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CHANGES IN THE PATTERNS OF POVERTY DURATION IN GERMANY OVER 1992-2010*

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Abstract

This paper studies changes in the patterns of poverty duration in Germany and explores how poverty experiences of individuals with different socio-economic characteristics have evolved over 1992-2010. The primary method used for the analysis is multivariate discrete-time hazard model based on joint modeling of poverty exit and re-entry rates, controlling for unobserved heterogeneity and initial condition problem. The analysis is performed with data from the German Socio-Economic Panel covering 1992 - 2010. The overall period of interest is split into a set of five-year 'moving' windows in order to capture changes in poverty duration over time. The results indicate that poverty has become more persistent in Germany at the end of the 2000s compared to the beginning of the 1990s. It has happened due to both the decrease in poverty exit rates and the increase in poverty re-entry rates. The evidence from the multivariate analysis reveals that non-EU immigrants and single parent households have become more prone to long episodes of poverty while those living in Eastern Germany have improved their situation over time.

Key words: poverty duration, multiple spells, changes in poverty persistence, hazard models.

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1. Introduction

Despite the introduction of major social policy reforms, Germany has been experiencing a steady increase in poverty rates over recent decades. Between the beginning of the 1990s and the end of the 2000s the income poverty rate based on the 60% median equivalized income poverty threshold has grown by 4 percentage points in Germany. With such trends in poverty dynamics Germany became a country with the steepest increase in income poverty rates in the OECD area (OECD, 2008).

Many studies tried to explain these trends (e.g. OECD, 2008; Biewen & Juhasz, 2011; Peichl et al., 2011). By applying decomposition techniques, they have been exploring what kind of changes in household structures and labor market conditions of households could have potentially contributed to the drastic increase in poverty rates over the recent two decades. At the same time, the literature on changes in patterns of poverty duration over time is scarce. Thus, it remains unclear whether the observed increase in income poverty rates took place due to the increase in the number of short-term incidences of poverty or due to the increase in poverty persistence. In addition, there is no evidence about how poverty experiences of people with different socio-economic characteristics have evolved over time.

The aim of this paper is threefold. First of all, we document changes in poverty duration in Germany over 1992-2010. Second, we explore whether these changes occurred due to changes in the probabilities of individuals to exit or to re-entry poverty. Lastly, we investigate how these probabilities evolved over time for individuals with different socio-economic characteristics.

The empirical part of the paper is based on discrete-time hazard rate modeling. In order to account for observed and unobserved inter-individual differences as well as initial conditions, poverty exit and re-entry hazard rates are modeled jointly with the equation for initial conditions by allowing them to be correlated.

The data for the analysis is derived from the German Socio-Economic Panel (GSOEP). Although the GSOEP has been spanning from 1984, the waves incorporated in the study cover only the period of 1992-2010 in order to include both West and East Germany into the analysis. The overall period is then split in a set of five-year moving windows with the purpose to capture changes in poverty duration over time and explore how poverty experiences of people with different socio-economic background have evolved since the beginning of the 1990s.

The paper is structured as follows. Section 2 reviews the literature in the field of poverty duration analysis and reveals potential gaps in knowledge which will be addressed in

the remaining part of the paper. Section 3 describes the data while Section 4 gives a detailed specification of the econometric model applied for the empirical part of the study. Results of the descriptive and explanatory analysis are provided in Section 5. Section 6 summarizes and concludes.

2. Literature review

Poverty duration has been widely analyzed by scholars and policy-makers for more than 20 years. In their pioneering work Bane and Ellwood (1986) introduced a 'spell-based approach' to analyze the amount of time people spend in poverty and events associated with poverty transitions in the USA. They conclude that most people experience short episodes of poverty while very few individuals remain poor for quite a long period of time. In addition, labor market events are found to be more important determinants of movements in and out of poverty while changes in household structure and social transfer payments play smaller role.

Stevens (1999) extended the work of Bane and Ellwood (1986) and introduced two major novelties. First of all, she has proved that ignoring multiple spells of poverty leads to the underestimation of its duration since many people who experience exits from poverty fall back into it shortly after. Second, Stevens applied a multivariate discrete-time hazard rate model to discover which factors facilitate exits from and entries into poverty over multiple spells.

The literature on poverty dynamics in Germany started in the early 1990s as a response to the methodological developments and data availability. Using the first six waves of the GSOEP data, Headey et al. (1994) analyze the duration of income poverty in Western Germany with the aim of testing whether Germany is a 'two-thirds society': two-thirds of the population enjoying relatively higher income and avoiding poverty and one-third locked into poverty or being close to it. Their key findings reveal that poverty is mainly short-term but far more people than previously thought experience it. They conclude that Western Germany appears to be a 75-15-10 society with 75% of population being non-poor, 15% occasionally poor but with generally adequate income and 10% frequently poor or almost poor. They also apply a multivariate analysis to link the frequency of poverty episodes to a set of socio-economic characteristics of individuals and their families showing that single parent households and households with more children or whose head is unemployed experience on average more episodes of poverty.

Krause (1998) also analyzed the duration of poverty in Eastern Germany straight after the reunification. His results confirm that most episodes of poverty in Germany are relatively

short. Nevertheless, poverty is much more prevalent in Germany than generally thought. First, even better-off families have a risk to fall into it. Second, along with the prevalence of short spells of poverty, long-term poverty also exists.

One limit of these first valuable works is that they did not analyze the determinants of the duration of poverty across multiple spells accounting for observed and unobserved characteristics of individuals and their households. This limitation has been addressed by Biewen (2003; 2006) who analyze the extent and composition of chronic poverty in Germany and its determinants. Biewen (2003; 2006) applied the same approach as Stevens (1999) to the GSOEP data for 1984-2000, but also controlled for initial conditions (the probability that the first freshly observed spell is a spell of poverty or non-poverty) by modeling poverty and non-poverty spells jointly with the equation for initial conditions (see also Devicienti, 2001). His results highlighted the fact that economic inactivity and pensioner status of the household head are most closely associated with long-term poverty while the number of children and the gender of household head do not have a significant impact.

A similar approach was further applied for the analysis of poverty duration in Germany by Moll (2006), Fertig and Tamm (2010). Moll (2006) analyzed poverty duration in Germany with the GSOEP data covering 1985-2002 and obtained the results which are in line with the findings of Biewen (2003; 2006). Fertig and Tamm (2010) focused on the duration of child poverty. Using the GSOEP data from 1984 to 2004 they analyzed the entire income histories of individuals from their birth to the time when they reached the age of 18.

Apart from the studies mentioned above and the works where Germany is analyzed in a comparative perspective with other countries, the literature on poverty dynamics in Germany is scarce leaving a lot of questions unanswered.[1] First of all, the most recent studies based on multivariate analysis of poverty entries and exits cover the period prior to 2004. At the same time, there is only limited evidence about poverty duration and its determinants after 2004 and this evidence is mainly based on the descriptive analysis[2]. Taking into account the availability of the GSOEP data for the period up to 2010, the analysis of more recent waves becomes possible and is highly needed. Secondly, due to the time limit of the existing analysis, information about poverty duration in East Germany covers only the first decade after the reunification. However, differences in patterns of poverty duration and its

[1] There are many papers that analyzed poverty duration in Germany in a comparative perspective with other countries (see, for example, OECD (2001), Fouarge (2004), Valletta (2004), Callens and Croux (2009), Andriopoulou and Tsakloglou (2011)).

[2] See, among others, Groh-Samberg (2007), Frick and Grabka (2009).

determinants between Eastern and Western Germany might look differently in the 2000s compared to the 1990s. Thirdly, there have not been studies performed so far which would reveal changes in poverty duration and its determinants in Germany over the recent two decades. Taking into account the rapid increase in poverty rates in Germany since 2000 these questions are not trivial. The necessity to address them was stressed by Groh-Samberg (2007) who showed in a descriptive way that it is not only poverty rates but also patterns of poverty that have evolved over time.[3]

Acknowledging everything mentioned above, this paper aims to shed light on changes in the patterns of poverty duration in the unified Germany over the recent two decades (1992-2010). More specifically, it purports to detect whether the observed increase in poverty rates is generated by the increase in short-term or persistent poverty. If the latter is the case, the next question to answer is to what extent poverty became more persistent and why – is it because of the increase in poverty re-entry rates or because it became more difficult to exit it? Finally, the paper will explore how poverty experiences of individuals with different socio-economic characteristics have changed since the beginning of the 1990s.

3. Data

3.1. Dataset and sample construction

The empirical analysis is based on data derived from the GSOEP. This is a longitudinal survey launched in 1984 in the Federal Republic of Germany and expanded to the territory of the former German Democratic Republic after the reunification of the country in June 1990.[4] Designed as a panel, the GSOEP collects annual data on a variety of demographic and socio-economic characteristics of individuals and their households (demographics, educational attainment, income components, labor market and occupational dynamics, health etc.). The richness of the information inside and the period of coverage make the GSOEP the best available dataset for exploring stability and changes in the living conditions of the German population over a long time span.

