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Early Childhood Education Activities and Care Arrangements of Disadvantaged Children in Germany

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Abstract We examine how children aged zero to 6 years with migration background and those who live with lone parents, or on low income or social assistance differ from other less disadvantaged groups in their use of formal ECEC services and non-formal education activities. Previous studies have shown that attendance rates are lower for children in some of these groups, who might benefit disproportionately from high-quality ECEC services. We contribute to this literature by providing a more differentiated analysis separately for children of different ages in East and West Germany, respectively. Furthermore, we examine to what extent supply and demand side explanations may account for the observed disparities in ECEC attendance between disadvantaged groups and other children. We also draw on reasons given by mothers for their under 3 year old children's non-attendance of ECEC institutions. The empirical analysis is based on the 2010 wave of the German Socio-Economic Panel (SOEP) and the Families in Germany Study (FID). The results suggest substantially lower attendance rates of formal and non-formal education activities among children under three with migration background and for those from low income families. For children over three, social disparities in formal ECEC attendance are rather small, whereas they remain considerable in non-formal education participation for children of lone parents in East Germany and for children of low income or social assistance receiving families in West Germany.

Keywords Child care · Early childhood education · Social inequalities · Germany

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1 Introduction

Early Childhood Education Activities and Care have received increasing attention in recent years. It has been acknowledged that the provision of good Early Childhood Education and Care (ECEC) services can be of major importance for child development. Furthermore, so-called non-formal education activities outside the home, such as sports or music classes, are also assumed to promote child development.[1] They might compensate for formal activities in ECEC services or have an additional effect.

A large international literature has explored the consequences of ECEC attendance for the cognitive and socio-emotional development of children. The effects have been shown to vary by a number of dimensions, such as starting age, hours per week spent in the ECEC setting, type of non-parental care and, most importantly, ECEC quality (for summaries, see e.g., Bradley and Vandell 2007; Camilli et al. 2010; Peisner-Feinberg et al. 2001). In particular, intervention programs, which combined high ECEC quality with parental involvement (mainly model early childhood programs with randomized design) and target disadvantaged children, show large effects in the short, medium and long run. Cost-benefit analyses show that such programs are particularly efficient from a life course perspective (Heckman et al. 2010; Karoly 2012). Studies which focus on the effects of large-scale public early childhood programs however show mixed results (for summaries, see e.g., Barnett 2011; Blau and Currie 2006; Heckman 2006), even in respect to the size of the quality effects. For children from disadvantaged families in terms of parental education, income, or migration background, some studies find compensating effects of ECEC attendance (and ECEC quality) (for international and US reviews see e.g., Anderson et al. 2003; Burger 2010; Gorey 2001). Others report similar associations across socio-economic groups or suggest that children require a minimum level of support from the home environment to benefit from ECEC services (e.g., Anders et al. 2012a, b; NICHD Early Child Care Research Network 2002; Vandell et al. 2010). Moreover, the results differ by outcomes. Studies generally show greater positive effects of ECEC services on cognitive skills than on socio-emotional behavior of children (Loeb et al. 2007).

ECEC services also make it easier for parents, in particular mothers, to combine family care and formal employment. A larger family income may positively impact children's well-being directly in respect to material well-being or indirectly via parental well-being. Again these effects are likely to be stronger for children from low income families

There is not much empirical evidence regarding the benefits of other out-of-home education activities. Nevertheless it is assumed that children benefit from such activities, if they are of high quality; this might be particular true for children from disadvantaged families who experience fewer education activities at home.

Given these potential benefits of early childhood education activities and care, in particular for disadvantaged children, we investigate if and to which extent formal and non-formal services are used by these groups of children in Germany. If particular groups are underrepresented, this raises questions with respect to possible

[1] For the purpose of our analysis, we define ECEC activities as consisting of formal ECEC services, and of non-formal education activities, which cover other activities outside the family, such as the attendance of play groups or regular music or sport activities.

reasons for these differences. We attempt to answer these questions of socio-economic differences of ECEC attendance using representative micro data for Germany. Following definitions of disadvantage which are common in the socio-economic literature,[2] we concentrate on four groups of children: (1) children who live with a lone parent, (2) children who live in a low income household, (3) children in households living on social assistance,[3] and (4) children with migration background. For the first three groups, ECEC services are of particular importance to facilitate parents' employment or job search. ECEC services help to reduce the risk of poverty for these families. For children with migration background, ECEC services can be of particular importance for language reasons. Moreover, quite often these groups of families are low income households as well. Furthermore, high-quality formal and non-formal educational activities might stimulate the cognitive development of disadvantaged children in particular. They may compensate for potential deficits of a less optimal home learning environment.[4]

From an international perspective, it is important to realize that the answers to our research questions very much depend on the country-specific ECEC policy package. In liberal market-oriented countries, such as the US and Great Britain, publicly funded ECEC-services are designed to specifically serve disadvantaged groups - the US American Head Start Program is one prominent example for this (e.g. U.S. Department of Health and Human Services 2010). By contrast, continental European countries, such as Germany, are well known for their universal ECEC systems at least for children 3 years and older—in general there are no targeted programs. In this context, we will focus on the following questions: Are disadvantaged children as likely to attend universal ECEC services as other children, and if yes, do they use them to the same extent as non-disadvantaged groups? Moreover, do disadvantaged children participate in non-formal educational activities less or more often than other children?

