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Abstract

This paper analyses the duration of child poverty in Germany. In our sample, we observe the entire income history from the individuals' birth to their coming of age at age 18. Therefore we are able to analyze dynamics in and out of poverty for the entire population of children, whether they become poor at least once or not. Using duration models, we allow poverty exit and re-entry to be correlated even after controlling for observable characteristics and also account for correlations with initial conditions. Our results indicate that household composition, most importantly single parenthood, and the labour market status as well as level of education of the household head are the main driving forces behind exit from and re-entry into poverty and thus determine the (long-term) experience of child poverty. However, unobserved heterogeneity seems to play an important role as well.

Keywords: Child poverty, duration analysis, unobserved heterogeneity.
JEL Classification: C41, D31, I32.

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1. Introduction

Both demographic change and structural and technological progress require that advanced economies display an increasingly productive future workforce, if they want to retain current standards of living or even the current level of growth rates of aggregate output (see e.g. BÖRSCH-SUPAN (2003)). Against this background, there is a growing concern about children growing up in disadvantaged environments since this tends to be associated with diminished cognitive and social skills. One typical example for such a disadvantaged environment is growing up in poverty, especially permanent poverty. For instance, CASE ET AL. (2002) provide evidence that permanently low income during childhood is associated with lower health status of children. Similar results are found for the association between school attainment and income. For instance, DUNCAN ET AL. (1998) demonstrate that in the United States (low) long-term income, especially during early years, negatively affects years of completed school.

Clearly, it is anything but trivial to pin down a causal relationship between poverty experience during young years and outcomes later in life (e.g. schooling attainment or labour market performance) because it is very likely that this process is an intricate interaction between genetic endowments, socialization and individual experience. Moreover, from the vantage point of the researcher many unobservable factors play a decisive role in outcome formation. However, there is also ample evidence that early interventions in this process exhibit strong positive effects on children's skill formation and other outcomes. The Perry Pre-School (SCHWEINHARDT ET AL. (2005)) and the Abecedarian Program (CAMPBELL ET AL. (2002)) are prominent examples in this context. The preliminary results of the Moving to Opportunity Program (KATZ ET AL. (2001)) also point towards a positive impact of interventions for children from economically disadvantaged families.

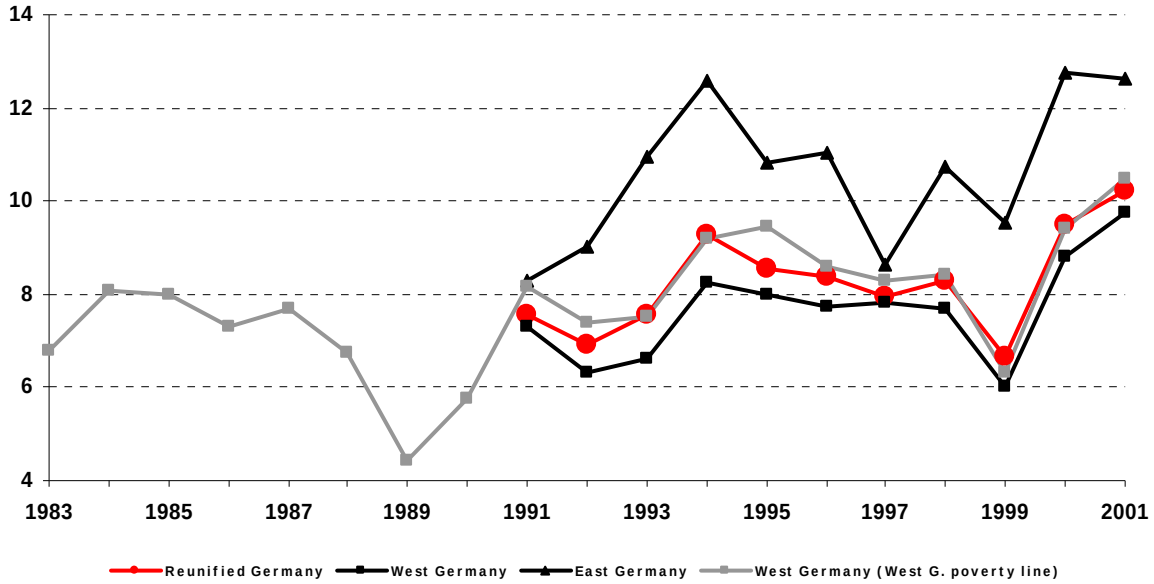
Thus, it seems safe to argue that poverty experience during childhood and a variety of factors associated with living in poor families tend to exhibit to some extent a causal impact on child development, with potential long-term consequences. It seems also plausible that long-term poverty experiences impinge upon child development in a much more detrimental way than transitory events of, say, one or two years. Hence, a longitudinal analysis of child poverty is indispensable, if one intends to identify those children with the highest risk of growing up in long-term poverty and to target public interventions at this risk group. For a wealthy and comparatively income-homogeneous country like Germany it is also important to carefully account for the appropriate conceptual treatment of poverty incidence and duration. If poverty is merely capturing the lower tail of the income distribution or is indeed describing a status of material deprivation will presumably make a big difference.

A cross-sectional snapshot of the incidence of relative child poverty in Germany during the last 20 years (see **Figure 1** taken from CORAK ET AL. (2005)) indicates that child poverty rates were slightly decreasing during the 1980s, but have been rising afterwards, especially during the most recent years. Furthermore, child poverty rates suggest that children in East Germany are more heavily affected by poverty than their peers in the West. Finally, CORAK ET AL. (2005) also demonstrate that children born to parents without German citizenship are worse off than children born to native household heads.

This paper aims at investigating the incidence and dynamics of poverty among children living in Germany taking into account the complete period of childhood and teenage years, i.e. from birth up to the age of 18. Since a large total number of years in poverty might result from either a single long spell in poverty or several consecutive short spells in and out of poverty

(STEVENS (1999)), it is important to analyze the dynamics of poverty. One way of doing so is analyzing flows into and out of poverty simultaneously using duration analysis.[2] We follow this strategy to investigate multiple spells in and out of poverty and allow them to be correlated, even after controlling for observable individual characteristics. Accounting for the correlation between exit and re-entry is necessary to accurately estimate total time spent in poverty (see HANSEN AND WAHLBERG (2004)) for the typical child, because some individuals might be endowed with unobservable characteristics that make them likely to exit poverty only after a long time but make them re-enter relatively fast. In addition, we also allow exit and re-entry to be correlated with the initial poverty status, since initial conditions might be important as well.

Figure 1: Child Poverty Rates in Germany (in %)



Source: CORAK ET AL. (2005)

Comparable models for analyzing poverty dynamics have been used in previous contributions to the literature. STEVENS (1999) was the first paper adapting duration models to account for the correlation between exit and re-entry by using a mass point distribution. She focuses on the impact of household characteristics on duration and on differences between blacks and whites. Her results suggest that 96% of whites exhibit favourable unobserved characteristics, making long spells in poverty and short spells out of poverty more likely. Among blacks, however, 14% display unfavourable unobserved characteristics. DEVICIENTI (2001) extends this approach by also accounting for initial conditions but reports severe problems of convergence of this kind of model. For Britain, he finds that 77% are endowed with favourable unobserved characteristics, which imply short poverty spells and unlikely re-entry. Empirical results of both studies indicate that higher education is associated with shorter spells in poverty and longer spells out of it, whereas households headed by women or single adult households experience longer spells in poverty and are likely to re-enter fast.

Focusing on differences in poverty dynamics between natives and immigrant (refugees and non-refugees) and families with and without children, HANSEN and WAHLBERG (2004) use similar models and apply them to data from Sweden. For both single and two adult households, they find that households with children are much more likely to be in poverty for

[2] Other approaches use first-order Markov models of poverty persistence (e.g. CAPPELLARI and JENKINS (2002)) or components-of-variance approaches to describe income dynamics (e.g. STEVENS (1999)).

a long time than those without. Furthermore, immigrant families spend more time in poverty than comparable native families. Due to large sample size, they are able to estimate separate regressions for various subpopulations and find that the distribution of unobservable characteristics differs between native Swedes and both groups of immigrants.

Finally, using data for Germany, BIEWEN (2006) analyzes how exit from and re-entry into poverty are related to each other and to the overall time spent in or out of poverty. He also accounts for clustering between observations of individuals living in the same household. Simulating the number of years spent in poverty for individuals with different characteristics he finds that unemployment as well as a low educational qualification of the household head increase the number of years in poverty by about 1.5 years within a 10 years period. The number of additional earners in the household plays a much smaller role and the number of children or the nationality of the household head hardly any. In addition, he finds that age has almost no effect on poverty profiles. About 6% of the population seem to have unfavourable unobserved characteristics, which make them less likely to leave poverty and more likely to fall back in after having left it. These unfavourable unobserved characteristics are much more important in determining the long-term experience of poverty than any of the observed household characteristics.

A main contribution of our paper to the literature above is that we do not only focus on those individuals who become poor at least once but on the entire population of children. This is only feasible since we exclusively focus on young individuals and thus are able to identify the beginning of their very first spell in (non-)poverty and can even analyze those individuals who never enter the respective other state. The length of existing household panels generally does not allow doing so for adults, because of left censoring. Using data from the German Socio-Economic Panel covering 21 years from 1984 to 2004, however, allows us to observe the entire income history of numerous children living in different household environments.