Although GSOEP spans from 1984, the data used for the analysis is derived from the completed interviews performed between 1992 and 2010 in order to include East Germany. We focus on adult individuals living in private households (excluding those in institutional establishments). Our choice to exclude children is based on the fact that children and adults

[3] Similar analysis of changes in poverty durations over time has been performed for the UK by Damioli (2010) and Jenkins (2011).
[4] Detailed description of the GSOEP dataset is provided in Haisken-DeNew & Frick (2005).

face different poverty generating processes: adults can influence their poverty situation by making certain decisions while income situation of children totally depend on their parents (see Fertig and Tamm (2010) for a study of child poverty duration in Germany).

Poverty status of individuals is defined according to the official definition of relative income poverty used in the European Union. A person is considered to be poor if his / her net equalized household income is less than 60% of the contemporaneous median equivalized income for the whole population. The income variable used for the construction of poverty status in the paper is the sum of annual household post-government income and annual household imputed rental value. The former is a sum of total family income obtained during the year from labor earnings, asset flows, private retirement income, private transfers, public transfers, and social security pensions with the deduction of total family taxes. The latter contains imputed rental value for housing occupied by owners or by tenants whose rent is below the market value (Grabka, 2010).[5] After summing these two income components and adjusting for inflation[6], the overall income is divided by the modified OECD equivalence scale in order to account for household economies of scale.[7] Finally, total net household equalized income is lagged by one year in order to eliminate the mismatch between the reference periods of income and covariates.[8] The unit of analysis is individual since individuals can be followed over time (Bane & Ellwood, 1986; Stevens, 1999; Devicienti, 2002).

Following common practice, the spell of poverty starts in the first year when a person's total net equalized income falls below the poverty threshold after having been above

[5] The possibility to include imputed rent in the calculation of total net household income has been widely discussed in the literature (see Frick et al., 2007; EUROSTAT, 2010). Imputed rent can be seen as a sort of in-kind benefits which substantially improve the income situation of people who own an accommodation or pay a rent below the market value. As a result, accounting for it provides a better measure of economic well-being of individuals.

[6] All amounts were converted to 2010 prices using the consumer price index. This is necessary to account for income changes due to inflation and, at the same time, to smooth differences in the development of prices between East and West Germany before 2000. Consumer price index had different values for East and West Deutschland until 2000.

[7] The OECD modified equivalence scale assigns to a single adult the value of 1, each additional adult member in household the value of 0.5, and each child the value of 0.3. One should bear in mind that income reported in the GSOEP is for the previous year. Taking into account the design of the SOEP interviews (everyone who is present in the household on the day of the interview is asked to provide his / her income for the previous year which is then used for the construction of household post-government income), in order to reach the correspondence between calculated household income and those members of household who participated in its accumulation, household post-government income reported for the previous year has been divided by the OECD scale for the current year.

[8] Debels and Vandecasteele (2008) have shown that although this method is better than the one without income lagging, it still does not account for changes in household composition during the year. Nevertheless, it is impossible to measure household income for the subsequent households to which an individual belonged through the year because the GSOEP does not provide information about the exact timing of household changes.

it and ends in the first year when income is higher than the poverty threshold after having been below it. A similar definition is also applied for non-poverty spells. Two issues should be taken into account due to such a design. First of all, since the poverty line is an arbitrarily defined concept even small "random" changes in income can move people across the line (Bane & Ellwood, 1986). Secondly, since it is unknown for how long individuals have been staying in poverty (non-poverty) at the beginning of the observation period, all left-censored spells are excluded from the analysis. Such exclusion usually leads to the overestimation of transitions in and out of poverty. This problem, however, can be addressed by controlling for initial conditions which is performed in the paper.

Since the focus of the paper is on changes in the patterns of poverty duration over time, the overall period for which income data is available (1992-2010) is split into a set of moving windows in a way to obtain within each window at least five consecutive periods when a poverty exit or re-entry can occur after the exclusion of left-censored spells and data cleaning. It is done to allow both short- and long-term spells of poverty to be observed in the data. Given our time span, 13 such five-year windows are generated.[9]

After data cleaning, a total sample of 5613 individuals and 35707 observations has been obtained for the whole period of 1992-2010. The number of individuals within each moving window fluctuates between 1891 and 2843 (6040 – 8804 observations). A detailed breakdown of individuals and observations by moving windows is given in Table 1 in the Annex.

3.2. Construction of covariates

The effects of socio-economic characteristics of individuals and their households on the probabilities to exit (re-entry) poverty are captured with a set of corresponding covariates. Most of them are measured at the household level and refer either to household head or household itself (gender, nationality, educational attainment and disability status of the household head, type of the household and region where it resides).[10] The motivation behind

[9] Information about all individuals is taken into account disregarding when they are first recorded in the data. In case of a temporary or a permanent drop out within a window, only the waves prior to the gap are used for the sample construction. Nevertheless, if individuals come back to the survey after temporary drop outs, information from those waves are used in later windows.

[10] In the GSOEP the definition of household head is very vague and does not consistently apply to a person who is either the main bread-winner in the family or responsible for accommodation. Contrarily, any household member who has the most exhaustive knowledge about the household and all its members can be considered as household head in the GSOEP. For more details see 'SOEP 2012 Erhebungsinstrumente. Anlagenband zum Methodenbericht' (p. 41 within 'The Manual for Interviewers'). Moreover, the decision about who this person is has to be made by the interviewer which makes it automatically subjective. As a result, even a housewife with zero personal income and without any legal responsibilities for accommodation or other assets can be recorded

is that poverty status of individuals is derived from net equalized household income. Hence, household characteristics are expected to be better predictors of the amount of time spent in poverty than covariates measured at the individual level.[11]

Apart from household characteristics, information about age of individuals is incorporated in the model as the only one variable measured at the individual level. The reason behind is to explore poverty experiences of people representing different age groups rather than households whose heads are of a different age. Depending on their age, persons can experience different frequencies of poverty incidences and different patterns of its persistence as well as their underlying forces also might differ (see e.g. Valletta, 2006, or Damioli, 2010). This choice is also motivated by the findings of the recent studies for Germany (see, for example, Goebel et al., 2010, and Goebel and Grabka, 2011) which reveal very heterogeneous changes in poverty rates for different age sub-groups of the population over the last decade. Such evidence permits to make an assumption that the probabilities to exit (re-entry) poverty and, hence, the experiences of poverty durations might also have evolved in a different way for different age groups.

Along with the covariates for poverty exit (re-entry) equations, another important issue refers to the selection of relevant instruments for the initial condition equation. On the one hand, these instruments should affect the probability that the first fresh spell is a spell of poverty (non-poverty). On the other hand, they should be based on the pre-sample information which in case of inclusion in the main transition equations should not yield significant results (Maes, 2011). Taking these two requirements into account, the following variables have been considered as potential instruments for initial conditions: educational characteristics of household head's parents (both school attainment and vocational training), age of household head by the first job and place where household head grew up. However, only those which had been found significant (father's school attainment and place of childhood) were included in the model with final specification. Detailed description of all covariates and the way of their construction is provided in Table 2 in the Annex.

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as a household head in some cases because she has more time to fill in the household questionnaire, she is better aware about household general conditions and is in a way 'responsible' for running the household. It might be reasonable to consider such a person as a household head in research on other topics but definitely not in the analysis of poverty durations based on the definition of net household equalized income. Hence, household head is defined in the paper as a person whose relative contribution to net equalized household income is the largest.

[11] Linking individual characteristics to net equalized household income would produce fuzzy results. As soon as resources are shared within the household (and this is the assumption made in the paper), there might be individuals with zero earned and unearned income but positive values of net equalized household income. Attempts to explain variation in timing of poverty transitions with characteristics of these people would not make much sense.

4. Specification of the model

The empirical part of the paper is based on the multivariate discrete-time duration model that allows incorporation of multiple spells into analysis accounting for observed and unobserved heterogeneity. This approach was first introduced in the field of poverty dynamics by Stevens (1999) and further developed by Jenkins and Riggs (2001), Biewen (2003; 2006), Fertig and Tamm (2010), and Devicienti (2011). It rests on the idea that poverty and non-poverty spells can be modeled jointly. The key advantage of this technique compared to the separate estimation of probabilities to exit or re-entry poverty is that it enables to analyze the duration of poverty across multiple spells by allowing them to be correlated. Contrarily to the single-spell approach, it provides better estimates of poverty persistence over time taking into account multiple episodes of poverty that individuals might experience[12].