2 Specific ECEC Regulations in Germany

Although Germany is well known for its universal ECEC approach, the following section provides some background information for a better understanding of attendance patterns.[5] Since 1996, each child 3 years and over has been entitled to a slot in a German day-care center ('*Kindertageseinrichtung*') for at least 4 h a day. To-date, the majority of children at the age of three attend a day-care center. At the age of three, this includes 87 % in West Germany and 95 % in East Germany. At older ages the percentages are close to 100 % (Bertelsmann Stiftung 2012). Nevertheless there are significant regional differences in respect to the daily hours spent in care: day-care centers in the southern states

[2] Disadvantaged is a relative term. Usually it has been indexed by family circumstances, child characteristics, or a combination of both. Moreover, the term is often used in the same sense as the terms 'children at risk' or 'children with special needs'. Following the socioeconomic literature, we focus on family circumstances rather than individual characteristics of the child in a narrow sense (e.g., OECD 2001, 2006).

[3] They are a particularly disadvantaged subgroup among low income families.

[4] For the importance of a good home learning environment, see e.g. Bradley (2002). Melhuish et al. (2008) argue that the provision of good quality ECEC services form 3 years of age are likely to produce further benefits, particularly when such services work closely with parents..

[5] For a more detailed description of the German system, see for instance, Spiess (2008).

mostly provide part-time care, while formal ECEC institutions in East Germany and in the larger cities in West Germany mostly provide full-time care (Hüsken 2011). Children below the age of three are not entitled to a day-care slot. However, since 2005 a first federal law ('Tagesbetreuungsausbaugesetz', Deutscher Bundestag 2004) and a second one in 2008 ('Kinderförderungsgesetz', Deutscher Bundestag 2008) have stipulated that at a minimum, children under the age of three be offered the chance to enroll in day-care programs if a lone parent or both parents are employed or in education or want to take up employment or if no other support program promoting the child's welfare is available. Overall, there are huge regional differences in the supply of day-care slots for children under the age of three between East and West Germany and even within these two regions (Statistisches Bundesamt 2011). This is due to variations in the financial situations of counties and municipalities and to the political priority given to ECEC provision. It is important to note that some states and municipalities have special regulations, which grant prioritized access to a day-care place for children with lone parents or those who do not speak German at home (for more details see e.g. Spieß et al. 2008).[6] .

From an economic perspective, one may distinguish demand and supply side reasons for why attendance rates may differ between groups. One reason on the demand side is simply differences in parents' preferences. If preferences were important drivers, an extension of ECEC services in their current form would not increase attendance rates. On the supply side, too high costs of ECEC services may be an obstacle to attendance. In particular for low-income households, fees for childcare facilities could—in principle- pose a prohibitively high financial burden (see e.g. Wrohlich 2006).[7] However, in almost all states, income-dependent parents' fees are the norm. In cases of hardship, the fees are often waived or paid by other public agencies. Furthermore, the fees in Germany are relatively low by international comparison (Immervoll and Barber 2005).

Another reason might be that there is parental demand but insufficient supply; in this case parents are 'rationed'. This might be due to a general lack of slots, or it might be specific for particular groups, which are not prioritized in a region with limited slots. Alternatively, specific aspects of the supply might not match parental demands, such as opening hours. Moreover, economic theory suggests that providers may engage in indirect or direct discrimination by prioritizing children from higher income families over the disadvantaged groups. Such behavior is more likely in a situation of excess demand, since then the providers rather than the families make the selection. But since German day-care centers are highly subsidized, this kind of discrimination is unlikely to serve as (the sole) explanation. If supply side reasons dominate, an extension of ECEC services in general or for particular groups would increase the attendance rates of children, whose parents actually have a demand for ECEC services.

In general, similar supply and demand side considerations apply to differences in the attendance of other non-formal educational activities. Either parents have weaker preferences for using such services or there is insufficient supply. However, it is

[6] The following considerations are based on an analysis of the state laws regulating day-care centers and family-based day-care.

[7] Past studies have also shown that the relative burden created by parents' contributions is higher for households in the lower income ranges than for households in the upper income range (see Kreyenfeld et al. 2007).

important to note that the supply side of the non-formal education activities is not as tightly regulated and not all services are state-subsidized. The providers of these services range from public providers, non-profit organizations to private for-profit companies (Deutscher Bundestag 2005). On the demand side, there are also important differences compared to formal ECEC attendance. Parents usually attend non-formal education activities together with their children—at least if their child is very young. Therefore they do not provide care for children while parents are at work. On the contrary, longer parental, and in particular, maternal employment hours are likely to negatively impact on the demand for non-formal education activities because full-time employed mothers have less regular time available. In terms of educational preferences, parents may regard non-formal education activities and formal ECEC services as substitutes or complements.