The remainder of the paper is organized as follows. The next section describes the duration model in detail. Section 3 presents information on the data and explains the empirical specification of the model. Empirical results are presented in section 4. The last section summarizes and offers some conclusions.

2. Duration Model

In this section, we will present the duration model that accounts for multiple spells in and out of poverty. Generally, a spell of poverty starts at time t if an individual was non-poor in $t-1$ and is poor in t. Analogously, a spell of non-poverty starts at time t if an individual was poor in $t-1$ and is non-poor in t. However, if $t-1$ is not observed in the data, spells are left-censored. In most studies left-censored spells are dropped in the empirical analysis (e.g. STEVENS (1999) and DEVICIENTI (2001)). Thus, these studies do not account for any information before the first switch from poverty to non-poverty or vice versa occurs. This implies that an individual, who enters the sample and never experiences any switch in poverty status is skipped in the analysis altogether. Instead, since our focus is on children, we do not have to drop these spells. This is because we consider the first observation at birth to start a non-left-censored (non-)poverty spell.[3] Thus, using the same kind of model, we can analyze the entire population, not only those, switching poverty status at least once.

[3] Most other studies include children as well but generally treat them like all other individuals. STEVENS (1999) for example includes children but assumes that they do not differ from other individuals except through age-dummies in the hazard models for exit and re-entry. The same holds for DEVICIENTI (2001) and BIEWEN (2006)

In jointly analyzing duration in and out of poverty, we can account for the correlation between the duration in both states by including terms for unobserved heterogeneity. Since being born into poverty or not might be affected by unobservable characteristics as well, we also account for initial conditions. Thus, apart from analyzing the impact of observable characteristics and the importance of duration dependence we can additionally assess whether unobserved characteristics have an influence on flows into or out of poverty and on the time spent in or out of poverty. Unobserved heterogeneity, e.g. ability, effort or preferences, enters the hazard functions and the model analyzing initial poverty status through intercept terms and is modelled by a mass point distribution.

The probability to be poor in the first period is specified as an ordinary probit equation conditional on observable characteristics Z_i from the first period as well as pre-sample information (i.e. educational attainment of the household head's parents) and an unobserved individual-specific effect θ_i^I,

$$\Pr(p_{i,1} = 1 \mid \theta_i^I) = \Phi(\theta_i^I + Z'_i \beta^I).$$

The hazard rate for leaving poverty at time *t* is specified as

$$\lambda_{i,t}^P(d_{i,t-1}^P \mid \theta_i^P) = \Phi\left(\theta_i^P + \alpha^P(d_{i,t-1}^P) + X'_{i,t} \beta^P\right),$$

and the hazard rate for leaving non-poverty at time *t* is specified similarly as

$$\lambda_{i,t}^{NP}(d_{i,t-1}^{NP} \mid \theta_i^{NP}) = \Phi\left(\theta_i^{NP} + \alpha^{NP}(d_{i,t-1}^{NP}) + X'_{i,t} \beta^{NP}\right).$$

The effect of duration *d* in (non-)poverty on the probability of exiting (non-)poverty is accounted for by $\alpha^P(d_{i,t-1}^P)$ and $\alpha^{NP}(d_{i,t-1}^{NP})$ without restricting it to any functional form. θ_i^P and θ_i^{NP} are unobserved individual-specific effects and $X'_{i,t}$ represent observable characteristics.

The contribution of the *i*th individual to the sample likelihood, conditional on the unobserved individual effects θ_i, is then

$$L_i(\theta_i^I, \theta_i^P, \theta_i^{NP}) = \Pr(p_{i,1} = 1 \mid \theta_i^I) \prod_{t=2}^{18} \left\{ \begin{array}{l} \left[\left(1 - \lambda_{i,t}^P(d_{i,t-1}^P \mid \theta_i^P)\right)^{1-e_{i,t}^P} \left(\lambda_{i,t}^P(d_{i,t-1}^P \mid \theta_i^P)\right)^{e_{i,t}^P} \right]^{p_{i,t-1}} \times \\ \left[\left(1 - \lambda_{i,t}^{NP}(d_{i,t-1}^{NP} \mid \theta_i^{NP})\right)^{1-e_{i,t}^{NP}} \left(\lambda_{i,t}^{NP}(d_{i,t-1}^{NP} \mid \theta_i^{NP})\right)^{e_{i,t}^{NP}} \right]^{(1-p_{i,t-1})} \end{array} \right\}.$$

Here, $p_{i,t-1}$ indicates whether individual *i* is in poverty in period *t-1* and $e_{i,t}^P$ and $e_{i,t}^{NP}$ indicate whether a transition from poverty to non-poverty (or vice versa) occurs between period *t-1* and *t*. Assuming that the individual effects take on one of the values given by the mass point distribution (i.e. $\theta_i^I = \theta_k^I$, $\theta_i^P = \theta_l^P$ and $\theta_i^{NP} = \theta_m^{NP}$) the unconditional overall log-likelihood function is

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who use quadratic age functions, however. In these studies, birth into (non-)poverty is not considered as entry, instead these spells are treated as left-censored.

$$\log L = \sum_{i=1}^{N} w_i \log\left[\sum_{k=1}^{K}\sum_{l=1}^{L}\sum_{m=1}^{M} \Pr(\pi_{k,l,m}) L_i(\theta_k^I, \theta_l^P, \theta_m^{NP})\right].$$

The estimated probability to belong to one of the latent classes defined by the mass point distribution is given by $\Pr(\pi_{k,l,m})$. In maximizing the log-likelihood, all parameters of the model, i.e. α, β, θ and $\Pr(\pi)$, are estimated jointly.

In the empirical analysis, we present weighted estimates using weights w_i as proposed in BIEWEN (2006), i.e. we use the inverse longitudinal inclusion probability. To a certain extent, the weights are supposed to account for panel attrition. In addition, we account for clustering. Because individuals in the same household have the same experience of poverty or non-poverty at a given point in time, they are also likely to share similar long-term experiences of poverty. This violates the assumption of independence of observations. Therefore, we define clusters by those children living together in the same household at the time of their birth or the beginning of their first non-left-censored spell. Within a cluster, no assumption on the correlation between observations is imposed.

In order to implement the model, we assume that each heterogeneity distribution has two support points (i.e. $K = L = M = 2$) and normalize one of them to zero. The baseline values of the unobserved effects are therefore represented by a full set of duration dummies, which is included in the hazard functions. In doing so, we obtain eight latent classes whose probabilities sum to one. Latent classes 1 to 4 have a lower probability to be poor in the first period than classes 5 to 8, everything else equal (see **Table 1**). Latent classes 2, 4, 6, and 8 have a higher propensity to leave poverty than the others do, and classes 3, 4, 7, and 8 are likely to exit non-poverty faster than the others do, always holding observable characteristics constant. Hence, latent class 2 can be labelled as *unlikely to be poor*, in terms of their unobservable characteristics, classes 3 and 7 as *likely to be poor* because their unobservables make them likely to exit non-poverty fast and remain in poverty for long time. *Frequent fluctuations* between poverty and non-poverty characterize classes 4 and 8. The other classes (1, 5 and 6) represent intermediate cases.

Table 1: Distribution of Latent Classes

	$\theta_1^I = 0$		$\theta_2^I > 0$	
	$\theta_1^P = 0$	$\theta_2^P > 0$	$\theta_1^P = 0$	$\theta_2^P > 0$
$\theta_1^{NP} = 0$	π1	π2	π5	π6
$\theta_2^{NP} > 0$	π3	π4	π7	π8

In some of our specifications, we do not account for initial conditions. In these cases, θ_i^I is restricted to zero in $\Pr(p_{i,1} = 1 \mid \theta_i^I)$, which yields latent classes 1 to 4, only.

Given estimates of α, β, θ and $\Pr(\pi)$ we can simulate the distribution of time spent in poverty during childhood for children born into families with predefined characteristics. We provide conditional distributions for those children born into poverty initially and those born into non-poverty. Furthermore, we also provide estimates of the unconditional distribution. In order to do so, we generate error terms by random draws from a normal distribution. We simulate poverty sequences for 100,000 individuals. Transitions between states (and initial poverty) occur if the estimated latent variable is above zero. In doing so, we assume that

household characteristics are fixed and that poverty status does not influence transitions between demographic and labour market states.[4]

3. Data and Model Specification

In the empirical analysis, we use data from the *German Socio-Economic Panel* (GSOEP), which is a representative longitudinal study of private households in Germany (see HAISKEN-DENEW and FRICK (2003)).[5] The data includes information on household socio-demographic composition, occupational biographies, employment, income and earnings, as well as health and life satisfaction indicators.

