P |
| *SPELL* | | | | | | | |
| *Duration* | *First spell, -7* | 0.076 | | 0.116 | | 0.110 | |
| | *First spell, -6* | 0.078 | | 0.120 | | 0.111 | |
| | *First spell, -5* | 0.065 | | 0.102 | | 0.096 | |
| | *First spell, -4* | 0.057 | | 0.091 | | 0.087 | |
| | *First spell, -3* | 0.052 | | 0.084 | | 0.078 | |
| | *First spell, -2* | 0.043 | | 0.070 | | 0.066 | |
| | *First spell, -1* | 0.040 | | 0.067 | | 0.063 | |
| | *Sec. spell, 0* | 0.094 | | 0.126 | | 0.120 | |
| | *Sec. spell, 1* | 0.114 | | 0.155 | | 0.148 | |
| | *Sec. spell, 2* | 0.104 | | 0.143 | | 0.135 | |
| | *Sec. spell, 3* | 0.089 | | 0.124 | | 0.118 | |
| | *Sec. spell, 4* | 0.070 | | 0.101 | | 0.096 | |
| | *Third spell, 0* | 0.111 | | 0.147 | | 0.139 | |
| | *Third spell, 1* | 0.110 | | 0.151 | | 0.144 | |
| | *Third spell, 2* | 0.111 | | 0.153 | | 0.144 | |
| | *Fourth spell, 0* | 0.168 | | 0.221 | | 0.210 | |
| *PERSON* | | | | | | | |
| ***Marriage*** | ***Yes*** | | | **1.979** | *** | **1.977** | *** |
| ***Divorce*** | ***Yes*** | | | **0.470** | *** | **0.469** | *** |
| ***Employment*** | ***Yes*** | | | **2.680** | *** | **2.683** | *** |
| ***Unemployment*** | ***Yes*** | | | **0.794** | | **0.798** | |
| *Education* | *Secondary* | | | 0.657 | *** | 0.661 | *** |
| *Low (Ref)* | *High* | | | 0.347 | *** | 0.348 | *** |
| *Age* | *41-50* | | | 0.872 | ** | 0.875 | ** |
| *16-40 (Ref)* | *51-60* | | | 0.753 | *** | 0.755 | *** |
| | *60+* | | | 0.661 | *** | 0.663 | *** |
| *Civil status* | *Never Married* | | | 1.341 | *** | 1.349 | *** |
| *Married (Ref)* | *Divorced/separated* | | | 1.797 | *** | 1.808 | *** |
| | *Widowed* | | | 1.346 | *** | 1.352 | *** |
| *Cohabiting status* | *Yes* | | | 1.311 | *** | 1.317 | *** |
| *Activity status* | *Working* | | | 0.567 | *** | 0.570 | *** |
| *Inactive (Ref)* | *Unemployed* | | | 1.131 | | 1.130 | |
| *Health status* | *Good* | | | 0.917 | * | 0.917 | * |
| *Household Type* | *Couple with child* | | | 0.859 | * | 0.854 | * |
| *Single, no child (Ref)* | *Couple, no child* | | | 0.769 | *** | 0.766 | *** |
| | *Other* | | | 1.035 | | 1.029 | |
| | *Single, with child* | | | 1.238 | *** | 1.232 | *** |
| *REGION* | | | | | | | |
| ***Welfare regime*** | ***Conservative*** | | | | | **0.749** | |
| ***Social-democr. (Ref)*** | ***Liberal*** | | | | | **0.879** | |
| | ***Southern*** | | | | | **0.650** | |
| ***Service sector*** | | | | | | **1.003** | |
| ***Research & Devel.*** | | | | | | **0.887** | |
| *Employment rate* | | | | | | 0.987 | |
| *Unemployment rate* | | | | | | 0.985 | * |
| *Gdp, relative* | | | | | | 0.993 | *** |
| *Gdp, growth* | | | | | | 2.925 | * |
| *VARIANCE(Intercept)* | | 0.060 | *** | 0.052 | *** | 0.021 | *** |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; † *duration* in probability scale, *other covariates* in odds-ratio's