Consider two possible mutually exclusive states (*s*) an individual can occupy at a certain point in time – poverty (*P*) and non-poverty (*N*). Correspondingly there are two types of events he or she can potentially experience, e.g. exits from and entries into poverty. For a random individual *i* (*i* = 1, 2, …, N) the probability to move from one state to another (h_{it}^s) in time period *t* (*t* = 0, 1, 2, …, T) after having been in the current state over a number of periods *d* (*d* = 1, 2, … , D) can be expressed as a logit function:

$$h_{it}^s(d \mid X_{it}^s, v_i^s) = \frac{\exp[a_d^s + \beta^s X_{it}^{s\prime} + v_i^s]}{1 + \exp[a_d^s + \beta^s X_{it}^{s\prime} + v_i^s]}, \quad (1)$$

In the expression above X_{it}^s is a vector of individual observable characteristics that can vary over time. β^s is a vector of parameters associated with X_{it}^s and estimated in the model. a_d^s represents a baseline hazard capturing the function of time spent in a current state *s*. It is specified in the most flexible way as a set of dummies corresponding to each value of duration, *d*, observed in the data. Finally, v_i^s stands for unobserved individual effect fixed in time. This effect is generated by individually specific time-constant unobserved characteristics (preferences, attitudes, abilities, efforts, tastes etc.) which together with observed covariates underline the probabilities of individuals to entry or exit poverty. In the context of single spells, ignoring unobserved component will not pose a problem. Contrarily, in the presence of multiple spells accounting for it is a key issue because the same unobserved

[12] The importance of accounting for multiple spells has been stressed by Stevens (1994), Jarvis and Jenkins (1997), Stevens (1999), Jenkins and Riggs (2001), Biewen (2003; 2006) and Hansen and Wahlberg (2007).

forces might influence the individual's probability of both entering and exiting poverty. This will lead to the correlation across spells and biased estimates.[13] Another important reason for incorporating unobserved heterogeneity into the model is the necessity to distinguish the effects of true state dependence from unobserved heterogeneity.[14] When neglected, the impact of unobserved heterogeneity confounds with the estimates of duration dependence increasing their magnitude and evoking downward bias on the estimated hazard rates (Kiefer, 1988; Cameron and Trivedi, 2005; Jenkins and Riggs, 2001; Damioli, 2010).

In order to avoid the aforementioned problems, poverty and non-poverty spells have to be estimated simultaneously allowing for the correlation of individual unobserved components (v_i^s) across spells.[15] These components follow a joint distribution $g(v_i^P, v_i^N)$ that is unspecified but can be approximated either parametrically or semiparametrically. In the first case, strict assumptions about the form of the distribution should be made which evokes a relatively high risk of misspecification with the subsequent inaccurate estimates of parameters. In the second case, a joint distribution of unobserved terms v_i^P and v_i^N can be approximated in a discrete way with a finite number of support points (Heckman and Singer, 1984). This approach departs from the assumption that the population under study consists of q (q = 1, 2, …, Q) types of individuals with different propensities to enter and exit poverty due to differences in unobserved characteristics. The number of subpopulation types is determined by combinations of support points derived from the data. Each q is assigned an associated probability measure p ($0 \le p \le 1$ and $\sum_{q=1}^{Q} P_q = 1$) which reflects the probability that a randomly selected individual belongs to the corresponding type of the population. All together they form a probability mass function showing how individuals are distributed across the defined subpopulation groups. Support points and corresponding to them probabilities are estimated through maximum likelihood procedure together with other parameters of the model (β^s, a_d^s).

Another important issue to address while estimating the persistence of poverty is censoring. The analytical framework described above accounts for right-censored spells (the spells with unobserved endings) by integrating their durations in the estimation of the hazards

[13] Ceteris paribus, individuals who are more prone to exit poverty are usually less prone to fall back in it. If this is the case, consideration of spells as independent will result into inconsistent estimates (Stevens, 1999; Jenkins and Riggs, 2001; Devicienti, 2011).

[14] For the extensive discussion see Bane and Ellwood (1986), Biewen (2009), Arranz and Canto (2011), Maes (2011).

[15] The approach was first applied in the field of poverty dynamics by Stevens (1999).

for poverty exits (entries) up to the period when an individual is no longer observed. Contrarily, incorporation of left-censored spells (the spells with unobserved beginnings) into the model is more problematic due to the absence of information about elapsed duration. At the same time, characteristics of individuals who experience left-censored spells usually differ from characteristics of those for whom the entrance in the state is observed (Arranz and Canto, 2011). It raises the necessity to control for initial conditions in order to eliminate the bias induced by the selection of the sample. A common strategy applied in the field so far is based on Heckman (1981) and foresees joint estimation of three equations – one for poverty entries, one for poverty exits and one for the probability that the first fresh spell is a spell of poverty or non-poverty. [16] The latter can be expressed as a function of individual observed and unobserved characteristics:

$$P_{it0} = \frac{\exp[q_i + \phi Z_{it0}]}{1 + \exp[q_i + \phi Z_{it0}]} \qquad (2)$$

where Z_{it0} is a vector of individual characteristics, ϕ is a vector of corresponding coefficients and q is an unobserved heterogeneity term. In line with Heckman's (1981) recommendation all Z_{it0} are derived from the pre-sample information and are not included into equations for h_{it}^s. In the spirit described above, equation (2) can be jointly estimated with the equations for poverty entries and exits by allowing unobserved components v_i^P, v_i^N, q_i to be correlated. Their trivariate distribution can be approximated in a discrete way by a number of support points derived from the data.

Summarizing the methodological framework described above, the contribution of individual *i* towards the likelihood function of the sample can be expressed in the following way:

$$L_i(v^P, v^N, q) = P_{it0}(q)^{P_{it1}} \cdot (1 - P_{it0}(q))^{1-P_{it1}} \times \prod_{t=1}^{T} [h_{it}^p(\theta^P)^{e_{it}} \cdot (1 - h_{it}^P(\theta^P))^{1-e_{it}}]^{P_{it}} \cdot$$
$$\cdot [h_{it}^N(\theta^N)^{e_{it}} \cdot (1 - h_{it}^N(\theta^N))^{1-e_{it}}]^{1-P_{it}}$$

Superscript P_{it1} above denotes whether the first fresh spell of individual *i* was a spell of poverty or non-poverty (with $P_{it1} = 1$ if the individual was observed in poverty and $P_{it1} = 0$ if not). P_{it} is a dummy variable reflecting poverty status of an individual at time *t* (with $P_{it} =$ 1if individual was poor and $P_{it} = 0$ if not). Superscript e_{it} is a dummy variable that shows

[16] Devicienti, 2001; Jenkins and Riggs, 2001; Biewen, 2003; Hansen and Wahlberg, 2004; Devicienti, 2011; Maes, 2011.

whether there have been changes in the poverty status of an individual in period *t* as compared to the period *t – 1*.

In order to obtain the estimates with respect to unobservables v_i^P, v_i^N, q_i, their support points and parameters β^s and ϕ the log-likelihood function for the whole population should be maximized:

$$\log L = \sum_{i=1}^{N} \log\{ \int_{K(v^P)} \int_{K(v^N)} \int_{K(q)} L_i(v^P, v^N, q) \cdot df(v^P, v^N, q)\}$$

with $K(v^P)$, $K(v^N)$, $K(q)$ depicting the number of support points for v^P, v^N, q respectfully.

5. Results

5.1. Descriptive statistics

Figure 5.1 provides the evolution of exit rates from poverty over 1992-2010. There are several common trends that can be observed for all time periods. First of all, the majority of those who fall into poverty manage to exit it after the first year of being in the state. These are people who experience short-term spells of poverty. Secondly, after the first year exit rates start decreasing. The probability to exit poverty after the second year fluctuates between 32.7% and 42.3% depending on the window and declines further as time spent in poverty evolves. Such trends signify the presence of duration dependence in the data: the longer someone remains poor, the smaller are his / her chances to leave poverty. Finally, a relatively small fraction of individuals who fall into poverty remain poor more than 5 years (between 6% and 18%). These people can be classified as persistently poor.

Apart from the similarities, Figure 5.1 reveals substantial differences in the patterns of poverty duration across the time periods. Thus, the probability to exit poverty after the first year has been steadily declining from window to window and reached 51.6% in 2005-2009 which is almost 8 percentage points lower than in 1993-1997. The chances to leave poverty have been decreasing not only for relatively short durations of poverty spells but also for longer ones. For example, the probability to exit poverty after the second year was equal to 41.9% in 2005-2009 compared to 36.7% in 1993-1997, after the third year – 25.3% compared to 33.4%, after the fourth year – 16.9% compared to 42.7% and after the fifth year only 6% compared to 23% observed in 1993-1997. As a result the likelihood to spend more than 5 years in poverty for those who have just started a poverty spell was 17.7% in the last time window compared to 6.8% in the first one.

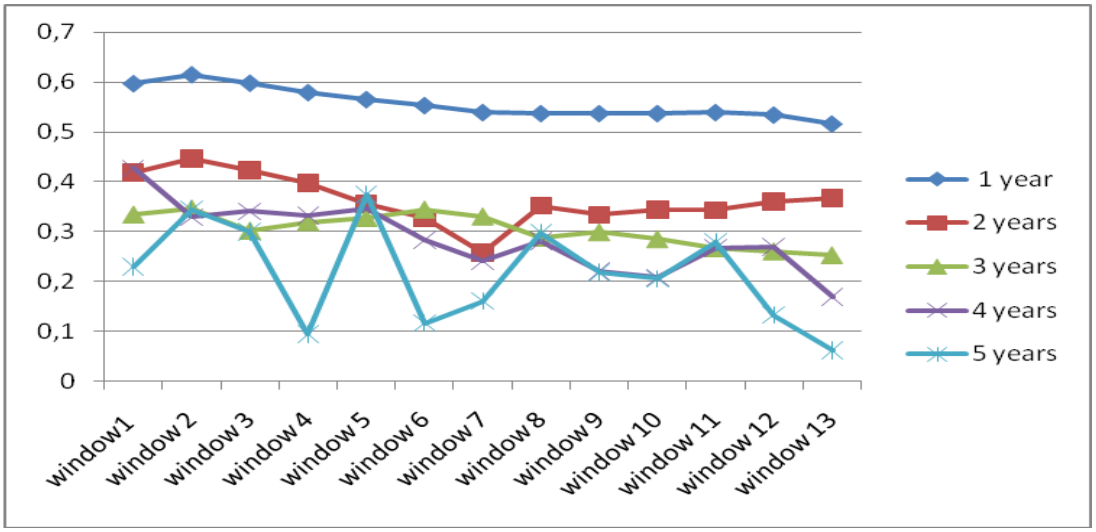

Figure 5.1. Dynamics of poverty exit rates across time windows[17]

Figure 5.2 below provides the evolution of estimated probabilities to re-entry poverty over the recent two decades. Contrarily to exit rates from poverty, the probabilities of re-entry are much lower. Thus, the likelihood to re-enter poverty for an individual who has just started a spell of non-poverty was equal to 22.6% in 1993-1997 in comparison with 59.7% exit rate documented during the same period. In addition, re-entry rates are falling remarkably after the first year of being out of poverty. As a consequence, only 45% - 62% of individuals (depending on the time period) who manage to climb out of poverty fall back into it over the next five years.