In the following empirical analysis, the unit of observation is the individual child. Children are defined as those individuals younger than 18 years of age. Central to our analysis is the calculation of household income, which includes: total labour income of all individuals in the household including income from self-employment, asset income, income from private and public transfers, and pension income. From these we subtract tax payments and social security contributions. In essence, this refers to the total money income available to the household after taxes and social transfers, given in real terms (year 2000 euros). In order to account for economies of scale we use the square root of the number of household members as the equivalence scale. We assume that equivalent household income is allocated equally to all household members, including children. In our analysis, an individual is defined as living in relative poverty if she has less than 50% of the prevailing median equivalent income in the population. Since we assign the same income to every member of the household, either none or all household members are poor. In other words, a child is poor if it lives in a poor household.[6]

We start our analyses by focusing on West Germany exclusively since for this part of the country we have consistent data for 21 years. This sample, which includes complete information on the entire childhood for various individuals, enables to provide a detailed description of poverty dynamics. In addition, we can investigate the sensitivity of results with respect to initial conditions and left-censored spells. Complementary to this, we focus on reunified Germany in the second part of the analysis. The sample for reunified Germany does

[4] AASSVE ET AL. (2006) mention that demographic and labour market states are endogenous as well, not only poverty status, and that transitions between poverty, demographic or labour market states might depend on outcomes in all other states. Therefore, they suggest modelling working and mating behaviour simultaneously and jointly estimate duration within the various states and its influence on poverty. This is done in order to pin down the causal effects of demographic and labour market states on poverty. In their model, all poverty persistence is attributed to persistence within demographic and labour market states and not to persistence within poverty itself. We, however, are more interested in providing a descriptive portrait of the long-term experience of poverty and thus also of the persistence of poverty itself. In our analysis, we therefore treat demographic and labour market states as exogenous.

[5] The data used in this paper was extracted from the GSOEP Database using the Add-On package SOEP Menu v2.0 (Jul 2005) for Stata(TM). SOEP Menu was written by John P. Haisken-DeNew (john@soepmenu.de). The following authors supplied SOEP Menu Plugins used to ensure longitudinal consistency, John Haisken-DeNew (21), Markus Hahn and John Haisken-DeNew (4) and Mathias Sinning (8). The SOEP Menu generated DO file to retrieve the data used here and any SOEP Menu Plugins are available upon request. Any data or computational errors in the paper are entirely the responsibility of the authors. HAISKEN-DENEW (2005) describe SOEP Menu in detail.

[6] Contrary to BIEWEN (2006) who also focuses on Germany, we use annual household income from the cross national equivalence files instead of income preceding the month of interview. Furthermore, we use four additional waves of data and focus on children instead of the entire population.

not span enough years to cover entire childhood. However, it provides more information on subgroups of the population, which exhibit considerable differences in terms of poverty rates.[7]

CORAK ET AL. (2005) demonstrate that children born to parents without German citizenship are worse off than children in native households. In the second part of the analysis, a major focus is therefore on differences in poverty dynamics between these subgroups. We compare the performance of migrants with natives by differentiating between children (i) of native Germans, (ii) of first-generation foreign immigrants, (iii) of second-generation foreign immigrants and (iv) those born to native Germans who were born abroad (*Ethnic Germans*). A child is considered to live in a family of native Germans if the household head possesses a German nationality and was born in Germany. Ethnic Germans are defined as households in which the household head holds German citizenship, was not born in Germany and immigrated after 1984.[8] A child is considered as offspring of a first-generation foreign immigrant, if the household head has no German nationality and was not born in Germany and as offspring of a second-generation foreign immigrant, if the household head has no German nationality but was born in Germany.[9]

In addition to these groups we also distinguish between children living in East and West Germany and control for a large set of other demographic and household characteristics. Among others, these characteristics comprise single parent households, the age of the household head, the educational level of the household head and whether the household head is working full-time. In the equation specifying initial poverty status we additionally include information on the educational attainment of the father and the mother of the household head, i.e. of the child's grandparents, and dummies for several periods, which are supposed to account for changes over time in the overall probability to enter poverty. **Table A.1** in the **Appendix** provides an exact definition of all covariates.

For the West German sample, we have income histories for 2,886 individuals born in the sample and for 3,513 children overall, including those who are not observed from birth on, who therefore start with a left-censored spell but experience at least one switch of poverty status and thus have at least one non-left-censored spell. This provides us with 22,762 person-year observations (26,022 if using all children but only observations from non-left-censored spells, respectively).[10] Of these children, 239 are observed during their entire childhood. Overall 7% of the children are initially born into poverty with slight differences between German (6%) and first- or second-generation foreigner (10%) households. For those born by

[7] The West German sample uses information from GSOEP samples *A* and *B*. These samples are representative for the native and foreign population living in West Germany at that time. The sample for reunified Germany is based on GSOEP samples *A* to *E* and uses data starting in 1992. The additional GSOEP samples include refreshments for those groups already covered by samples *A* and *B* and additionally cover individuals living in East Germany as well as recent migrants.

[8] In the first part of the analysis we do not distinguish between children of native Germans and children of Ethnic Germans, because we use GSOEP samples *A* and *B* only. In these samples, there is only a very small number of Ethnic Germans.

[9] Contrary to other countries naturalisation is anything but easy in Germany. Generally, immigrants either have to marry a German citizen or have to reside in the country for more than 8 years before being able to apply for German citizenship. Before the year 2000, immigrants even had to live in Germany for 15 years at least before being able to apply. Furthermore, children born to non-citizens (i.e. the second generation) do not automatically obtain German citizenship. Finally, dual citizenships are not accepted by German authorities, which forces immigrants to give up the citizenship of their home country if they want to obtain German nationality.

[10] If an individual (temporarily) drops out of the sample or if information on household income etc. is missing and has not been imputed in the GSOEP, all information from later waves is dropped.

single parents, the respective rate is 50%.[11] Finally, of those not born in the sample, 64% experience a poverty spell as first non-left-censored spell.

Table 2: Distribution of Observations by Spell Length

	West Germany 1984-2004							
	Children born in sample				All non-left-censored spells			
	Poverty spells		Non-poverty spells		Poverty spells		Non-poverty spells	
Duration of spell	no exit	exit	no exit	exit	no exit	exit	no exit	exit
1	327	506	3,072	237	559	863	3,599	346
2	132	127	2,630	141	216	222	3,007	201
3	58	54	2,296	106	94	87	2,579	133
4	28	21	1,993	62	51	26	2,222	78
5	12	14	1,761	45	19	25	1,939	53
6	6	5	1,540	42	12	5	1,683	51
7	4	2	1,328	20	7	3	1,440	24
8	3	1	1,151	25	4	2	1,226	29
9	1	1	993	16	2	1	1,054	17
10	1	0	861	16	2	0	908	18
11	1	0	732	13	1	0	768	15
12			618	5			643	8
13			524	5			539	6
14			427	7			435	7
15			348	2			349	2
16			257	4			257	4
17			177	4			177	4
	Reunified Germany 1992-2004							
1	230	312	2,339	170	583	744	2,964	332
2	90	82	1,888	91	232	197	2,299	167
3	33	29	1,512	78	88	68	1,791	108
4	15	8	1,174	45	32	34	1,399	58
5	9	4	975	17	15	10	1,138	26
6	4	0	779	15	6	0	905	19
7	3	1	609	9	4	1	706	15
8	1	0	461	7	1	0	526	11
9			335	3			377	5
10			234	5			257	5
11			141	2			155	2
12			52	2			52	2

Note: Table provides number of observations with (no) exit from (non-)poverty spell at specific duration of the spell.

The distribution of number of exits and re-entries by duration of spell is provided in **Table 2**. Looking at these absolute numbers without controlling for any observable or unobservable characteristics, we observe lower exit rates at longer duration of spells for both samples (West Germany and reunified Germany), especially with non-poverty spells. For example, for West German children born in sample the exit rate from poverty is 61% (=506/(327+506)) at spell duration one, while it is 45% at duration six. Furthermore, we find that the longest poverty spell is right-censored after 11 years in West Germany, while there are several children in the sample experiencing non-poverty during their entire childhood. Moreover, comparing exits

[11] Approximately 4.5% of those children born into poverty are born into households that have not been poor the year before the child was born. The rate is slightly above 10% among households consisting of only one adult the year before the child was born. That is, it is very likely that these households fall into poverty because the child is born. Apart from child birth, a further reason leading to poverty might be a reduction in labour market participation – which might be interrelated to child birth. This, however, is observed in less than 20% of the cases entering poverty in the year the child is born. Among the formerly single adult households there are even 35% who enter poverty although these households become two adult households in the year of child birth.

between children born in the sample and all non-left censored spells reveals that there are only minor differences. Whether differences between both samples are important will further be analyzed at the end of subsection 4.1. In what follows, we generally concentrate on children who were born in sample. **Table A.2** provides survival rates in and out of poverty by population groups. Interestingly, survival rates in poverty look similar for children in native and foreigner households. However, children in households of first- and especially of second-generation immigrants seem to remain in non-poverty for a shorter time.

For reunified Germany we have income histories for 2,369 children born in the sample and for 3,261 children overall, which provides us with 11,764 and 15,334 person-year observations, respectively. During these years, the rate of initial poverty for those born in sample is 9% and, hence, slightly higher than in the West German sample. Furthermore, differences between natives (8%) and migrants (12% first-, 8% second-generation foreign migrants and 15% Ethic Germans) are somewhat more pronounced, especially for Ethnic Germans. With respect to survival rates, however, Ethnic Germans do not perform worse than other groups (see **Table A.3**).