3 Previous Studies for Germany

An increasing number of empirical studies have explored variations in day-care attendance of young children in Germany with different foci, such as female labor force participation or child outcomes. In summarizing previous research for Germany, we concentrate on empirical studies which use representative data sets, apply multivariate analyses and provide some information on disadvantaged groups.[8] A number of empirical studies have been conducted based on the Socio-Economic Panel (SOEP) (see e.g. Büchner and Spieß 2007; Fuchs-Rechlin 2008; Kreyenfeld and Krapf 2010; Wrohlich 2006), the Microcensus (see e.g. Fuchs 2006; Kreyenfeld 2007) and Survey Data of the German Youth Institute (see e.g. Fuchs and Peukert 2006; Geier and Riedel 2008; Lang 2006). These studies investigate attendance of ECEC services and deal either explicitly or implicitly with some groups of disadvantaged children—only some of them also distinguish between different age groups of children. It is noteworthy that limited research has been conducted to date focusing explicitly on the use of ECEC services by disadvantaged children in Germany. Moreover there is not much research on the reasons for not using it and only very few studies focus on other activities outside the home (see below). [9]

Existing studies display broadly similar results: With regard to *children under the age of three*, previous research finds that older children, those with a working mother, and children with more educated mothers are more likely to attend day-care than the respective reference group. Some studies also show that children with migration background are less likely to attend day-care and that children of lone parents are more often enrolled in ECEC services. *For the over-threes*, links have been demonstrated between attendance rates and the age of the child, the number of siblings, part-time employment, size of the municipality, and in some studies with household income as well.

[8] There are various studies analyzing the attendance of ECEC services for different socio-economic groups, but do not apply multivariate approaches. For a very recent example, based on EU-SILC data, see Wirth and Lichtenberg (2012) who show that the attendance of ECEC services in almost all EU countries is higher for children of employed mothers and higher educated mothers. Moreover, in all analyzed European states children living in poor households have lower attendance rates than others.

[9] For studies which focus on the attendance of ECEC services in other countries with a universal ECEC service approach, see for instance, Driessen (2004).

Geier and Riedel (2008) show in their analysis for children below the age of four that the relation of day-care attendance with income is statistically significant for two- and three-year old children but not for younger children. Their results show no significant lone parent and migration effect anymore, once they control for the employment status and educational qualifications of mothers. In respect to migration background, Fuchs and Peukert (2006) find the opposite. Krapf and Kreyenfeld (2010) also show for younger and older children that the employment status of the mothers significantly correlates with day-care attendance. Moreover, maternal education has a consistently strong effect: Children with more educated mothers are more likely to use ECEC services. They find that the influence of education even increased over the past few years. Furthermore their results show that children of mothers with non-German citizenship have a lower probability of attending ECEC services. Spieß et al. (2008) show that children from poorer households have a much lower probability of attending day-care than better-off children. In the Western states, this probability is reduced by more than 5%age points if the child lives in a poor (low-income) household.[10] In the East, this value is nearly as high as 10 percentage points. Children with migration background on both sides of the family are significantly less likely to attend day-care: this effect is very large with a 12 percentage point lower probability compared to children without migration background. Furthermore, children who have one or both parents with migration background have a significantly higher probability of full-day ECEC attendance.

The take-up of non-formal educational activities has been analyzed on the basis of the SOEP data by Spieß and Mühler (2008) and Schmiade and Spieß (2010). They find that children from more educated mothers and from higher income households are more likely to participate in these activities. For younger children, mothers who are not working for pay are more likely to enroll their children in these activities. In respect to disadvantaged children, these studies report that children with migration background are significantly less likely to use these services. Furthermore, older children from households on social assistance have a significant lower probability of attending such activities.

With the exception of a few scholars (e.g. Kreyenfeld and Krapf 2010) previous studies did not differentiate between East and West Germany. Given the different political history in terms of day-care provision, this is potentially problematic for questions of children's ECEC attendance. Before the German reunification in 1990, West German family, tax and labor market policies favored male breadwinner/female carer families. By contrast, family policies in the German Democratic Republic encouraged a relatively fast and full-time return to the labor market for mothers by providing maternity leave and publicly available day-care centers for young children (for a detailed discussion of East und West German policies between 1949 and 1990 see Cooke 2007; Rosenfeld et al. 2004). Given the greater supply and the widespread acceptance of using ECEC services for children under 3 years, there may be smaller differences in the attendance rates between children living in disadvantaged households and other families in East than in West Germany.