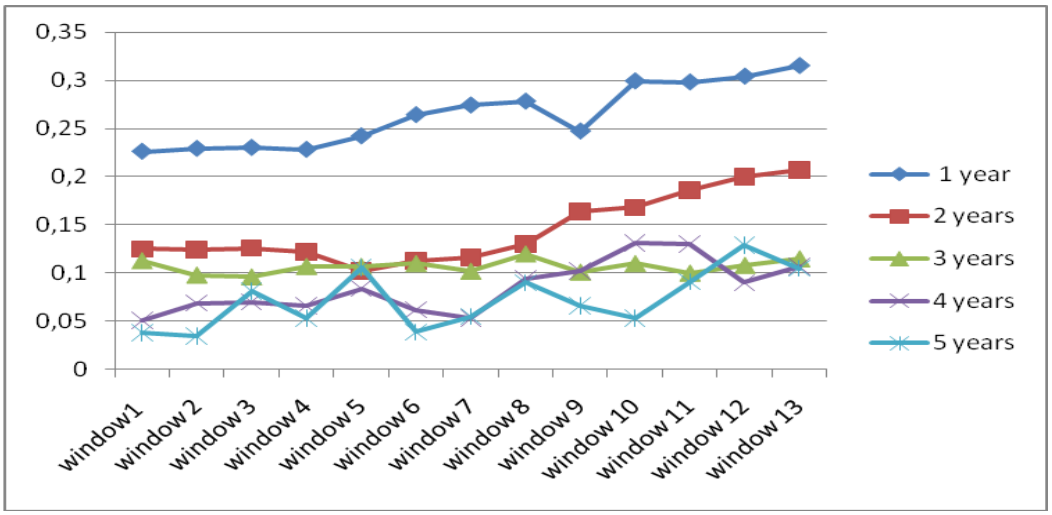

Figure 5.2. Dynamics of poverty re-entry rates across time windows[18]

[17] Life-table estimates based on the GSOEP data.
[18] Life-table estimates based on the GSOEP data.

A closer look at the dynamics of re-entry probabilities in Figure 5.2 reveals their obvious increase over 1992-2010. Thus, for example, only 22.6% of fresh non-poverty spells ended with a re-entry during the first year of being out of poverty in 1993-1997 compared to 31.5% in 2005-2009. However, the biggest increase in the re-entry probabilities over the period of interest is observed for individuals who have left poverty four and five years ago: they have doubled since 1992. As a result of such trends, only 38.3% of people who left poverty managed to stay out of it at least five years after in 2005-2009 compared to 54.7% in 1993-1997.

The decrease in poverty exit rates and the increase in poverty re-entry rates over 1992-2010 signify that poverty became more persistent in the late 2000s compared to the beginning of the 1990s. However, in order to detect how poverty durations have evolved over time and to what extent poverty became more persistent a joint analysis of poverty exit and re-entry rates is needed. By combining life-table estimates of poverty exits and re-entries a distribution of poverty durations across multiple spells can be derived.[19] The evolution of such distributions over 1992-2010 is given in Figure 5.3.

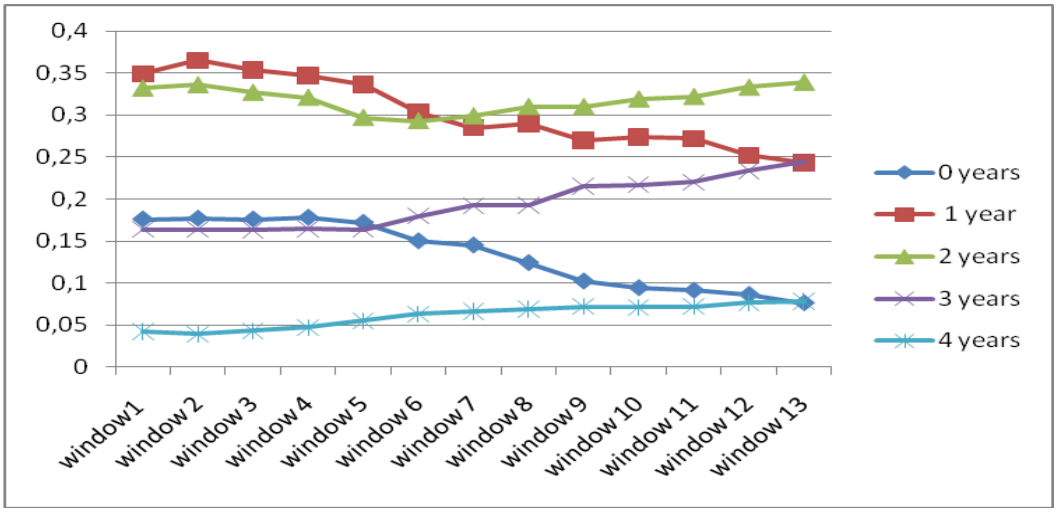

Figure 5.3. Distribution of poverty durations across multiple spells[20]

Figure 5.3 shows that only 7.5% out of all individuals left in the sample after the exclusion of left-censored spells do not fall into poverty again afterwards in the last time window. This number is more than two times smaller compared to the beginning of the 1990s. At the same time, the predicted proportion of those who are one year poor out of five

[19] A detailed procedure how to derive these distributions is described in Jarvis and Jenkins (1997) and Devicienti (2002).

[20] These distributions are derived from the life-table estimates of poverty exit and re-entry rates. All spells starting from the first fresh one are taken into account.

decreased from 35% in the first time window to 24% in the last one. Contrarily, the predicted proportions of those who spend in poverty three or four and more years increased from 16% to 24% and 4% to 8% correspondingly. This evidence confirms that poverty has become much more persistent in Germany with fewer people experiencing relatively short spells of poverty and more people being trapped into long-term poverty.

The changes in the durations of poverty across time raise a question of how poverty experiences of people with different socio-economic characteristics have changed since 1992. More specifically, it becomes relevant from the policy-making perspective to explore whether individuals with a certain set of characteristics became more prone to long-term poverty compared to others. To answer this question a multivariate analysis is needed.

Table 3 in the Annex summarizes descriptive statistics (means and standard deviations) for all variables which are used for explaining the differences in the probabilities to exit (re-entry poverty) for individuals with different socio-economic characteristics by windows.

The following remarkable changes in the mean values of covariates have been observed in the sample of spells between the first and the last windows. First, the share of individuals who are 55-64 year-old has decreased from 19% to 14%. At the same time, the shares of the youngest (below 24) and elderly (those who are older than 65) have increased from 8 to 12% and from 16 to 20% correspondingly. Secondly, the share of female headed households has increased by 9 percentage points which might reflect their more active position on the labor market at the end of the 2000s compared to the beginning of the 1990s. Thirdly, the share of immigrants in the sample decreased from 17 to 10%. Fourthly, the share of individuals in the sample who live in Eastern Germany has declined by 10 percentage points. Fifthly, the sample of individuals became better educated: while at the beginning of the 1990s around 5% of individuals had uncompleted education by the end of the 2000s their share fell to 3%. Finally, the shares of single person and single parent households increased substantially over the period of interest while the shares of couples with children and other (usually multigenerational) households decreased.

All these shifts in the sample statistics allows to assume that as time evolved female-headed households, young (less than 25 year-old) and elderly people, better educated individuals as well as those living in single person and single parent households became more prone towards poverty than before. Contrarily, people living in East Germany, immigrants, and couples with children improved their chances to escape poverty. Nevertheless, in order to

unravel simultaneous effects of all abovementioned socio-economic characteristics on poverty duration and trace their changes over time multivariate analysis is needed.

5.2. Explanatory analysis

Table 4 in the Annex presents evolution of the estimated coefficients for three equations – poverty exit (Panel 1), poverty re-entry (Panel 2) and initial conditions (Panel 3) over 13 moving windows.