4. Empirical Results

In this section, we summarize the estimation results for the two samples of data. In the first subsection data for West Germany covering the time period 1984-2004 is used to estimate the duration model delineated above. In the second subsection, we present results for reunified Germans covering 1992-2004.

4.1 Results for West Germany 1984-2004

Estimation Results of Duration Model

In the first section of the results, we focus on children living in West Germany who were born since 1983. **Table 3** summarizes estimation results of our preferred specification. From this table it becomes transparent that living in a single parent household reduces the probability of leaving poverty and increases the probability of moving out of non-poverty significantly. By contrast, children living in a household were the household head is working full-time remain in poverty for a shorter time and exhibit a lower probability to enter it again. Furthermore, education seems to impinge upon poverty duration beyond its impact on labour market status. Children of highly educated parents exhibit a significantly longer duration in non-poverty and weakly significant shorter poverty spells. The picture is more intricate with respect to age. Whereas we do not observe significant differences between age groups concerning poverty duration, our results suggest that households headed by individuals up to the age of 30 exhibit shorter non-poverty spells than those headed by older age groups.

Table 3: Results of Duration Model for West Germany 1984-2004

Duration	**Hazard of leaving poverty**		**Hazard of leaving non-poverty**	
	Coefficient	**Std. error**	**Coefficient**	**Std. error**
Duration 1	**-2.1392**	0.9107	**-1.1231**	0.2905
Duration 2	**-2.2526**	1.0372	**-1.1654**	0.3293
Duration 3	**-1.9176**	0.7412	**-1.1924**	0.3527
Duration 4	*-1.5972*	0.8827	**-1.3173**	0.3103
Duration 5	**-2.0952**	0.7027	**-1.2652**	0.2607
Duration 6+	**-2.0362**	0.6051	**-1.4113**	0.2801
Single parent	**-0.6148**	0.1954	**0.7844**	0.1335
Age $\leq 25^{*)}$	-0.3562	0.3672	**0.4409**	0.1614
Age 26-30$^{*)}$	-0.2124	0.3101	**0.2653**	0.1296
Age 31-40$^{*)}$	-0.3029	0.2939	0.0549	0.1069
Full-time working$^{*)}$	**0.434**	0.1663	**-0.3722**	0.1102
Years of education$^{*)}$	*0.0873*	0.0466	**-0.0647**	0.0236
1st gen. foreigner$^{*)}$	0.0444	0.2024	0.2898	0.1765
2nd gen. foreigner$^{*)}$	-0.3892	0.296	0.4052	0.2508
Initially poor	**Coefficient**		**Std. error**	
Single parent	**1.6355**		0.3472	
Age $\leq 25^{*)}$	**0.86**		0.3001	
Age 26-30$^{*)}$	**0.596**		0.293	
Age 31-40$^{*)}$	-0.2026		0.3007	
Full-time working$^{*)}$	**-1.0669**		0.3257	
Years of education$^{*)}$	**-0.0936**		0.039	
1st gen. foreigner$^{*)}$	0.4276		0.3443	
2nd gen. foreigner$^{*)}$	*1.0089*		0.5548	
Heterogeneity	**Coefficient**		**Std. error**	
θ^{poverty}	**1.877**		0.763	
$\theta^{\text{non-poverty}}$	**0.9812**		0.1555	
$\theta^{\text{initial status}}$	**1.7502**		0.4797	
$\Pr(\pi 1)$	0.0000			
$\Pr(\pi 2)$	0.7748			
$\Pr(\pi 3)$	0.0000			
$\Pr(\pi 4)$	0.0423			
$\Pr(\pi 5)$	0.0339			
$\Pr(\pi 6)$	0.0000			
$\Pr(\pi 7)$	0.0245			
$\Pr(\pi 8)$	0.1244			
Individuals	2,886			
Observations	22,762			

Notes: Covariates marked by $^{*)}$ refer to characteristics of the household head. Equation for initial poverty status additionally includes a constant term, two period dummies (1983-1989 and 1990-1996), and information on the educational attainment of the parents of the household head (see Table A.1 in the Appendix). Coefficients printed in *italics* indicate marginal significance (10%-level), and coefficients printed in **boldface** indicate statistical significance at 5%-level.

Moreover, living in a household in which the head is either a first- or a second-generation immigrant neither impinges upon poverty nor non-poverty duration on any reasonable significance level. However, the probability to be born into poverty initially is higher in households of second-generation immigrants, at least on a 10% significance level. All other factors influencing initial poverty status have the expected sign. That is, we observe significantly higher probabilities for children of single parents and parents younger than 31

years. The probability to be born into poverty is significantly lower for children of full-time working and better educated parents. We observe no systematic differences for children of first-generation immigrants compared to natives.[12]

Finally, controlling for unobserved heterogeneity yields a set of estimated duration dummies, which do not differ significantly from each other. Hence, our results suggest that duration dependence does not exist.[13] However, the apparent absence of duration dependence in our sample might be, at least to some extent, attributable to the nature of our data. Since our unit of observation is a child who is born in the sample, we do not observe the full duration of poverty of a specific household *prior* to the birth of the child. Thus, it is possible that some children are born into households that were poor for many years before. If households exhibit a decreasing probability to exit poverty with spell length and the marginal decrease becomes smaller over time, a large share of children born into poor households with a rather long poverty experience in sample might yield estimation results that suggest no duration dependence. The same holds for duration dependence in non-poverty. For children born after 1994 pre-birth histories of (non-)poverty spells of the household are described in **Table A.4**.[14] Results suggest that children born into poverty live in households that entered poverty rather recently, while the non-poverty spell of the households of a child born into non-poverty is often ongoing for quite long. Thus, our measures for duration dependence are more likely to be biased for spells out of poverty than for spells in poverty.

All parameters capturing unobserved heterogeneity are highly significant. However, only 5 out of 8 possible latent classes are occupied. The majority of children (77%) lives in *unlikely to be poor* households, i.e. they are in latent class 2 where unobservable characteristics make initial poverty unlikely, spells out of poverty long, and those in poverty short. More than 16% of children live in households where unobservables lead to a high probability of *frequent fluctuations* (classes 4 and 8) and slightly more than 2% are among the *likely to be poor* by means of their unobservable characteristics (class 7). Finally, 3% are in class 5 which represents one of the intermediate cases.

Simulation Results

Since the quantitative magnitudes of the estimated coefficients in the duration model are anything but straightforward to interpret, we use our estimation results for simulations of several poverty outcomes. These simulations illustrate the quantitative effect of observable as well as unobservable characteristics on these outcomes and, thus, provide a better understanding of the potentials and limitations of possible public interventions. Specifically, we simulate the percentage of children being born into poverty, the average number of years spent in poverty as well as the share of children experiencing zero, five or more, ten or more

[12] We also estimated several specifications that additionally included information on the 'number of full-time working adults', the 'number of children' or year dummies. These variables, however, are either not significant or yield results that are less easily interpretable. For example, the variable 'number of full-time working adults' is significant for poverty exits, but renders the coefficients for 'single parent' and for 'full-time working household head' insignificant. This is probably due to the high correlation between these variables. Hence, we decided to report the results of the parsimonious specification.

[13] Without controlling for unobservable heterogeneity, our estimation results suggest significant negative duration dependence for both states, i.e. the probability to leave (non-)poverty decreases with increasing duration.

[14] **Table A.4** reads as follows. Overall, 74 children were born into poverty after 1994. Of these, 29 were born into families with missing income information in the year before birth, 15 were born into families that just entered poverty in the year of birth and the remaining 30 into families that were already poor the year prior to birth. Of these 30, we have no information on income two years before birth for 9 of them, while we know that 4 entered poverty one year before birth and the remaining 17 were poor longer than that.

and 18 years in poverty (out of a maximum number of 18). We do this for several combinations of observable characteristics and latent classes. More precisely, the simulations allow the following comparisons and combinations of them:

1. Single vs. couple households
2. Full-time vs. not full-time working household head
3. 10 vs. 13 years of education
4. Conditional vs. unconditional on initial poverty status
5. Being in latent classes 2, 4, 6 and 7
6. Conditional vs. unconditional on latent class

In these simulations, we assume that the conditioning characteristics do not change during the entire period of childhood, i.e. we provide a picture for a society, which is immobile in terms of household composition and labour market attachment. Thus, these simulations should be interpreted as upper and lower bounds of child poverty experience since households might form or split up and labour market status might change. Simulation results are summarized in **Tables 4** and **A.5** (in the Appendix). In **Table 4** educational attainment is held constant at 13 years of education, which is equivalent to holding an intermediate secondary schooling degree together with an apprenticeship and further vocational training or to holding an upper secondary school degree. **Table A.5** in the Appendix summarizes the results of changing educational attainment from 13 to 10 years, i.e. an intermediate secondary schooling degree without any vocational training.