Although several previous studies control for other relevant demand or supply side influences on ECEC attendance in their multivariate analyses, they made no attempt at

[10] Similar results apply if poverty is measured by a concept of deprivation.

disentangling which of these factors account for the lower likelihood of ECEC participation noted among disadvantaged groups. We extend this literature by differentiating between groups of explanations which may account for some of these disadvantages. For children under 3 years who do not attend formal ECEC institutions, we also examine to what extent mothers point to different reasons on the demand or supply side as underlying their children's non-attendance. Similar descriptive analyses of reasons given by mothers have been previously presented only for non-attendance of children aged 3 years to school-age (Geier and Riedel 2008). Given that attendance rates are much lower and differences between disadvantaged and other children larger among the younger age groups, subjective evaluations of mothers provide important evidence which complements our stepwise regression analysis.

4 Data and Methods

Our empirical analysis is based on data from the German Socio-Economic Panel Study (SOEP) and the 'Familien in Deutschland'-Study (FiD). The SOEP is a representative annual household panel study which started in 1984. The most recent wave covers about 20,000 respondents from 11,000 households.[11] We use the SOEP wave from the year 2010 jointly with the FiD wave 2010.[12] FiD is a dataset where especially families with young children and those with special needs (low income, lone parents, and large families) are surveyed. The FiD data cover information from about 4,500 households with a total of about 7,800 respondents. The structure and the content of these two data sets are very similar and mostly identical, so that they can be analyzed jointly using specific weighting factors. The advantage of using these two data sets together is that this allows a large enough sample size for the purpose of our analysis. Nevertheless, some questions are FiD specific, in particular questions relating to the reasons for not using day-care. In this case, our analysis refers to the FiD data only.

First we use cross tables to explore differences in formal and non-formal ECEC participation between the four disadvantaged groups and children who fall into none of these groups. We also report cross tables for the percentages of mothers who agree with different reasons for not using formal ECEC services for their under 3 year olds. For older children and for children in East Germany, the sample of children who did not attend formal ECEC institutions was too small to permit analyzing these subjective reasons from the mother's point of view. Across all analyses, we differentiate between children under 3 years and those who are aged three to school-age. Children usually start primary school at the age of six in Germany. The regression analyses are carried out separately for East and West Germany. The differentiation into these two age groups and between the two regions is important due to the much higher levels of provision of formal ECEC services for children from the age of three across Germany and in the East German states.

In a second step, we apply stepwise multivariate regression models. We apply logit models for the binary dependent variables of whether children attend formal ECEC institutions and non-formal education classes, respectively. The extent of formal

[11] For more information about the SOEP, see Wagner et al. (2007).
[12] For more details, see http://www.bildungspaket.bmas.de/ Download: August 2012.

ECEC attendance among children aged three to school-age is differentiated in not attending, half-day, and full-day attendance. The three attendance patterns are analyzed using multinomial logistic regression models. These models are based on the assumption of independence of irrelevant alternatives. We assume the choice between the three options i) using no ECEC institutions, ii) half-day use, or iii) full-day use to be different enough that the odds between each pair of options are largely unaffected by adding the third option. Tests using binary logistic models for each combination of the three categories did not provide qualitatively different results. For all regression models, we calculate robust standard errors which adjust for clustering of children within families and youth welfare office districts.

In the baseline model, we include only four variables describing whether children live in a lone parent family, if the parents have migration background or if the child lives in a low income household or in a social assistance receiving family, respectively. The second step includes the educational level of the mother to test whether differences between population groups are driven by the mothers' educational aspirations for their children and knowledge about benefits of ECEC attendance for child development. In a third modeling step, we include indicators of family composition to examine the role of children's age and siblings in the models of formal day-care use. Furthermore, we control for maternal employment and household income to assess the importance of mothers' time availability and financial constraints of the household, which are closely interrelated. It should be noted that low income or social assistance receipt may be closely related to a young age of the child and maternal non-employment. We have tested for multicollinearity between the indicators for children's age, maternal employment, household income, and social assistance receipt in all the models. The variance inflation factor suggested some correlation between these variables but never exceeded a value of 3. As usually thresholds of 4 or 5 are used (Schroeder 1990), multicollinearity does not seem to be an issue. Finally, by including regional indicators of formal ECEC provision for the respective age group, the female unemployment and the geographical distance to a grandmother, we examine whether the differences in the availability of ECEC services, labor market conditions, and informal help account for differential take-up rates across groups.

For children aged under three, we run separate models for employed and non-employed mothers, as the labor market participation of the lone parent or both parents has been one criterion for being able to apply for a subsidized place. For children's attendance of non-formal education and care activities, the third model adds the extent to which they use formal ECEC services to examine the importance of their own time availability and to what extent formal and non-formal ECEC services are treated as substitutes or complements by families. We also ran separate logit models for whether the mother agreed with one of ten different possible reasons for their child's ECEC non-attendance including control variables. The results for four frequently occurring reasons which showed some significant group differences are shown in Table 8 in the Appendix (the results for the other reasons are available from the authors on request).