The estimates of the duration dummies in Panel 1 show that as soon as we control for unobserved heterogeneity and initial conditions clear patterns of negative duration dependence vanish in a set of periods. Thus, the amount of time spent in poverty did not have any influence on individuals' probability to exit poverty at the beginning of the 1990s. The coefficients of duration dummies started gaining statistical significance in the third window but not for a long time and without substantial differences in their magnitudes. At the beginning of the 2000s there was no any duration dependence observed in the equations for poverty exits again. The situation changed radically in the second half of the 2000s when the amount of time spent in poverty started playing an important role in predicting probabilities to exit it. There might be several plausible explanations for the increase in negative poverty duration dependence at the end of the 2000s. First of all, the world financial crisis started in 2008 leading to a rapid and deep recession. This recession was the most pronounced compared with others which took place in Germany after the Second World War (Faik, 2012) and negatively affected income situation of many individuals. In addition, just before the crisis (in 2005 and 2006) Germany was experiencing the highest unemployment rates since its reunification. Employment situation was substantially improved after 2006 mainly due to Hartz IV reform which was introduced in 2005 and aimed to combat unemployment by, among others, changing eligibility criteria for unemployment benefits and cutting their size. However, along with the decline in unemployment rates Hartz IV reform has pushed a number of individuals into low-paid employment which also might have resulted in higher poverty rates and its persistence.

In contrast to the unstable patterns of duration dependence in the equations for poverty exits, in the re-entry equations duration dummies are almost always statistically significant. Nevertheless, within each window their effects almost do not differ in size supporting the evidence that individuals with longer periods of time spent out of poverty do not have lower chances to re-enter it compared to individuals experiencing shorter non-poverty spells.

Apart from duration dependence, estimated coefficients for other covariates help to detect how the role of different socio-economic characteristics of individuals and their households evolved since the beginning of the 1990s. Thus, for example, the dynamics of the coefficients for age dummies confirm the descriptive evidence from the previous section that young individuals (those under 35) became more prone to longer spells of poverty in the 2000s compared to the 1990s. They are still not worse off compared to the middle age people in terms of probabilities to exit poverty but they did lost their advantage to exit poverty faster which was observed until 2003. Contrary to the youngest age group, elderly people (65 and more) did not have the advantage of faster exits compared to those of 35-44 years old from the very beginning. Moreover, at the edge of the 2000s they experienced even lower exit probabilities than people from the middle age group but those effects disappeared from 2002 onwards. A plausible explanation of such trends might be the introduction of pension reform in 2001 which stimulated creation of private pension funds (also for people with low income) as well introduction of the minimum level of social insurance for old and disabled people in 2003.

Summarizing the findings about the dynamics of the coefficients for age dummies we can conclude that all differences between age subgroups which were observed in the 1990s and at the beginning of the 2000s completely vanished in the last two windows. In other words, all other things being equal, age of the individual does not determine his / her chances to exit (re-entry) poverty anymore.

Until 2001 people with other than tertiary education had a substantially higher probability to re-entry poverty. However, this clear pattern disappeared afterwards equalizing to a certain extent the chances to re-entry poverty of individuals with general and uncompleted education with the chances of holders of higher education. In contrast to the situation with poverty re-entries, educational attainment almost did not play a role in determining probabilities to exit poverty before 2002. From 2003 onwards people with lower than tertiary education started experiencing substantially lower probabilities to exit poverty. However, all these effects disappeared in the last window which includes the years of financial crisis. A general conclusion which can be made out of the trends in coefficients for education is that people with high education on average experience lower persistence of poverty but this effect has become less pronounced since the beginning of the 2000s.

There have been also a lot of fluctuations observed in the coefficients capturing the effects of household types on the probabilities to exit and re-entry poverty. They can be summarized in the following way. Couples without children have never experienced higher

probabilities to exit poverty compared to single person households. Nevertheless, they did experience lower propensities to re-entry poverty in the second half of the 1990s and at the beginning of the 2000s. The disappearance of this effect afterwards allows to conclude that 'economies of scale' does not bring people living in a couple the same advantage as before. Vanishing of similar effects for other types of households also supports this conclusion. At the same time, single parent households started experiencing higher chances to re-entry poverty in the late 2000s which might reflect the effects of high unemployment and financial crisis. Contrary to them, families with children are quite well off in Germany enjoying higher probabilities to exit and in some time periods lower probabilities to re-entry poverty. This is a typical situation for Germany which contradicts to findings for other countries, above all for the US and UK[21].

In addition to all mentioned above, the role of two other characteristics in shaping poverty persistence have substantially changed over time. First of all, in line with the evidence from the descriptive part of the paper those living in East Germany do not experience higher probabilities to re-enter poverty compared to their counterparts living in West Germany from 2001 onwards. Such a trend might be explained by a partial catch up of Eastern Germany with Western part of the country over the 1990s. Secondly, the relative poverty situation of migrants with non-EU citizenship has become worse over time. While EU citizen living in Germany almost never experienced more difficulties (and sometimes were even better off) with climbing out of poverty, non-EU citizens faced substantially lower probabilities to exit poverty in the second half of the 1990s and almost always much higher probabilities to re-enter it. Moreover, if negative effects for non-EU citizens in poverty re-entry equations were not stable over the 1990s, there is a very clear and stable pattern since 2001signifying that non-EU citizens started experiencing much higher probability to re-entry poverty compared to Germans. Such evidence might speak for the fact that non-EU immigrants might be among the ones who are most vulnerable towards negative changes in macroeconomic conditions (increase in unemployment rates and fluctuations in the business cycle).

There have been no systematic changes observed for the remaining two covariates which were considered as such that could potentially influence the probabilities to exit (re-entry) poverty, namely gender of household head and his / her disability status. Similarly to previous studies in the field (e.g. Biewen, 2006), female headed households on average do not

[21] See Biewen (2006) for more details.

experience longer periods of poverty compared to households where head is a man. The negative effects in poverty exit equations were found only in two windows (at the end of the 1990s – beginning of the 2000s) and were compensated by lower probabilities to re-entry poverty during the same periods. Apart from it, female headed households experience higher probabilities to exit and lower probabilities to re-entry poverty in some windows without any clear pattern over time. Regarding disability status of household head, it has not been found statistically significant in the models meaning that the chances to experience shorter or longer spells of poverty do not depend on whether household head is disabled or not.

In addition to observed characteristics, unobserved characteristics are also found significant in all windows, except the one covering 1999-2003. The distribution of unobserved heterogeneity (see the bottom of Table 4 in the Annex) provides evidence that there are two types of individuals in the data – those who are less likely to be found in poverty in the initial year and more likely to exit poverty once they fall into it (non-poverty type) and those who are prone to experience longer episodes of poverty. Figure 5.4 below shows the dynamics of relative shares of each subgroup over the recent two decades.

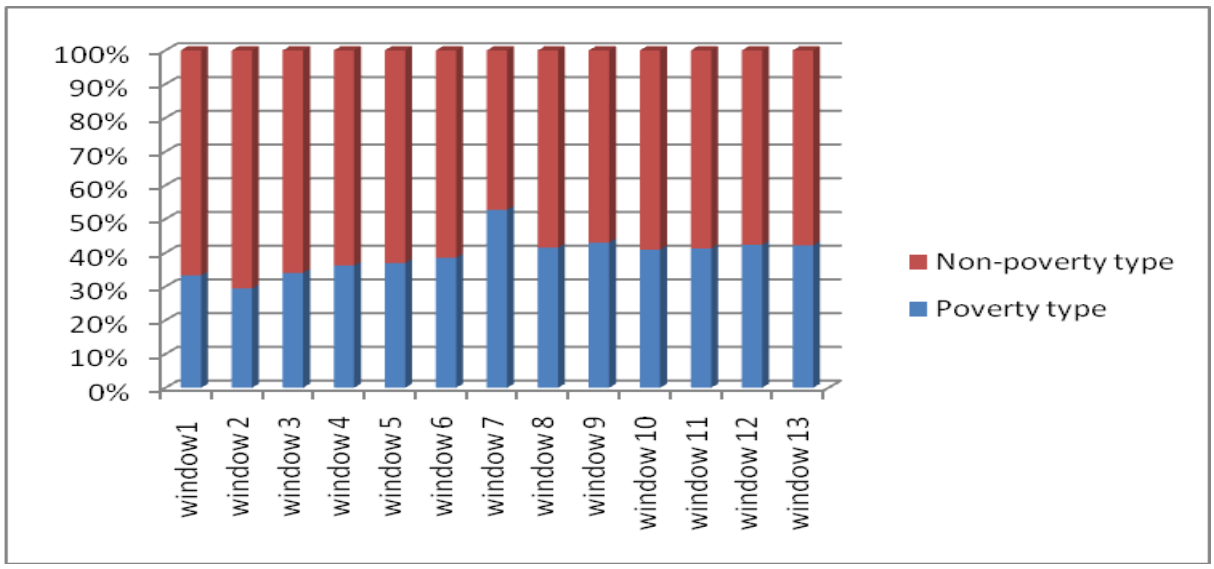

Figure 5.4. Dynamics of the estimated proportions of two types of individuals (based on their unobserved characteristics)[22]

Figure 5.4 reveals that the share of individuals who are not prone to longer episodes of poverty has declined over the recent two decades. Thus, if at the beginning of the 1990s

[22] These proportions are obtained from the estimates for the effects of unobserved heterogeneity (see bottom of Table 4 in the Annex)

around 66% of respondents belong to this type of individuals, at the end of the 2000s their share declined by almost 9 percentage points reaching 57.7%. Correspondingly, the share of poverty prone individuals in the sample increased from 33.3% to 42.2%. These trends provide additional evidence about the increase in poverty persistence in Germany over the last 20 years.