Simulation results in the upper part of the left panel of **Table 4** (unconditional on initial poverty status but conditional on latent class) indicate that children in single parent household are by all means remarkably worse off than their peers in couple households. For instance, in latent class 2 (the "unlikely to be poor" in terms of unobservables), children of single parents exhibit a 33 percentage points higher risk to be born into poverty than children of couples if the household head is not working and a seven percentage points higher probability to be initially poor with a full-time working household head. Their average number of years in poverty amounts to more than 3.3 years if the household head is not employed compared to less than half a year for children in couple households. Moreover, the share of children experiencing a poverty spell of five or more years is 29 percentage points higher in not full-time working single households compared to comparable couple households. This detrimental situation of single parent children also holds in all other latent classes. In class 4 ("frequent fluctuations") children of single parents experience on average four to six years longer poverty spells than their peers with two parents. The average number of years in poverty increases to more than 13 and 16.5 years, respectively, for single parent children in the "likely to be poor" class 7.

Table 4: Simulation Results for West Germany 1984-2004

Type	Unconditional on initial poverty status						Conditional on initially poor			Conditional on initially non-poor		
	Initially poor (%)	Average number of years poor	0 years poor (%)	5+ years poor (%)	10+ years poor (%)	18 years poor (%)	Average number of years poor	5+ years poor (%)	10+ years poor (%)	Average number of years poor	5+ years poor (%)	10+ years poor (%)
Conditional on latent class												
Couple, working, (π2)	0.12	0.13	89.83	0.01	0	0	1.31	0.18	0	0.13	0.01	0
Couple, not working, (π2)	2.36	0.43	73.39	0.39	0	0	1.77	2.51	0	0.39	0.32	0
Single, working, (π2)	7.72	1.21	43.81	3.69	0.03	0	2.54	11.62	0.11	1.09	3.05	0.01
Single, not working, (π2)	35.81	3.34	13.22	29.55	1.88	0	4.44	43.94	3.49	2.73	21.53	0.89
Couple, working, (π4)		1.30	32.59	2.09	0	0	2.41	7.51	0	1.30	2.09	0
Couple, not working, (π4)	Same as	2.82	10.24	18.85	0.12	0	3.98	36.37	0.50	2.80	18.43	0.11
Single, working, (π4)	for π_2	5.04	1.15	58.95	2.16	0	6.05	75.68	5.54	4.96	57.54	1.87
Single, not working, (π4)		8.16	0.04	93.86	28.86	0	8.86	97.06	39.80	7.77	92.09	22.81
Couple, working, (π6)	9.50	0.24	81.39	0.18	0	0						
Couple, not working, (π6)	40.04	0.94	45.00	1.21	0	0						
Single, working, (π6)	62.51	2.00	17.80	8.46	0.07	0			Same as for π_2			
Single, not working, (π6)	91.88	4.30	1.72	42.14	3.29	0						
Couple, working, (π7)		3.85	29.53	35.66	10.23	0.12	6.99	65.94	26.12	3.52	32.49	8.58
Couple, not working, (π7)	Same as	9.27	6.23	78.28	49.77	4.80	11.62	91.24	67.01	7.69	69.64	38.18
Single, working, (π7)	for π_6	13.23	0.46	96.63	82.50	13.47	14.30	98.71	89.12	11.43	93.08	71.21
Single, not working, (π7)		16.54	0.01	99.91	98.62	48.58	16.72	99.95	98.97	14.49	99.45	94.56
Unconditional on latent class												
Couple, working	1.84	0.44					1.75			0.41		
Couple, not working	9.25	1.16					2.60			1.01		
Single, working	17.74	2.37					3.70			2.09		
Single, not working	46.06	4.87					5.83			4.04		

Notes: Simulations based on 100,000 replications. Baseline characteristics not subject to systematic variation are German, age of household head 31-40, 13 years of education, baseline categories for education of parents of household head, before 1990.

From the perspective of economic policy, the effect of labour market status is very important because this characteristic can be addressed by public interventions, e.g. by better childcare facilities to extend labour market participation of families with children. In general, our results suggest that children of a full-time working household head experience a notably lower number of years in poverty, on average. For instance, for children in single parent households the average number of years in poverty is reduced by between two (latent class 2) and three years (latent classes 4 and 7) if the household head works full-time. The labour market status of the household head exhibits an even larger impact on the probability of being born into poverty initially. Our results indicate a decrease of this poverty indicator by almost 30 percentage points for children of single parents. Finally, the effect of full-time working on the share of children spending five of more years in poverty seems to depend decisively on unobserved characteristics. Whereas children of full-time working singles in latent classes 2, 4 and 6 exhibit a much smaller risk to be poor for five or more years, their peers in latent class 7 gain almost nothing from a working household head.

Another interesting, though even more difficult to address, individual characteristic for policy makers is education. **Table A.5** in the Appendix summarizes simulation results for a change of years of education from 13 to 10. By comparing these results with those reported in **Table 4** it becomes transparent that children of better-educated household heads are better off with respect to all indicators. However, years of education of the head have to change from nine (lower secondary schooling degree) to 18 years (completed university degree), in order to exhibit a quantitative impact on child poverty experience that is comparable to the effect of labour market status. Clearly, this is not a completely fair comparison since better education is very likely to impinge upon labour market prospects and, thus, indirectly on poverty experience as well.

Results in **Table 4** indicate further that unobservable characteristics play an important role for all considered child poverty indicators. For instance, moving from latent class 2 to 4, i.e. from the "unlikely to be poor" to the "frequent fluctuations" class, increases the average number of years in poverty by around four years for children of single parents. Moreover, the same change raises the share of children experiencing five or more years in poverty by more than 60 percentage points if the household head is not working full-time. For children of couples the change in latent classes results in considerably smaller increases in poverty indicators, e.g. average years in poverty rise by slightly more than one and around 2.5 years, respectively, depending on the labour market status of the household head. By contrast, moving from class 2 to class 6, i.e. if only unobservables for initial poverty status change, yields much smaller changes in child poverty indicators. In this case, the conditional distributions remain constant and only the probability of initially being born into poverty rises. This initial effect (class 6 vs. class 2) is much smaller than the cumulative effects of both hazard rates (class 4 vs. class 2).

Unobservable characteristics are also important for the simulation results if the initial poverty situation is taken into account. If we compare results conditioning on initial poverty with those conditioning on initial non-poverty, average years of child poverty increase by around one year for all subgroups in latent classes 2 and 4, whereas this indicator rises by more than three (two) years for children in (not) full-time working couple households in class 7. Finally, by assuming that latent classes are uncorrelated with observable characteristics and thus equally represented within single and couple households as well as within households in which the head is working or not, we can also simulate years in poverty unconditional on latent class. More precisely, we adjust the conditional estimates using the estimated probabilities for each class as weight. Results in the lower panel of **Table 4** indicate that

typical children born into a full-time working couple household on average experience less than half a year of poverty, while their peers in not-working single parent households are almost 5 out of 18 years poor. Clearly, these results are mainly driven by poverty experiences of children in the largest latent class 2 and, hence, underestimate poverty indicators for those children in classes 4 and 7.

Left-censoring and Initial Conditions

To investigate whether and to what extent our results are robust with respect to modelling initial conditions and sample definition, we perform two sensitivity analyses. In the first re-estimation of our duration model, we disregard the possible correlation of initial poverty status with both hazard rates. In the second sensitivity check we also include children who are not born in sample. Estimation results are summarized in **Table 5**.

Comparing the left part of **Table 5** (specification without initial conditions) with the baseline model (**Table 3**), does not yield blatant differences. In general, the same coefficients are significantly different from zero in both models and magnitudes are similar. The distribution of latent classes, however, differs substantially. Latent class 2 ("unlikely to be poor") is much smaller (50% instead of more than 77%). By contrast, latent classes 4 ("frequent fluctuations") and 1 are much larger than their counterparts in the baseline model (classes 4+8 and 1+5, respectively). Finally, including also children not born in sample (right part of **Table 5**), results in even less remarkable differences compared to the baseline model. The most notable changes are the insignificance of household head's labour market status and education in the hazard for leaving poverty. Moreover, the distribution across latent classes largely resembles that of our original model. However, the effect of unobservables is more pronounced for the hazard of leaving non-poverty and less pronounced for the hazard of leaving poverty and for initial poverty status.

Table 6 summarizes the relative change in simulation results for average years in child poverty conditional on initial (non-)poverty for several combinations of observable characteristics. The left part of this table refers to the model without initial conditions. From there it becomes transparent, that poverty experience is smaller than in the baseline model in almost all cases if we also condition on latent classes, especially for simulations, which condition on initial non-poverty. In this case, average years in poverty are underestimated by up to 40%. Differences amount to almost 60% without conditioning on initial status.