To be able to compare the size of coefficients across different same-sample nested logit models, we apply the 'khb method' to the coefficients describing the four disadvantaged groups. This corrects for the effects of rescaling in different model specifications and allows us to separate the effects of confounding from rescaling (Karlson et al. 2012).

Sample Selection and Non-Response The sample includes all children aged up to 7 years who do not yet attend primary school at the time of the interview in 2010. We observe 4,903 and 1,081 children in West and East Germany, respectively. We apply cross-sectional probability weights which combine design and non-response weights to account for overrepresentation of lone parent and low income families in the FID data and for differential non-response. Parents of 17 and 15 % of children in West and East Germany, respectively, have some missing responses for one or more of the dependent and independent variables. The variables with the largest number of missing responses concern receipt of social assistance and geographical distance to grandparents. For all other variables, the number of missing observations is very small. We therefore used multiple imputations with logit models to impute the missing observations for these two variables and reran all the models with the imputed variables. Multiple imputation methods assume missingness at random (Rubin 1987; Schafer 1997). This is reasonable for both variables. In addition to the other variables used in the analysis, we include further information on the fathers' employment and household composition to impute social assistance receipt. The grandmother proximity information is largely missing because it has not been asked in the 2010 wave and had to be taken from other waves of the data sets. Therefore sample characteristics and predictors of wave non-response such as health status, interviewer change and home ownership were added to the imputation model. The results based on the imputed models did not vary substantively from the non-imputed results. As marginal effects cannot easily be computed based on multiply imputed logit regressions, we display the marginal effects of the results based on the original data with dummy variables for missings in grandmother proximity and social assistance receipt. The sample with complete information consists of 4,245 and 980 children living in West and East Germany, respectively.

Operationalization of Dependent and Independent Variables For children under 3 years, attendance of formal ECEC services is measured using a binary variable which indicates whether or not the child attends either a day-care center or family day-care. The small proportion of children in this age group who attend ECEC services full-time in West Germany prevented further differentiation by the length of time spent in care. Table 7 shows that 22 and 44 % of under 3 year olds attend formal ECEC services in West and East Germany, respectively. In the FID survey, mothers whose child did not attend formal ECEC institutions were asked to indicate their agreement or disagreement with a list of 10 possible reasons. This was measured on a 4-point Likert scale ranging from strong agreement to strong disagreement. We constructed a binary measure of whether mothers either agreed or agreed strongly with each respective statement. As can be seen from Table 2, between 60 and 80 % of mothers agreed that the child was still too young, that they wanted to raise the child by themselves, and that they were currently staying home anyway. About 20 % of mothers pointed to high costs, insufficient availability, and that the child should spend time with his or her siblings as being important reasons. Few mothers agreed with the other reasons such as the long distance, unsuitable opening hours, or time-consuming transport.

For children aged three to school age, we differentiate between not attending any ECEC institution, half-day and full-day attendance, respectively. Half-day attendance is defined as up to 5 h per weekday, whereas full-day care refers to more than 5 h.

Family day-care is mainly provided for and used by children under 3 years of age. At age three, children usually switch to a day-care center if they have not attended it earlier already. For the small number of children who still attend family day-care afterwards, the data do not contain information on hours spent in this type of care. As further tests showed no difference in family day-care attendance patterns of children over three between population groups, these children are excluded from the analysis of day-care attendance. In West Germany, just over 90 % of children aged three or older attend formal day-care, with an about equal split between half-day and full-day care. In East Germany, 84 % of children attend full-day care compared to only 10 % who attend ECEC institutions for only half the day.

Participation in non-formal education and care activities is measured based on mothers' answers to four questions regarding whether the respective child attends parent-child groups or privately organized classes for music, sports, or painting activities. We created a binary variable indicating if the mother said yes to any of the four types of activities. 40 and 23 % of under 3 year olds in West Germany and East Germany, respectively, attend some non-formal educational activities. For children in the older age group, these percentages rise to about 60 and 50 %, respectively (see Table 1).

We focus on children growing up with a lone parent, those with migration background, and children in families living off low income or social assistance, respectively. Children are defined as falling into the first group when they are observed sharing the household only with the mother or the father, irrespective of marital status.[13] As shown in Table 7, 10 and 20 % of children in West and East Germany respectively, live with a lone parent.

Children with migration background are defined as those where all parents living in the same household are among the first or second generation of immigrants. We apply these rather narrow definitions, since in line with the literature, we found that children in household where both parents or the only parent have migration backgrounds display much larger differences in ECEC participation than children with one parent without migration background. 27 % of West German children live with parents with migration background. The percentage of children with migration background in East Germany is with below 5 % too small for reliable subgroup analyses.