6. Conclusions

This paper explores changes in poverty duration and its determinants in Germany over the recent two decades on the basis of the GSOEP data (1992-2010).

The main conclusion of the study is that poverty became more persistent in Germany at the end of the 2000s compared to the beginning of the 1990s. Simple life-table estimates reveal that the probabilities to exit poverty have substantially decreased since the beginning of the 1990s while the probabilities to re-entry it increased. It has resulted in the increase in the share of individuals experiencing longer episodes of poverty.

Along with the descriptive estimates, multivariate analysis of the determinants of poverty duration across multiple spells has revealed that negative duration dependence in poverty exit equations has strengthened at the end of the 2000s compared to the situation before. In addition, the role of certain socio-economic characteristics of individuals and their households in influencing poverty exits (re-entries) has changed over recent two decades. Thus, young, better educated individuals as well as those living in a couple have partly lost the advantage to experience shorter episodes of poverty which they had before compared to middle aged, better educated and living alone individuals. At the same time, the situation of non-EU immigrants and single parent households became substantially worse towards the end of the period of interest. There might be different explanations of why these population sub-groups have become more vulnerable towards poverty than before. Plausible roots can be searched in the negative changes of the general macroeconomic conditions and substantial social policy reforms introduced in Germany since 2000.

The analysis of the changes in the distribution of unobserved heterogeneity provided additional evidence about the increase in poverty persistence in Germany over time. More specifically, the share of people with the unobserved poverty prone characteristics increased in the sample from 33.3% to 42.2% between the first and the last time windows.

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Annexes

Table 1. Number of individuals and observations across moving windows

Window	Years covered*	Total number of individuals	Total number of observations
Window 1	1993-1997	2157	6655
Window 2	1994-1998	2137	6554
Window 3	1995-1999	2087	6630
Window 4	1996-2000	2040	6394
Window 5	1997-2001	1891	6040
Window 6	1998-2002	2354	6225
Window 7	1999-2003	2504	6754
Window 8	2000-2004	2630	7321
Window 9	2001-2005	2785	7993
Window 10	2002-2006	2843	8804
Window 11	2003-2007	2731	8472
Window 12	2004-2008	2764	8336
Window 13	2005-2009	2720	8093

* We started constructing the windows with 7-year time frame within each window. However, after the exclusion of left-censored spells and linking poverty exit (re-entries) to the covariates from the previous year, only 5 years of observations were left within each window. All windows are marked with the years to which income information refers. For example, in year 1993 dependent variable is based on income information which refers to 1993 while independent variables are those from 1992. Such a designation of years makes it possible to link changes in poverty durations to changes in macroeconomic conditions and social policies.

Table 2. Operationalization of the covariates for the multivariate analysis

Original variables (title and GSOEP file)	**Original scale of measurement**	**Applied variables**	**Applied scale of measurement**
Sex (sex, PPFAD)	1=male; 2=female	Female Ref.: Male	0=male; 1=female
Year of birth (gebjahr, PPFAD)	1886-1991	Age 18-24 Age 25-34 Age 55-64 Age 65 and more Ref.: Age 35-44	1=age between 18 and 24; 0=otherwise 1=age between 25 and 34; 0=otherwise 1=age between 55 and 64; 0=otherwise 1=age 65 and higher; 0=otherwise 1=age between 25 and 34; 0=otherwise
Nationality (nation*, PGEN)	1-147	EU Non-EU Ref.: German	1=EU; 0=otherwise 1= non-EU; 0=otherwise 1=German; 0=other
Current wave sample region (sampreg*, PPFAD)	1=West Germany; 2=East Germany	East Ref.: West Germany	1=East Germany; 0=West Germany
Disability status (m11124*, PEQUIV)	1=disabled; 0=not disabled	Disabled Ref.: Not disabled	1=disabled; 0=otherwise
Type of household (typ1hh*, HGEN)	1=single person household; 2=couple without children; 3=single parent; 4=couple with children less than 16; 5=couple with children more than 16; 6=couple with children less and more than 16; 7=Multiple generation household; 8=other	Couple Single parent Couple with Other Ref.: Single person household	1=couple without children; 0=other 1=single parent; 0=other 1=couple with children; 0=other 1=multiple generation household and other combination; 0=other 1=single person; 0=other

Continuation of Table 2

Level of education (casmin*, PGEN)	0=in school; 1=inadequately completed; 2=general elementary school; 3=basic vocational qualification; 4=intermediate general qualification; 5=intermediate vocational; 6=general maturity certificate; 7=vocational maturity certificate; 8=lower tertiary education; 9=higher tertiary education	Uncompleted General Vocational Ref.: Tertiary	1=in school, inadequately completed; 0=other 1=general elementary, intermediate general, general maturity certificate; 0=other 1=basic vocational, intermediate covational, vocational maturity certificate; 0=other 1=lower or higher tertiary; 0=other
Father's education (vsbil, BIOPAREN)	-2=does not apply; -1=not available; 0=do not know; 1=secondary school; 2=intermediate school; 3=technical school; 4=upper school; 5=other degree; 6=no school degree; 7=school not attended	Vocational training High school No school Other school Don't know Ref: Secondary school	1=intermediate or technical school; 0=other 1=upper secondary school; 0=other 1=no school degree or school not attended; 0=other 1=other degree; 0=other 1=do not know, does not apply or the answer is not available; 0=other 1=secondary school; 0=other
Place of childhood (ortkindh, BIOPAREN)	1=large city; 2=medium city; 3=small city; 4=countryside	Large city Medium city Small city Ref.: Countryside	1=large city; 0=other 1=medium city; 0=other 1=small city; 0=other 1=countryside; 0=other
-	-	Duration 1 Duration 2 Duration 3 Duration 4 Duration 5	1=1st year in poverty (non-poverty); 0=other 1=2nd year in poverty (non-poverty); 0=other 1=3rd year in poverty (non-poverty); 0=other 1=4th year in poverty (non-poverty); 0=other 1=5th year in poverty (non-poverty); 0=other

* Time-varying variables with the values given for each year when individual is in the survey.