Table 5: Results of Sensitivity Analysis for West Germany 1984-2004

	Model without initial conditions				Model including children not observed from birth on			
Duration	**Hazard of leaving poverty**		**Hazard of leaving non-poverty**		**Hazard of leaving poverty**		**Hazard of leaving non-poverty**	
	Coefficient	**Std. error**	**Coefficient**	**Std. error**	**Coefficient**	**Std. error**	**Coefficient**	**Std. error**
Duration 1	**-2.2103**	0.9812	-1.2848	1.8951	-1.6972	3.3792	**-0.7435**	0.2626
Duration 2	**-2.3318**	1.0721	-1.3511	2.0413	-1.7319	3.5525	**-0.8212**	0.2878
Duration 3	**-1.9830**	0.8302	-1.3788	2.0520	-1.5503	3.3370	**-0.8731**	0.3058
Duration 4	*-1.6122*	0.9437	-1.5142	2.1607	-1.4055	2.7911	**-1.0032**	0.2721
Duration 5	**-2.0437**	0.7529	-1.4617	2.0985	-1.5074	1.5413	**-1.0085**	0.2292
Duration 6+	**-2.0010**	0.5848	-1.6387	2.2717	**-2.0324**	0.7202	**-1.1314**	0.2468
Single parent	**-0.5844**	0.2927	**0.7432**	0.3062	**-0.4862**	0.2321	**0.7580**	0.1429
Age $\leq 25^{*)}$	-0.3742	0.3574	0.3945	0.3249	-0.1703	0.6881	0.2406	0.1545
Age 26-30$^{*)}$	-0.1909	0.2929	0.2184	0.2858	0.0451	0.5932	0.1048	0.1162
Age 31-40$^{*)}$	-0.2820	0.2761	0.0418	0.1430	-0.0190	0.4607	-0.0436	0.0954
Full-time working$^{*)}$	**0.4327**	0.1422	**-0.3598**	0.1074	0.5415	0.3601	**-0.4590**	0.1055
Years of education$^{*)}$	*0.0799*	0.0474	**-0.0632**	0.0282	0.0734	0.0719	**-0.0732**	0.0218
1st gen. foreigner$^{*)}$	0.1054	0.2192	0.2684	0.1848	0.0649	0.1573	0.2265	0.1569
2nd gen. foreigner$^{*)}$	-0.3657	0.2910	0.4056	0.4157	-0.3193	0.3362	0.2605	0.2100
Initially poor	**Coefficient**		**Std. error**		**Coefficient**		**Std. error**	
Single parent	**1.2628**		0.2428		**1.6478**		0.2988	
Age $\leq 25^{*)}$	**0.6052**		0.2866		0.1680		0.2359	
Age 26-30$^{*)}$	0.2995		0.2824		-0.1351		0.2137	
Age 31-40$^{*)}$	-0.2062		0.2690		**-0.3941**		0.1971	
Full-time working$^{*)}$	**-0.9373**		0.1796		**-0.7557**		0.2488	
Years of education$^{*)}$	**-0.0631**		0.0306		**-0.1067**		0.0274	
1st gen. foreigner$^{*)}$	0.3164		0.3120		0.3590		0.2754	
2nd gen. foreigner$^{*)}$	*0.7255*		0.4232		*0.7241*		0.4295	
Heterogeneity	**Coefficient**		**Std. error**		**Coefficient**		**Std. error**	
θ^{poverty}	**1.9810**		0.7793		**1.3647**		0.3058	
$\theta^{\text{non-poverty}}$	*0.9118*		0.5038		1.3102		2.6284	
$\theta^{\text{initial status}}$					**0.9657**		0.1300	
Pr(π1)	0.1466				0.0000			
Pr(π2)	0.4956				0.7539			
Pr(π3)	0.0131				0.0042			
Pr(π4)	0.3447				0.0445			
Pr(π5)					0.0528			
Pr(π6)					0.0000			
Pr(π7)					0.0436			
Pr(π8)					0.1010			
Individuals	2,886				3,513			
Observations	22,762				26,022			

Notes: Covariates marked by $^{*)}$ refer to characteristics of the household head. Equation for initial poverty status additionally includes a constant term, two period dummies (1983-1989 and 1990-1996), and information on the educational attainment of the parents of the household head (see Table A.1 in the Appendix). Coefficients printed in *italics* indicate marginal significance (10%-level), and coefficients printed in **boldface** indicate statistical significance at 5%-level.

Table 6: Simulation Results for Sensitivity Analysis (West Germany 1984-2004)

Type	Model without initial conditions			Including children not observed since birth		
	Difference to baseline model in %			Difference to baseline model in %		
	Initially poor	Initially non-poor	Un-conditional	Initially poor	Initially non-poor	Un-conditional
Conditional on latent class						
Couple, working, (π1/π5)	9.7	-35.4	-57.2	-45.2	-39.4	-18.3
Couple, not working, (π1/π5)	5.6	-33.7	-53.7	-34.3	-14.7	-26.9
Single, working, (π1/π5)	-0.8	-32.3	-48.1	-45.7	-41.7	-38.9
Single, not working, (π1/π5)	-1.3	-25.1	-25.2	-19.9	-12.5	-19.1
Couple, working, (π2/π6)	-2.4	-41.8	-24.9	-2.4	-0.9	8.4
Couple, not working, (π2/π6)	-6.6	-39.7	-2.8	6.2	27.1	45.5
Single, working, (π2/π6)	-14.7	-38.8	-19.5	-10.5	-11.8	8.3
Single, not working, (π2/π6)	-17.9	-33.6	-16.1	1.7	7.5	13.6
Couple, working, (π3/π7)	-4.3	-30.6	-34.5	-37.7	-35.4	-32.1
Couple, not working, (π3/π7)	-3.9	-22.6	-28.7	-20.3	-14.6	-17
Single, working, (π3/π7)	-4.3	-15.3	-20.7	-27.1	-26.5	-25.4
Single, not working, (π3/π7)	-1.4	-7.3	-8.8	-9.1	-7.9	-9.2
Couple, working, (π4/π8)	-19.2	-39.6	-41.5	-2.3	-2.4	2
Couple, not working, (π4/π8)	-21	-33.5	-36	10.3	15.5	16
Single, working, (π4/π8)	-20.1	-27.4	-29.9	-7.6	-7.6	-5.3
Single, not working, (π4/π8)	-13.8	-18.2	-18.2	0.6	1.7	1.3
Unconditional on latent class						
Couple, working	23	-9.1	-6.7	-5.5	-3.4	3.2
Couple, not working	28.3	-3	10.1	7.1	21.5	23.8
Single, working	21.7	0	8.4	-9.7	-8.2	1.9
Single, not working	17	2.8	15	3.9	8.3	11.2

Notes: Comparison of average number of years poor for (i) specification with vs. without initial conditions and (ii) specification based on spells of children born in sample vs. all non-left-censored spells. (πi/πj) refers to a weighted average of the share of individuals in πi and πj in the models controlling for initial conditions and to πi in the model without controlling for initial conditions.

However, results change dramatically, if we do not condition on latent classes, due to large differences in the distribution of unobserved heterogeneity. In this case, our results suggest, that firstly the average number of years in poverty conditional on initial non-poverty is underestimated only for children living with two adults. Secondly, for all other groups, the number of years is overestimated by around 20% if we condition on initial poverty; and thirdly the overall unconditional number of years depends on the combination of observable characteristics. The unconditional poverty experience is underestimated by 7% for full-time working couple households and overestimated by up to 15% for the other three household types. This indicates that, at least in our data, the omission of initial conditions leads to quite strong differences if we condition on initial state and latent class, but to much smaller differences if we simulate the unconditional distribution. Thus, in our sample a model not accounting for initial conditions seems to be well suited for unconditional simulations of average years in poverty. However, it seems to be misleading for the provision of structural information on the presence of duration dependence or the distribution of unobservable factors/latent classes. Moreover, it leads to biased simulation results when conditioning either on initial poverty status or on latent class.

Theoretically, the effect of including children not born in the sample but observed at older ages is unclear *a priori*. By considering their first non-left-censored spell, we over-sample children with frequent fluctuations. Simultaneously, we neglect children who enter poverty before entering the sample and do not leave it for a long time. The latter should lead to an

underestimation of total time in child poverty. On the other hand, this approach also neglects children entering long non-poverty spells before the first observation and should, thus, yield overestimated poverty experiences. Hence, the net effect is unclear *a priori*. Our simulation results, however, suggest that the inclusion of children not born in sample results in an overestimation of years in poverty by 2% to 24% if we do not condition on latent classes and initial poverty status (see right part of **Table 6**). In general, differences are larger for children living with not full-time working household heads.

4.2 Results for Reunified Germany 1992-2004

Estimation Results of Duration Model

In a second step, we utilize data for reunified Germany covering the period 1992-2004 to estimate a slightly augmented duration model. More precisely, we additionally include dummy variables for children living in East Germany, for children of Ethnic Germans, and for children living in migrant families who entered Germany at least 10 years before. Furthermore, the number of duration dummies is reduced to four. The estimation results are summarized in **Table 7**.

Again, our results suggest that children living in single parent households, with not full-time working household heads and with less educated parents exhibit a significantly higher exposure to low-income experiences. Yet, none of these factors is significant for duration in poverty, only for duration in non-poverty and initial poverty status. Furthermore, we find that children of Ethnic Germans display a remarkably higher probability to being born into poverty and leave non-poverty somewhat faster than native Germans. The latter, however, is only weakly significant.

By contrast, children of first- or second-generation foreign immigrants do not seem to differ significantly from native Germans.[15] In addition, years since migration of the household head does not impinge upon poverty experience of the child at any reasonable significance level. Living in East Germany increases the risk of initial poverty but does not influence the duration within each state. The most striking differences are observable for the distribution of unobservable factors. Again, the majority of children belong to latent class 2. However, in the case at hand this class is considerably smaller (68%) than for the West German sample. Additionally, in the reunified Germany sample more children belong to those classes with a high probability of initial poverty status, i.e. to classes 5-8. Finally, the impact of the different heterogeneity parameters is much larger now, both for the probability to exit poverty and to exit non-poverty. This indicates that in the sample for reunified Germany heterogeneity in the duration of (non-)poverty is attributed to a much larger extent to unobservable factors than it is the case in the West German sample.[16]

[15] All three coefficients (i.e. for initial poverty status, exit from poverty and exit from non-poverty) are insignificant individually and jointly, for children of first- and second-generation foreign immigrants. For children of Ethnic Germans, however, restricting all three coefficients to zero is rejected by a Wald test.