Low income families are defined based on their net equivalence household income. The cut-off points are calculated based on the household's proximity to the poverty line as defined by 60 % of median income which is adapted to the family composition using the OECD equivalence scale. Two parent families with two or more children are classified as low income when their monthly net household income is below 2,500 Euros. The equivalent income cut-off points for two parent families with one child or for lone parents with one or more children are 2,000 and 1,500 Euros, respectively. This is a rather wide definition resulting in 30 and 46 % of families with young children being classified as having low income in West and East Germany, respectively. To differentiate socio-economic disadvantage further, we include a measure of whether both parents or the lone parent receive social assistance benefits ('*Arbeitslosengeld II*'). 10 and 22 % of families in West and East Germany, respectively, fall into this group.

[13] Children co-residing with a step-parent are not considered under this definition.

We consider mothers' educational level as an indicator for their educational aspirations for their children and their knowledge about the importance of early childhood education for later development. We differentiate between mothers who hold a college degree, those with some vocational qualifications and a third group with neither qualification. College education is the reference category in the regression models. Family composition may also influence the probability of a child attending ECEC institutions. Children's age and number of children is included, as older children are usually considered to benefit more from these services and ECEC participation becomes more expensive and difficult to organize in a larger family. We also control for whether the child has a younger sibling, as this may reduce maternal labor market participation and need for non-parental care and may make it more difficult to shuttle children to non-formal educational activities.

We consider maternal participation in education and employment to examine differences in maternal time availability, demand for child care, and eligibility to apply for a formal ECEC place for under 3 year olds. We differentiate between i) non-employed, ii) unemployed, iii) in education, iv) part-time employment, and v) full-time employment. Following the OECD definition, full-time employment is defined as working over 30 h per week. Furthermore parents' participation in education is controlled. The household's financial situation is captured by including the natural log of the imputed net household income. To capture differences in availability of informal help with child care, we include a binary variable whether the maternal or paternal grandmother lives within a one-hour ride from the family's home.[14] Availability and access to formal ECEC services is captured by a regional measure of the percentage of children in the respective age group who attend ECEC institutions at the youth office district level (Hüsken 2011). We also include a control variable for the unemployment rate at county level (Regionaldatenbank Deutschland 2012) as a measure of regional prosperity and necessity for mothers to contribute to the household income.

5 Results

Table 1 shows how many disadvantaged children attend early childhood activities and care in comparison to children from non-disadvantaged families. 25 % of children under 3 years from non-disadvantaged groups attend formal ECEC services in West Germany. Among the groups of disadvantaged children the percentage for children from lone parent families is almost the same. However, attendance rates of children with migration background and those from low income families are much lower at 14 and 13 %, respectively. Attendance rates are generally higher in East Germany, whereas the patterns

[14] We tested more nuanced differences in proximity and information on grandfathers but this variable showed the best fit with the data. As the question about proximity to relatives was not asked every year, we used answers from other survey years and assumed that the geographical distance had not changed substantially. Estimates should therefore be interpreted with some caution.

Table 1 Children's early childhood education activities and care participation in percent for each group (row percentages)

	Lone parent families	Parents have migration background	Low income families	Parents receive social assistance	All other families
Children under 3 years in West Germany					
Attend ECEC	27	14***	13***	15**	25
Non-formal education activities	22***	23***	23***	15***	51
N	220	691	835	249	1124
Children under 3 years in East Germany					
Attend ECEC	33**	s.s.	39***	21***	57
Non-formal education activities	11**	s.s.	19*	7**	22
N	83		280	94	194
Children aged three to school age in West Germany					
Attend ECEC part-time	28***	41**	42*	39*	51
Attend ECEC full-time	59***	51**	42	44	41
Non-formal education activities	51***	47***	43***	33***	73
N	282	516	218	225	912
Children aged three to school age in East Germany					
Attend ECEC part-time	9*	s.s.	9*	11+	17
Attend ECEC full-time	77	s.s.	88	81	82
Non-formal education activities	29***	s.s.	46**	33***	59
N	91		202	80	188

s.s. indicates small sample in respective cell. Percentages do not add up to 100 as children may fall into multiple groups. Significance tests refer to difference to 'all other families' and are based on Pearson Chi2

SOEP v.27 & FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

between groups are similar to West Germany. 57 % of the children from non-disadvantaged families attend ECEC services. Children from lone parents, low income families and those living off social assistance have significantly lower attendance rates.

The differences are even more pronounced in respect to the attendance of non-formal education. In particular in West Germany, a much larger percentage of non-disadvantaged children attend non-formal education activities compared to children from disadvantaged families. Every second child from non-disadvantaged families takes part in such an activity, while only 15 % of the children whose parents receive social assistance do so. For children 3 years and older, we differentiate between part-time and full-time attendance of ECEC services. For West Germany, Table 1 shows that in particular children from lone parent families and those with migration background use ECEC services more often full-time. By contrast, the group differences in full-time versus part-time ECEC attendance in East Germany are rather small. In respect to non-formal education, we observe lower attendance rates for all groups of disadvantaged children than for the others. Again this is particularly pronounced in West Germany.