*Table 6. Male Poverty Exit in 63 European Regions (1994-2001). Estimation Results for a Discrete-Time Recurrent Hazard Model with Random Effects and No Covariates (A), only Individual Level Covariates (B) and the Multilevel Model (C)*

| | | MODEL A | | MODEL B | | MODEL C | |
|---|---|---|---|---|---|---|---|
| | | Coef† | p | Coef† | p | Coef† | P |
| *SPELL* | | | | | | | |
| *Duration* | *First spell, -7* | 0.063 | | 0.108 | | 0.101 | |
| | *First spell, -6* | 0.061 | | 0.105 | | 0.096 | |
| | *First spell, -5* | 0.052 | | 0.091 | | 0.083 | |
| | *First spell, -4* | 0.046 | | 0.081 | | 0.076 | |
| | *First spell, -3* | 0.042 | | 0.075 | | 0.069 | |
| | *First spell, -2* | 0.031 | | 0.057 | | 0.053 | |
| | *First spell, -1* | 0.033 | | 0.063 | | 0.059 | |
| | *Sec. spell, 0* | 0.115 | | 0.171 | | 0.156 | |
| | *Sec. spell, 1* | 0.142 | | 0.211 | | 0.193 | |
| | *Sec. spell, 2* | 0.105 | | 0.161 | | 0.147 | |
| | *Sec. spell, 3* | 0.110 | | 0.171 | | 0.158 | |
| | *Sec. spell, 4* | 0.056 | | 0.088 | | 0.082 | |
| | *Third spell, 0* | 0.103 | | 0.151 | | 0.139 | |
| | *Third spell, 1* | 0.134 | | 0.205 | | 0.190 | |
| | *Third spell, 2* | 0.102 | | 0.173 | | 0.162 | |
| | *Fourth spell, 0* | 0.169 | | 0.192 | | 0.183 | |
| *PERSON* | | | | | | | |
| ***Marriage*** | ***Yes*** | | | **1.077** | | **1.072** | |
| ***Divorce*** | ***Yes*** | | | **1.587** | | **1.587** | |
| ***Employment*** | ***Yes*** | | | **4.536** | *** | **4.516** | *** |
| ***Unemployment*** | ***Yes*** | | | **0.820** | | **0.824** | |
| *Education* | *Secondary* | | | 0.616 | *** | 0.624 | *** |
| *Low (Ref)* | *High* | | | 0.347 | *** | 0.355 | *** |
| *Age* | *41-50* | | | 0.873 | ** | 0.873 | ** |
| *16-40 (Ref)* | *51-60* | | | 0.876 | | 0.877 | * |
| | *60+* | | | 0.820 | ** | 0.815 | ** |
| *Civil status* | *Never Married* | | | 1.308 | ** | 1.331 | ** |
| *Married (Ref)* | *Divorced/separated* | | | 1.099 | | 1.126 | |
| | *Widowed* | | | 0.983 | | 0.997 | |
| *Cohabiting status* | *Yes* | | | 1.457 | *** | 1.490 | *** |
| *Activity status* | *Working* | | | 0.640 | *** | 0.640 | *** |
| *Inactive (Ref)* | *Unemployed* | | | 1.367 | *** | 1.359 | *** |
| *Health status* | *Good* | | | 0.872 | ** | 0.874 | ** |
| *Household Type* | *Couple with child* | | | 0.867 | | 0.848 | * |
| *Single, no child (Ref)* | *Couple, no child* | | | 0.655 | *** | 0.649 | *** |
| | *Other* | | | 1.093 | | 1.068 | |
| | *Single, with child* | | | 0.972 | | 0.957 | |
| *REGION* | | | | | | | |
| ***Welfare regime*** | ***Conservative*** | | | | | **0.686** | |
| ***Social-democr. (Ref)*** | ***Liberal*** | | | | | **0.797** | |
| | ***Southern*** | | | | | **0.618** | * |
| ***Service sector*** | | | | | | **0.997** | |
| ***Research & Devel.*** | | | | | | **0.914** | |
| *Employment rate* | | | | | | 0.984 | * |
| *Unemployment rate* | | | | | | 1.004 | |
| *Gdp, relative* | | | | | | 0.996 | * |
| *Gdp, growth* | | | | | | 1.964 | |
| *VARIANCE(Intercept)* | | 0.074 | *** | 0.061 | *** | 0.020 | *** |

* p < *0.05;* ** p < *0.01;* *** p < *0.001;* † duration *in probability scale,* other covariates *in odds-ratio's*

*Table 7. Effect of Life Cycle Events on Poverty Entry and Poverty Exit by Gender in 63 European Regions (1994-2001)*

| | *Entry* | | | | *Exit* | | | |
|---|---|---|---|---|---|---|---|---|
| | *Women* | | *Men* | | *Women* | | *Men* | |
| | $B^{\dagger}$ | *p* | $B^{\dagger}$ | *p* | $B^{\dagger}$ | *p* | $B^{\dagger}$ | *p* |
| *Marriage* | -0.458* | | 0.214 | | 0.682*** | | 0.069 | |
| *Divorce* | 1.686*** | | 0.045 | | -0.756*** | | 0.462 | |
| *Employment* | 0.445*** | | 0.381*** | | 0.987*** | | 1.508*** | |
| *Unemployment* | 0.071 | | 0.482*** | | -0.226 | | -0.193 | |

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, $^{\dagger}$ coefficients expressed on a logit scale