[16] We also tried to estimate models with different distributions of latent classes for Germans and migrants. Generally, these models did not converge. For a specification not accounting for initial conditions we found that the distributions are quite similar and do not indicate that migrants are more likely to be endowed with unfavourable unobservable characteristics. If any, class 2 is somewhat more likely among migrants.

Table 7: Results of Duration Model for Reunified Germany 1992-2004

Duration	**Hazard of leaving poverty**		**Hazard of leaving non-poverty**	
	Coefficient	**Std. error**	**Coefficient**	**Std. error**
Duration 1	*-2.821*	1.6597	**-0.9188**	0.3503
Duration 2	-2.7	1.7401	**-0.8502**	0.4059
Duration 3	*-2.0715*	1.1704	*-0.7734*	0.4601
Duration 4+	*-1.7862*	0.9359	**-1.1861**	0.3939
Single parent	-0.2079	0.3867	**0.8882**	0.1505
Age ≤ 25*)	-0.2558	0.3901	**0.6004**	0.2808
Age 26-30*)	-0.1013	0.3097	*0.3224*	0.1852
Age 31-40*)	-0.4454	0.3385	0.0503	0.1537
Full-time working*)	0.3433	0.2382	*-0.2203*	0.1134
Years of education*)	0.0385	0.0636	**-0.0864**	0.0297
1st gen. foreigner*)	-0.0572	0.3008	0.404	0.2617
2nd gen. foreigner*)	-0.2528	0.4582	0.267	0.3645
Ethnic German*)	-0.4286	0.3793	*0.5137*	0.312
Years since migration ≥ 10*)	-0.0862	0.2513	-0.1887	0.2937
East Germany	-0.0614	0.2051	0.2113	0.1519
Initially poor	**Coefficient**		**Std. error**	
Single parent	**3.8283**		0.8576	
Age ≤ 25*)	**1.4138**		0.6237	
Age 26-30*)	0.5054		0.3916	
Age 31-40*)	0.0865		0.3998	
Full-time working*)	**-1.6206**		0.5219	
Years of education*)	-0.103		0.0697	
1st gen. foreigner*)	1.349		0.9478	
2nd gen. foreigner*)	0.0107		1.2064	
Ethnic German*)	**1.9831**		0.9808	
Years since migration ≥ 10*)	-1.4246		1.1621	
East Germany	**0.885**		0.3032	
Heterogeneity	**Coefficient**		**Std. error**	
θ^{poverty}	**4.4039**		1.1165	
$\theta^{\text{non-poverty}}$	*2.6648*		1.4306	
$\theta^{\text{initial status}}$	0.9198		1.0425	
Pr(π1)	0.0381			
Pr(π2)	0.6841			
Pr(π3)	0.0000			
Pr(π4)	0.0000			
Pr(π5)	0.0247			
Pr(π6)	0.1291			
Pr(π7)	0.0000			
Pr(π8)	0.1240			
Individuals	2,369			
Observations	11,764			

Notes: Covariates marked by *) refer to characteristics of the household head. Equation for initial poverty status additionally includes a constant term, two period dummies (1983-1989 and 1990-1996), and information on the educational attainment of the parents of the household head (see Table A.1 in the Appendix). Coefficients printed in *italics* indicate marginal significance (10%-level), and coefficients printed in **boldface** indicate statistical significance at 5%-level.

Simulation results

In a final step, we again utilize these estimation results for simulation purposes. Specifically, we compare poverty experience of children of native and Ethnic Germans and focus on couple households since most children of Ethnic Germans live with two adults. Results are summarized in **Table 8**. Again, we observe that children in households with a full-time working household head are generally better off than their otherwise comparable peers in not working households, irrespective of ethnicity and latent class. However, children of Ethnic Germans are experience poverty spells which are around two times or even more than two times longer than otherwise comparable native children. For instance, in the "frequent fluctuations" class 8, children of non-working Ethnic German households spend almost eight years in poverty compared to around 3.5 years for their peers in non-working native households. These results suggest that there are unobservable factors that are associated with living in a household of Ethnic Germans and that render poverty considerably more likely.

5. Conclusions

This paper investigates the incidence and dynamics of poverty among children living in Germany taking into account the whole period of childhood and teenage years. We estimate duration models, which investigate multiple spells in and out of poverty. These spells are allowed to be correlated because some households might be endowed with unobservable characteristics that make them likely to exit poverty only after a long time but make them re-enter relatively fast. In addition, we also allow exit and re-entry to be correlated with the initial poverty status to accurately estimate total time spent in poverty. Estimation results are then used to simulate different indicators of child poverty experience. These simulation exercises provide upper and lower bounds for the impact of different observable as well as unobservable characteristics on child poverty.

In general, our results confirm the main findings of papers focusing on adults. Family composition and labour market status are among the main factors impinging upon the level and the duration of child poverty. In addition, the level of education of the household head exhibits a significant effect, which is independent on its impact on labour market status. Furthermore, we find that a large part of heterogeneity is attributable to unobservable factors which make some people likely to exit poverty slowly, make others (or the same) likely to exit non-poverty fast, or augment the propensity of being born into poverty initially. Some 2% of West German children are born into families in which unfavourable unobservables result in a high probability to experience long poverty spells and short periods in non-poverty.

Simulation results show that typical children born into a two adult household, in which the head is working full-time, experience on average less than half a year of poverty during childhood (if household composition and labour market status remain unchanged). By contrast, children born into a single parent household, in which the head is not working full-time, spend almost 5 out of 18 years in poverty. These differences in average years of poverty are reinforced considerably, if unfavourable observable and unfavourable unobservable characteristics coincide. For instance, a child in a non-working single parent household on average experiences 16.5 years of poverty, if it belongs to those 2% of the population with very unfavourable unobservable characteristics. Almost 50% of these children will be poor during their entire childhood. By contrast, 90% of those children born into two parent working households endowed with positive unobservable characteristics will experience not a single year of poverty. Overall, results are very similar for the West German sample using data for 1984-2004 and the sample for reunified Germany for 1992-2004. However, unobservable factors seem to be even more important in the second sample.

Table 8: Simulation Results for Reunified Germany 1992-2004 – Comparison between Children of Native and Ethnic Germans

Type	Unconditional		Conditional on initially poor			Conditional on initially non-poor		
	Initially poor (%)	Average number of years poor	Average number of years poor	5+ years poor (%)	10+ years poor (%)	Average number of years poor	5+ years poor (%)	10+ years poor (%)
Conditional on latent class								
Couple, working, native German, (π2)	0	0.22	1.78	1.88	0	0.22	0.04	0
Couple, working, Ethnic German, (π2)	0	0.83	2.72	13.70	0.19	0.83	2.87	0.02
Couple, not working, native German, (π2)	0	0.46	2.31	7.23	0.04	0.46	0.90	0
Couple, not working, Ethnic German, (π2)	0.25	1.61	3.81	31.91	1.90	1.60	10.44	0.33
Couple, working, native German, (π6)	2.01	0.25						
Couple, working, Ethnic German, (π6)	46.91	1.72						
Couple, not working, native German, (π6)	33.08	1.07	same as for π2					
Couple, not working, Ethnic German, (π6)	94.02	3.68						
Couple, working, native German, (π8)		1.83	3.23	22.48	0.26	1.80	8.32	0.04
Couple, working, Ethnic German, (π8)	same as for	4.96	5.73	66.37	7.49	4.28	44.88	2.39
Couple, not working, native German, (π8)	π6	3.55	4.61	48.07	2.68	3.03	25.29	0.59
Couple, not working, Ethnic German, (π8)		7.67	7.76	87.39	27.75	6.27	72.75	13.02

Note: Simulations based on 100,000 replications. Baseline characteristics not subject to systematic variation are: West Germany, age of household head 31-40, 13 years of education, baseline categories for education of parents of household head, after 1996. For Ethnic Germans the years since migration dummy is set to zero for the first 9 years and to one for years 10 to 18.

Comparing children from different migrant groups, we find that migration status generally has no significant influence on the average number of years in poverty during childhood, except for Ethnic Germans. Children in these families, who generally came from East-European countries during the 1990s, experience double the number of years poor during childhood than otherwise comparable children of native Germans. Children of first- or second-generation foreign immigrants, however, have a very similar experience of poverty to children of native Germans.