Table 2 Percent of mothers in West Germany who agree with different reasons for not using formal ECEC institutions for children under 3 years (row percentages)

	Lone parent families	Parents have migration background	Low income families	Parents receive social assistance	All other families
Child too young	78	82	79	77	80
Want to raise child by myself	67*	66**	67*	68*	76
At home anyway and can take care	75	68*	74	75	74
Child should spend time with siblings	11*	26	22	16*	22
Costs are too high	24	26	25	21	22
No spots available	29***	22***	24***	31***	16
Distance too far	6	4	4	4	3
Opening hours not suitable	7	3*	5+	4	7
Transfers too time-consuming	4	4	4	4	4

Percentages do not add up to 100 as children may fall into multiple groups. Results for the reason 'child has chronic disease' are not shown due to the very small percentage of mothers who agreed. Significance tests refer to difference to 'all other families' and are based on Pearson Chi2

FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

As the majority of children under 3 years of age do not attend ECEC services in West Germany, we further investigate the reasons for this. Table 2 shows that the most common reason is the age of the child. Among all groups of children around 80 % of the mothers perceive the child as being too young for attending day-care. The second most frequently given reason is that mothers are at home anyway and can take care. This is the case for 76 % of the mothers of non-disadvantaged children—it is remarkable that only 68 % of mothers with migration background point to this reason. Moreover, mothers of disadvantaged children are more likely to claim that there was no day-care spot available than mothers of other families. About 30 % of lone parents and of parents receiving social assistance agree with this statement, while only 16 % of the mothers of other families give this as a reason for not using ECEC services. Thus, it seems that disadvantaged families feel subjectively more rationed than other families with children.

Table 3 summarizes the results of our *multivariate regression analysis* for formal ECEC attendance of children aged under three.[15] Significant differences between the disadvantaged groups and other families can be observed mostly among children whose mothers are in employment or education, in East and West Germany. The first model shows that children from employed lone mothers in West Germany have a 31 percentage point higher probability of attending ECEC services. This correlation stays significant over all models. Thus controlling for household income or availability of formal or informal help does not substantially change this result. Children

[15] Due to space constraints, only average marginal effects are displayed in Tables 3, 4, 5 and 6. Tables with raw coefficients are available from the first author on request.

with migration background have an 11 percentage point lower probability of attending ECEC services which becomes significant only after accounting for the family size, household income and for the fact that these children tend to live in municipalities with higher ECEC attendance rates. Children from low income families have an even lower probability of not attending ECEC services. Once we control for the household income, this correlation ceases to be significant and is captured completely in the correlation with income.[16]

Among non-employed mothers, only children with migration background have a 4 percentage point lower probability of attending formal ECEC services after all other factors are controlled. For the control variables, the models for employed and non-employed mothers show the expected correlations - the age of the child, number of children, mothers' full-time employment and local supply of ECEC services matter. Interestingly, household income is not significantly related to formal ECEC attendance among children with non-employed mothers. Grandparental proximity shows a significant negative association only among non-employed mothers.

In East Germany, children of working lone mothers are more likely to attend formal ECEC services in Models 1 and 2 but not after including further control variables in Model 3. The control variables, such as the child's age, number of children, maternal full-time employment, and the local ECEC attendance rate generally show similar patterns as in West Germany. Interestingly, household income is not a significant predictor of ECEC attendance among East German children. Grandmaternal proximity is positively rather than negatively associated with formal ECEC attendance, but only for working mothers.

Most of the differences in agreement with reasons for not using formal ECEC services between mothers in disadvantaged households lose their significance once control variables are included in the models (see Table 8 in the Appendix). Mothers with migration background are still less likely to say that they are staying home anyway. Not surprisingly, employed mothers are less likely to answer that their child does not attend an ECEC facility because they prefer to raise it themselves or are at home anyway to take care or want the child to spend time with siblings. The more children a mother has, the more likely she is to indicate that the child should spend time with siblings as a reason. Interestingly, the local ECEC attendance rate is negatively associated with mothers' preferences to raise their children themselves.

From age three onwards, the vast majority of children use ECEC institutions. Table 4 demonstrates for West Germany that disadvantaged children differ mainly in their attendance of full time versus part time care. Children from lone parents in West Germany are significantly more likely to attend day-care centers full-time than other children. The third model with control variables shows that the effect size is remarkable with a difference of 23 percentage points. Children with a migration background similarly have a 12 percentage point higher probability of attending day-care centers full-time. Children from low income families do not differ in the extent to which they attend ECEC services once the child is 3 years and over. For East Germany, there are

[16] The subsample of mothers in employment or education who receive social assistance is too small to be included as a separate variable in these models.