Table 3. Descriptive statistics of the sample characteristics

Variables	Windows												
	1993-1997	**1994-1998**	**1995-1999**	**1996-2000**	**1997-2001**	**1998-2002**	**1999-2003**	**2000-2004**	**2001-2005**	**2002-2006**	**2003-2007**	**2004-2008**	**2005-2009**
Gender	0.34 (0.47)	0.33 (0.47)	0.34 (0.47)	0.34 (0.47)	0.34 (0.47)	0.34 (0.47)	0.34 (0.47)	0.36 (0.48)	0.37 (0.48)	0.38 (0.49)	0.40 (0.49)	0.42 (0.49)	0.43 (0.50)
Disability	0.12 (0.32)	0.11 (0.31)	0.11 (0.31)	0.12 (0.32)	0.12 (0.33)	0.14 (0.34)	0.13 (0.34)	0.14 (0.34)	0.14 (0.35)	0.15 (0.35)	0.15 (0.36)	0.14 (0.35)	0.14 (0.35)
Nationality													
German	0.83 (0.37)	0.82 (0.38)	0.82 (0.38)	0.82 (0.39)	0.81 (0.39)	0.82 (0.38)	0.83 (0.37)	0.85 (0.36)	0.87 (0.34)	0.88 (0.33)	0.88 (0.32)	0.89 (0.31)	0.90 (0.30)
EU	0.06 (0.24)	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.08 (0.26)	0.07 (0.26)	0.07 (0.25)	0.05 (0.22)	0.04 (0.20)	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.04 (0.19)
Non-EU	0.11 (0.37)	0.11 (0.31)	0.11 (0.32)	0.11 (0.31)	0.11 (0.31)	0.11 (0.31)	0.10 (0.30)	0.10 (0.30)	0.09 (0.28)	0.08 (0.27)	0.08 (0.27)	0.07 (0.25)	0.06 (0.24)
East	0.43 (0.42)	0.39 (0.49)	0.36 (0.48)	0.33 (0.47)	0.31 (0.46)	0.30 (0.46)	0.29 (0.46)	0.29 (0.45)	0.30 (0.46)	0.30 (0.46)	0.31 (0.46)	0.32 (0.46)	0.33 (0.47)
Age of the head													
Age 18-24	0.08 (0.27)	0.09 (0.28)	0.09 (0.29)	0.10 (0.30)	0.11 (0.31)	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.33)	0.12 (0.33)	0.12 (0.33)	0.12 (0.33)	0.12 (0.33)
Age 25-34	0.25 (0.43)	0.25 (0.43)	0.25 (0.43)	0.25 (0.43)	0.22 (0.41)	0.18 (0.39)	0.18 (0.38)	0.16 (0.37)	0.16 (0.37)	0.16 (0.37)	0.17 (0.37)	0.18 (0.38)	0.19 (0.39)
Age 35-44	0.22 (0.41)	0.22 (0.41)	0.23 (0.41)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.24 (0.42)	0.23 (0.42)	0.21 (0.41)	0.21 (0.40)	0.20 (0.40)	0.19 (0.40)	0.18 (0.39)
Age 45-54	0.10 (0.30)	0.11 (0.30)	0.11 (0.32)	0.12 (0.32)	0.12 (0.33)	0.14 (0.34)	0.14 (0.35)	0.15 (0.36)	0.14 (0.35)	0.15 (0.36)	0.15 (0.36)	0.16 (0.37)	0.17 (0.38)
Age 55-64	0.19 (0.38)	0.18 (0.38)	0.18 (0.37)	0.16 (0.37)	0.17 (0.37)	0.17 (0.38)	0.16 (0.37)	0.17 (0.38)	0.17 (0.37)	0.16 (0.37)	0.16 (0.36)	0.15 (0.36)	0.14 (0.35)
Age 65 and more	0.16 (0.36)	0.15 (0.36)	0.14 (0.35)	0.14 (0.34)	0.15 (0.36)	0.16 (0.37)	0.16 (0.36)	0.17 (0.37)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Level of education													
Uncompleted	0.05 (0.22)	0.06 (0.23)	0.06 (0.24)	0.06 (0.24)	0.06 (0.23)	0.05 (0.23)	0.04 (0.19)	0.04 (0.19)	0.03 (0.18)	0.03 (0.17)	0.03 (0.17)	0.03 (0.17)	0.03 (0.16)
General	0.22 (0.41)	0.23 (0.42)	0.23 (0.42)	0.24 (0.43)	0.25 (0.44)	0.25 (0.44)	0.25 (0.43)	0.24 (0.43)	0.23 (0.42)	0.22 (0.41)	0.22 (0.42)	0.22 (0.41)	0.22 (0.41)
Vocational	0.63 (0.48)	0.62 (0.48)	0.62 (0.48)	0.61 (0.49)	0.60 (0.49)	0.61 (0.49)	0.62 (0.48)	0.63 (0.48)	0.64 (0.48)	0.65 (0.48)	0.64 (0.48)	0.64 (0.48)	0.64 (0.48)
Tertiary	0.10 (0.30)	0.09 (0.29)	0.09 (0.28)	0.09 (0.28)	0.09 (0.29)	0.09 (0.28)	0.09 (0.28)	0.09 (0.29)	0.10 (0.29)	0.10 (0.30)	0.11 (0.31)	0.11 (0.32)	0.11 (0.32)
Type of household													
Single person	0.17 (0.37)	0.17 90.37)	0.17 90.37)	0.18 (0.38)	0.18 (0.39)	0.20 (0.40)	0.22 (0.41)	0.23 (0.42)	0.24 (0.43)	0.24 (0.43)	0.25 (0.43)	0.25 (0.43)	0.26 (0.44)
Couple	0.23 (0.42)	0.23 (0.42)	0.22 (0.41)	0.21 (0.41)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.25 (0.43)	0.27 (0.44)	0.27 (0.45)	0.27 (0.44)	0.26 (0.44)	0.26 (0.44)
Single parent	0.08 (0.28)	0.09 (0.27)	0.08 (0.28)	0.10 (0.29)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.10 (0.30)	0.11 (0.31)	0.11 (0.32)	0.12 (0.32)	0.12 (0.33)	0.12 (0.32)
Couple with children	0.45 (0.49)	0.46 (0.50)	0.48 (0.50)	0.47 (0.50)	0.46 (0.50)	0.44 (0.50)	0.42 (0.49)	0.39 (0.49)	0.35 (0.48)	0.34 (0.47)	0.33 (0.47)	0.34 (0.47)	0.34 (0.47)
Other	0.05 (0.22)	0.05 (0.22)	0.05 (0.22)	0.04 (0.19)	0.03 (0.18)	0.03 (0.18)	0.03 (0.18)	0.03 (0.17)	0.03 (0.18)	0.04 (0.18)	0.03 (0.18)	0.03 (0.17)	0.02 (0.16)
Father's education													
Vocational training	0.07 (0.25)	0.07 (0.24)	0.07 (0.25)	0.07 (0.25)	0.08 (0.27)	0.08 (0.27)	0.09 (0.28)	0.09 (0.29)	0.10 (0.30)	0.10 (0.29)	0.10 (0.30)	0.11 (0.31)	0.11 (0.32)
Secondary school	0.65 (0.47)	0.64 (0.47)	0.62 (0.48)	0.61 (0.49)	0.59 (0.49)	0.60 (0.49)	0.59 (0.49)	0.60 (0.50)	0.60 (0.49)	0.60 (0.49)	0.61 (0.49)	0.60 (0.49)	0.58 (0.49)
High school	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.04 (0.20)	0.05 (0.22)	0.06 (0.24)	0.07 (0.25)	0.07 (0.25)	0.07 (0.24)	0.07 (0.26)	0.08 (0.27)
No school	0.09 (0.28)	0.10 (0.30)	0.11 (0.31)	0.12 (0.33)	0.13 (0.34)	0.13 (0.34)	0.12 (0.32)	0.10 (0.30)	0.08 (0.28)	0.08 (0.27)	0.07 (0.26)	0.07 (0.25)	0.07 (0.24)
Other school	0.03 (0.16)	0.03 (0.22)	0.03 (0.18)	0.04 (0.18)	0.04 (0.19)	0.03 (0.18)	0.03 (0.18)	0.03 (0.17)	0.03 (0.17)	0.03 (0.17)	0.03 (0.18)	0.03 (0.18)	0.03 (0.18)
Don't know	0.12 (0.32)	0.12 (0.32)	0.13 (0.33)	0.12 (0.33)	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.32)	0.12 (0.33)	0.12 (0.32)	0.12 (0.33)	0.13 (0.33)
Place of childhood													
Small city	0.20 (0.40)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)
Medium city	0.16 (0.36)	0.16 (0.37)	0.16 (0.36)	0.16 (0.36)	0.17 (0.38)	0.17 (0.37)	0.18 (0.39)	0.18 (0.39)	0.18 (0.39)	0.18 (0.39)	0.19 (0.39)	0.19 (0.39)	0.18 (0.38)
Large city	0.21 (0.40)	0.22 (0.42)	0.21 (0.41)	0.22 (0.41)	0.22 (0.41)	0.22 (0.42)	0.22 (0.41)	0.22 (0.41)	0.23 (0.42)	0.23 (0.42)	0.22 (0.41)	0.22 (0.42)	0.23 (0.42)
Countryside	0.43 (0.49)	0.41 (0.49)	0.42 (0.49)	0.41 (0.49)	0.40 (0.49)	0.41 (0.49)	0.40 (0.49)	0.40 (0.49)	0.38 (0.49)	0.38 (0.49)	0.38 (0.49)	0.38 (0.48)	0.38 (0.48)

* Constructed on the basis of all spells available within the window.

Table 4. Joint multivariate estimation of poverty exits and re-entries by time windows