Furthermore, our results clearly confirm that the labour market status (of the parents) is one of the main factors influencing child poverty. Children in full-time working households display a significantly lower likelihood to be born into poverty, remain in poverty for shorter time, and are significantly less likely to exit non-poverty. Thus, policy interventions aiming at an increased labour market participation of adults with children have the potential to generate a positive effect on the (financial) well-being of children and, thus, to reduce child poverty. However, since unobserved characteristics play a substantial role and are difficult to assess due to their very nature, it is anything but trivial to target such interventions accurately. Hence, the effect of interventions aiming at a higher labour market participation of parents by e.g. better childcare facilities is difficult to assess *a priori*. Depending on the unobservable characteristics of respondents to such an intervention, it might not unfold the expected significant impact on child poverty. For instance, if better childcare facilities are mainly used by couple households with favourable unobservable characteristics, the average number of years spent in poverty by their children is reduced on average by merely 0.3 years. Hence, it seems recommendable that such an intervention should focus on single parents and eligibility should be pegged to some form of parental contribution so that single parents are able to signal their endowment with favourable unobservable characteristics and have higher chances to utilize such facilities.

Finally, we demonstrate that neglecting initial conditions leads to misleading conclusions on the distribution of latent classes and biased simulation results for the number of years in child poverty if we condition on latent class or initial poverty status. Simulation results that do not condition on latent class and initial poverty status, however, are quite close to those of the baseline model. Inclusion of individuals who start with left-censored spells leads to simulation results that predict more years in poverty than those of the model using only children observed from birth on, at least for some groups.

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Appendix

Table A.1: Variable Description

Variable	Description
Information used in all equations	
Single parent	1 if only one adult present in the household, 0 otherwise.
Age categories	
Age ≤ 25	1 if age of household head is below 26, 0 otherwise.
Age 26-30	1 if age of household head between 26 and 30, 0 otherwise.
Age 31-40	1 if age of household head between 31 and 40, 0 otherwise.
Age > 40 (omitted category)	1 if age of household head is above 40, 0 otherwise.
Full-time working	1 if household head is working full-time, 0 if not working or working part-time.
Years of education	Years of education of household head.
Population groups	
Native German (omitted category)	1 if household head has German citizenship, was born in Germany or immigrated before 1984, 0 otherwise.
1st gen. foreigner	1 if household head has no German citizenship and was born abroad, 0 otherwise.
2nd gen. foreigner	1 if household head has no German citizenship but was born in Germany, 0 otherwise.
Ethnic German	1 if household head has German citizenship, was not born in Germany and immigrated after 1984, 0 otherwise.
Years since migration ≥ 10	1 if household head migrated to Germany at least 10 years before, 0 otherwise.
East Germany	1 if household lives in East Germany, 0 otherwise.
Further information used in initial poverty equation only *(coefficients not reported in the tables)*	
Education of the child's grandfather and grandmother	
Grandfather/-mother no degree	1 if father/mother of the household head has no degree or did not attend school, 0 otherwise.
Grandfather/-mother lower secondary (omitted category)	1 if father/mother of the household head holds a lower secondary degree, 0 otherwise.
Grandfather/-mother intermediate secondary	1 if father/mother of the household head holds an intermediate secondary degree, 0 otherwise.
Grandfather/-mother upper secondary	1 if father/mother of the household head holds an upper secondary degree, 0 otherwise.
Grandfather/-mother other	1 if father/mother of the household head holds another degree, 0 otherwise.
Grandfather/-mother missing	1 if information on education of the father/mother of the household head is missing, 0 otherwise.
Period dummies	
Period 1983-1989	1 if first spell refers to years 1983-1989, 0 otherwise.
Period 1990-1996	1 if first spell refers to years 1990-1996, 0 otherwise.
Period 1997-2003 (omitted category)	1 if first spell refers to years 1997-2003, 0 otherwise.

Table A.2: Survival Rates (West Germany)

	West Germany 1984-2004					
	Poverty spells			Non-poverty spells		
Duration of spell	Native Germans	1st generation immigrants	2nd generation immigrants	Native Germans	1st generation immigrants	2nd generation immigrants
1	39.88	37.59	42.55	94.33	90.29	82.79
2	20.57	19.02	19.86	90.60	83.48	73.70
3	10.44	10.01	11.35	87.55	77.64	66.79
4	5.57	7.06		84.91	75.57	62.24
5	4.37	0.59		83.26	72.56	58.96
6	2.19	0.59		81.51	69.98	51.10
7	1.75			80.39	69.08	44.29
8	1.31			78.77	67.32	44.29
9	0.66			77.65	65.88	44.29
10	0.66			76.49	63.92	44.29
11	0.66			75.03	63.16	44.29
12				74.57	62.26	
13				73.66	62.26	
14				72.56	61.01	
15				72.03	61.01	
16				71.68	57.62	
17				69.73	57.62	

Note: Table provides survival rates in (non-)poverty for population groups. Estimates based on those children born in sample.

Table A.3: Survival Rates (Reunified Germany)

	Reunified Germany 1992-2004							
	Poverty spells				Non-Poverty spells			
Duration of spell	Native Germans	1st gen. immigr.	2nd gen. immigr.	Ethnic Germans	Native Germans	1st gen. immigr.	2nd gen. immigr.	Ethnic Germans
1	42.82	43.75	35.71	39.39	93.80	91.08	89.52	93.91
2	22.65	21.88	14.29	23.64	90.17	84.97	80.82	88.45
3	12.46	10.94	7.14	11.82	86.60	76.22	75.05	87.03
4	9.79	6.25		0.00	83.20	75.31	71.10	81.22
5	9.79	0.00			81.91	73.82	66.79	81.22
6	9.79				80.60	72.59	58.44	81.22
7	7.34				79.79	71.09	53.57	75.42
8	7.34				78.51	71.09	53.57	67.04
9					78.51	67.41	53.57	67.04
10					77.31	64.04	53.57	67.04
11					76.01	64.04		
12					72.71	64.04		

Note: Table provides survival rates in (non-)poverty for population groups. Estimates based on those children born in sample.

Table A.4: Poverty History of Households before Childbirth

	West German sample (for children born after 1994)					
	Children born into poverty (74 overall)			Children born into non-poverty (906 overall)		
Years before birth	**Household entered into poverty**	**Household already in poverty before**	**left-censored**	**Household entered into non-poverty**	**Household already in non-poverty before**	**left-censored**
In the year of birth	15	30	29	20	492	394
1 year before birth	4	17	9	28	431	33
2	6	9	2	16	360	55
3	4	2	3	16	253	91
4	1	1	0	9	194	50
5	0	1	0	9	146	39
6	0	1	0	11	109	26
7	0	1	0	6	85	18
8	0	1	0	8	63	14
9	1	0	0	7	42	14

Note: Table indicates the number of households that either entered (non-)poverty or were already in (non-)poverty at a given time before the child was born. 'Left-censored' includes those households where no information on income is available before a certain point in time.

Table A.5: Simulation Results for Change in Years of Education from 13 to 10; West Germany 1984-2004

Type	West Germany 1984-2004											
	Unconditional on initial poverty status						Conditional on initially poor			Conditional on initially non-poor		
	Initially poor (%)	Average number of years poor	0 years poor (%)	5+ years poor (%)	10+ years poor (%)	18 years poor (%)	Average number of years poor	5+ years poor (%)	10+ years poor (%)	Average number of years poor	5+ years poor (%)	10+ years poor (%)
Conditional on latent class												
Couple, working, (π2)	0.30	0.24	83.27	0.08	0	0	1.52	0.86	0	0.23	0.08	0
Couple, not working, (π2)	4.36	0.78	60.56	1.79	0.02	0	2.26	7.99	0.08	0.71	1.51	0.01
Single, working, (π2)	12.66	2.03	28.71	12.08	0.29	0	3.44	26.86	0.94	1.82	9.96	0.18
Single, not working, (π2)	46.64	5.09	5.58	53.99	8.97	0	6.09	67.14	13.51	4.22	42.68	4.90
Couple, working, (π4)		1.99	19.50	7.89	0.01	0	3.15	19.84	0.08	1.99	7.85	0.02
Couple, not working, (π4)	same as for	4.08	4.17	40.61	1.20	0	5.26	60.98	3.51	4.02	39.67	1.08
Single, working, (π4)	π2	6.60	0.26	81.68	10.45	0	7.58	91.05	20.24	6.47	80.34	9.10
Single, not working, (π4)		9.92	0.01	96.74	59.11	0	10.52	99.47	69.20	9.40	98.08	50.03
Couple, working, (π6)	15.07	0.42	70.96	0.19	0	0						
Couple, not working, (π6)	51.20	1.50	30.87	2.14	0.04	0						
Single, working, (π6)	72.48	3.00	8.97	22.20	0.74	0			same as for π2			
Single, not working, (π6)	95.33	6.00	0.51	65.97	13.09	0.01						
Couple, working, (π7)		6.21	16.65	57.24	21.09	0.81	9.58	82.54	49.24	5.64	52.85	22.35
Couple, not working, (π7)	same as for	12.23	2.08	91.43	73.14	13.82	14.06	97.12	84.90	10.28	85.30	60.47
Single, working, (π7)	π6	15.23	0.07	99.24	94.09	28.96	15.94	99.74	96.68	13.37	98.02	87.38
Single, not working, (π7)		17.28	0	99.99	99.75	67.47	17.37	99.99	99.81	15.44	99.89	98.41

Note: Simulations based on 100,000 replications. Baseline characteristics not subject to systematic variation are: German, age of household head 31-40, **10 years of education**, baseline categories for education of parents of household head, before 1990.