Variables	Windows												
	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1999-2003	2000-2004	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009
Equation for poverty exits													
1 year	0.009	-0.930	**-1.219***	-0.873	**-1.518****	**-1.568*****	-0.299	-0.518	-0.595	-0.686	**-1.148*****	**-1.511*****	**-1.581*****
2 years	-0.190	-0.867	**-1.296***	**-0.960***	**-1.516*****	**-1.718*****	-0.527	-0.323	-0.520	-0.530	**-1.092*****	**-1.255*****	**-1.238*****
3 years	-0.056	-0.701	**-1.271***	-0.772	**-0.959***	**-1.172***	-0.415	-0.204	-0.276	-0.345	**-1.024*****	**-1.301*****	**-1.357*****
4 years	0.511	-0.581	-0.922	-0.519	-0.656	**-1.254***	-0.761	-0.036	-0.524	-0.540	**-0.842****	**-1.127*****	**-1.715*****
5 years	-0.297	-0.543	-1.050	**-1.94***	-0.516	**-2.151****	**-1.248***	0.170	-0.454	-0.596	-0.660	**-1.991*****	**-2.786*****
Female head	0.163	-0.125	0.258	**0.404***	0.128	-0.061	**-0.344***	**-0.322***	-0.112	0.144	**0.317***	0.274*	0.019
Disabled head	0.170	-0.081	-0.091	-0.370	-0.537	0.125	-0.192	0.215	**0.327***	0.139	-0.182	-0.204	-0.206
EU citizen	0.086	0.433	**0.602***	**0.675***	**0.874***	0.188	-0.256	-0.024	-0.172	-0.544	-0.143	-0.328	0.133
Non-EU citizen	-0.365	**-0.582***	**-0.666***	-0.154	-0.212	-0.401	-0.338	**-0.509***	-0.160	0.031	-0.206	0.383	0.049
East Germany	0.177	-0.077	-0.265	-0.348	-0.295	0.123	0.017	-0.098	-0.096	-0.090	-0.188	0.010	-0.180
Age of HH 18-24	0.098	**0.521***	0.505	**1.022*****	**0.991*****	**0.820****	**0.510***	**0.510***	0.352	-0.040	-0.075	-0.069	0.058
Age of HH 25-34	0.035	**0.667***	0.310	**0.443***	0.323	**0.513***	0.042	-0.243	0.017	-0.037	0.004	0.240	0.224
Age of HH 45-54	-0.219	0.141	0.061	0.439	0.286	0.189	-0.054	0.045	0.023	-0.308	-0.187	-0.130	-0.066
Age of HH 55-64	-0.104	0.259	0.022	-0.277	-0.086	0.107	-0.174	-0.124	-0.137	-0.406	-0.027	-0.067	-0.221
Age of HH 65 and >	0.165	0.497	0.105	0.295	-0.284	-0.358	-0.244	-0.221	0.014	-0.321	-0.198	-0.100	-0.264
General education of HH	**-1.265****	-0.617	-0.120	-0.439	0.013	0.060	-0.460	**-0.797****	**-0.805****	-0.788**	**-0.489***	-0.275	-0.095
Vocational education of HH	**-1.200****	-0.704	0.004	-0.269	0.460	0.458	-0.077	-0.477	**-0.696****	-0.539*	-0.020	-0.037	0.114
Uncompleted education of HH	-0.585	-0.317	0.002	-0.387	-0.173	0.378	-0.312	**-1.143****	**-2.175****	-2.072***	**-1.319*****	**-1.335*****	-0.535
Couple	0.178	0.366	0.082	0.102	-0.254	-0.405	0.122	-0.124	0.181	0.227	0.272	0.260	0.336
Single parent	0.142	0.393	0.147	-0.263	0.030	0.132	0.131	-0.396	-0.179	-0.345	-0.304	0.065	0.227
Couple with children	0.350	**0.547***	**0.646****	0.067	-0.106	0.130	0.236	0.335	**0.471****	0.227	**0.336***	0.304	**0.433***
Other type of household	0.675	**1.325*****	0.931	0.225	0.445	**1.412****	**1.261*****	0.441	0.103	-0.427	0.075	0.296	0.247
Equation for poverty re-entries													
1 year	**-3.455*****	**-3.975*****	**-4.546*****	**-4.677*****	**-5.173*****	**-4.077*****	-17.432	**-3.530*****	**-4.644*****	**-3.947*****	**-3.675*****	**-3.733*****	**-4.594*****
2 years	**-2.947*****	**-3.369*****	**-3.683*****	**-4.176*****	**-4.863*****	**-3.656*****	-17.199	**-2.934*****	**-2.895*****	**-3.224*****	**-2.520*****	**-2.774*****	**-3.183*****
3 years	**-2.615*****	**-3.164*****	**-3.297*****	**-3.416*****	**-4.027*****	**-2.868*****	**-4.482*****	**-2.298*****	**-2.687*****	**3.292*****	**-2.676*****	**-2.914*****	**-3.181*****
4 years	**-3.280*****	**-3.358*****	**-3.390*****	**-3.568*****	**-3.840*****	**-3.375*****	**-3.004*****	**-2.408*****	**-2.580*****	**-2.918*****	**-2.280*****	**-2.900*****	**-3.083*****
5 years	**-3.550*****	**-3.998*****	**-3.165*****	**-3.807*****	**-3.479*****	**-3.853*****	**-2.916*****	**-2.443*****	**-3.018*****	**-3.896*****	**-2.632*****	**-2.518*****	**-3.042*****
Female head	-0.155	-0.038	-0.164	-0.323	-0.194	**-0.708***	**-0.514***	**-0.398***	-0.331	0.002	-0.186	**-0.299***	0.259
Disabled head	-0.036	-0.500	-0.311	-0.187	0.282	-0.170	0.299	0.026	-0.118	-0.012	-0.055	0.102	0.148
EU citizen	0.399	0.146	0.235	0.365	**0.876****	0.530	-0.174	0.061	**-1.141****	-0.164	-0.327	0.291	0.292
Non-EU citizen	**0.595***	-0.029	**0.811****	0.132	0.193	**0.768***	**0.694***	0.547*	**0.741****	**0.533***	**0.861*****	**0.605***	**0.841****
East Germany	-0.189	-0.110	**0.459***	**0.516***	**0.509****	0.138	0.207	-0.095	0.023	-0.079	-0.029	-0.060	0.100
Age of HH 18-24	0.125	0.131	-0.255	-0.298	-0.580	0.191	-0.171	-0.087	-0.460	0.128	-0.250	-0.416	0.116
Age of HH 25-34	0.106	**-0.572***	0.056	**-0.637***	-0.175	-0.168	0.364	-0.099	-0.325	-0.276	**-0.515***	-0.156	-0.280
Age of HH 45-54	-0.303	-0.490	0.057	-0.367	-0.122	0.007	-0.005	0.026	**0.709****	**0.422***	0.230	0.088	0.188
Age of HH 55-64	-0.031	**-0.562***	-0.038	0.246	0.466	0.311	0.400	0.261	0.075	0.439	-0.181	0.245	0.403
Age of HH 65 and >	-0.054	-0.316	0.054	0.011	**0.622***	**0.809***	0.089	0.148	-0.105	0.430	-0.144	0.017	0.233
General education of HH	**0.978****	**1.772*****	**1.170*****	**1.733*****	**1.611*****	**1.291*****	0.565	0.492	0.602	0.477	0.486	**0.769****	**0.720***
Vocational educ. of HH	**0.928*****	**1.514*****	**0.898****	**1.124*****	**0.903****	**0.941***	0.445	0.282	**0.649***	**0.716***	**0.662****	**0.758****	**0.648****

Continuation of Table 4

Uncompleted education of HH	**1.187****	**1.817*****	0.339	**1.087***	**1.684*****	**1.500****	0.272	**0.896***	0.983	0.922	0.223	-0.146	0.959
Couple	-0.448	-0.333	**-0.563***	**-0.590***	-0.200	**-0.800****	**-1.032*****	**-0.598***	-0.431	0.015	0.099	-0.081	0.067
Single parent	-0.269	-0.025	0.326	0.257	0.401	0.095	0.544	**0.686***	-0.205	0.258	0.096	0.616	**0.672****
Couple with children	**-0.569***	-0.254	-0.279	-0.202	0.196	**-0.670***	-0.399	-0.177	-0.110	0.418	-0.125	0.011	0.140
Other type of household	**-0.893***	-0.436	0.007	0.426	0.558	-1.052	**-1.185****	0.230	0.670	-0.110	-0.524	-0.547	-1.302
Initial conditions													
Vocational training	0.099	0.193	-0.033	-0.255	**-0.420****	-0.180	-0.098	**-0.391****	-0.157	-0.135	-0.015	0.035	0.070
High school	-0.128	-0.310	**-0.499****	**-0.454***	-0.165	-0.183	0.082	**-0.278***	-0/237	-0.177	-0.060	-0.039	0.085
No school	0.207	0.094	0.023	-0.165	0.114	-0.209	-0.071	-0.155	0.135	**0.267***	**0.349****	**0.270***	-0.108
Other school	**0.452***	0.231	0.141	-0.219	-0.209	-0.035	-0.170	-0.141	-0.062	-0.162	-0.119	0.053	-0.071
Don't know	-0.018	0.020	0.034	0.053	0.066	0.110	-0.049	0.169	0.121	0.105	0.082	0.048	0.060
Small city	**0.226***	0.140	**0.306*****	0.099	0.072	0.028	-0.105	0.055	0.065	0.070	0.005	-0.101	-0.048
Medium city	0.101	**0.283****	**0.383*****	0.093	0.148	0.171	-0.032	-0.010	-0.008	-0.012	0.118	-0.002	-0.024
Large city	**0.220***	**0.221***	**0.327*****	0.137	-0.009	-0.078	-0.010	0.147	0.080	0.003	-0.04	**-0.188***	-0.065
Constant	**0.773*****	**0.899*****	**0.584*****	**0.723*****	**0.883*****	**1.053*****	**0.729****	**1.071*****	**1.001*****	**1.092*****	**1.055*****	**1.015*****	**1.033*****
Unobservables													
R2	**0.691*****	**0.872*****	**0.663*****	**0.591*****	**0.536*****	**0.465*****	-0.110	**0.343*****	**0.278*****	**0.364*****	**0.355*****	**0.307*****	**0.313*****
thP	**2.842*****	**2.702*****	**2.602*****	**2.973*****	**3.408*****	**2.675*****	**2.572*****	**2.887*****	**2.541*****	**2.692****	**2.512*****	**2.629*****	**2.545*****
thNP	**3.172*****	**3.850*****	**3.909*****	**3.912*****	**4.060*****	**4.167*****	17.239	**4.091*****	**5.064*****	**3.801*****	**4.031*****	**3.705*****	**4.338*****
Thq	**-2.162*****	**0.264*****	**-2.158*****	**-2.190*****	**-2.307*****	**-2.441*****	**-2.408*****	**-2.363*****	**-2.326*****	**-2.262*****	**-2.250*****	**-2.183*****	**-2.162*****
Log likelihood	-5804.7898	-5639.8388	-5708.6268	-5362.9432	-5165.5601	-4856.4699	-5650.7572	-6372.5248	-7039.5657	-8034.3265	-7779.6398	-7564.4562	-7398.2887
Number of observations	6655	6554	6630	6394	6040	6225	6754	7321	7993	8804	8472	8336	8093

p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001.