Table 3 Marginal effects of logistic models of ECEC attendance for children under 3 years in West and East Germany, by maternal employment status (standard errors in parentheses)

	West Germany						East Germany					
	Mother in employment or education			Non-employed mothers			Mother in employment or education			Non-employed mothers		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
Lone parent	0.31***	0.32***	0.33***	0.03	0.03	0.04	0.22+	0.24+	0.12	0.06	0.05	0.03
	(0.07)	(0.06)	(0.08)	(0.03)	(0.03)	(0.03)	(0.14)	(0.13)	(0.23)	(0.08)	(0.08)	(0.05)
Migration background	−0.09	−0.05	–0.11+	−0.02	−0.01	–0.04+						
	(0.08)	(0.09)	(0.06)	(0.02)	(0.02)	(0.02)						
Low income	–0.21**	–0.14+	0.03	−0.01	0.01	0.00	−0.16	−0.12	−0.14+	0.10	0.07	0.02
	(0.07)	(0.07)	(0.06)	(0.03)	(0.03)	(0.03)	(0.12)	(0.12)	(0.08)	(0.06)	(0.05)	(0.05)
Receiving social assistance				0.03	0.04	0.01				−0.04	−0.05	−0.02
				(0.04)	(0.04)	(0.03)				(0.07)	(0.07)	(0.04)
Mother low education		−0.28**	−0.04		−0.07+			−0.08	−0.09		0.14	−0.04
		(0.09)	(0.09)		(0.04)			(0.14)	(0.12)		(0.11)	(0.06)
Mother vocational qual.		−0.15*	−0.01		−0.07*	−0.03		−0.16	−0.12		0.10	0.02
		(0.07)	(0.06)		(0.03)	(0.02)		(0.13)	(0.08)		(0.06)	(0.06)
Age of child			0.27***			0.11***			0.23***			0.13***
			(0.03)			(0.01)			(0.04)			(0.02)
No. of children			−0.09***			−0.00			−0.15***			−0.01
			(0.02)			(0.01)			(0.03)			(0.01)
Mother works part-time			0.09						−0.18			
			(0.08)						(0.15)			
Mother works full-time			0.10*						0.13*			

Table 3 (continued)

	West Germany						East Germany					
	Mother in employment or education			Non-employed mothers			Mother in employment or education			Non-employed mothers		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
			(0.05)						(0.05)			
Mother unemployed						0.02						0.06
						(0.03)						(0.04)
Log net household income			0.26**			0.04			−0.09			0.04
			(0.08)			(0.04)			(0.14)			(0.06)
Grandmother lives within 1 h			−0.08			−0.07**			0.14*			−0.00
			(0.06)			(0.03)			(0.07)			(0.04)
Local ECEC attendance rate			0.00+			0.01***			0.01*			0.01*
			(0.00)			(0.00)			(0.01)			(0.00)
N	837	837	837	1,503	1,503	1,503	219	218	218	313	313	313
Pseudo R2	0.05	0.07	0.34	0.01	0.03	0.27	0.06	0.08	0.52	0.04	0.05	0.46

All models control for missing values of social assistance. Model 3 controls for the child's gender, younger siblings, local unemployment rate, and missing values for grandmother proximity. Coefficients of lone parent, migration background, low income and social assistance are adjusted using the khb method

SOEP v.27 & FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

Table 4 Marginal effects based on multinomial logistic models of ECEC attendance for children aged 3 to school-age in West Germany and East Germany (reference category: part-time attendance) (standard errors in parentheses)

	West Germany						East Germany					
	M1		M2		M3		M1		M2		M3	
	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time
Lone parent	0.03	0.24**	0.02	0.24***	0.05	0.23**	0.01	0.03	0.01	0.04	0.03	−0.04
	(0.05)	(0.07)	(0.05)	(0.07)	(0.04)	(0.07)	(0.02)	(0.06)	(0.02)	(0.06)	(0.03)	(0.05)
Migration background	−0.01	0.12*	−0.02	0.14*	−0.03	0.12*						
	(0.02)	(0.06)	(0.03)	(0.05)	(0.02)	(0.05)						
Low income family	0.04	−0.04	0.02	−0.02	−0.02	0.10	0.00	0.03	−0.00	0.05	0.03	0.01
	(0.03)	(0.05)	(0.03)	(0.05)	(0.05)	(0.07)	(0.03)	(0.07)	(0.03)	(0.07)	(0.03)	(0.05)
Social assistance	0.05	−0.14	0.04	−0.13	0.01	−0.05	0.03	−0.04	0.03	−0.02	−0.01	0.06
	(0.05)	(0.09)	(0.06)	(0.09)	(0.04)	(0.08)	(0.03)	(0.07)	(0.03)	(0.07)	(0.01)	(0.04)
Mother low education			0.11**	−0.14*	0.08*	−0.04			0.01	−0.13+	−0.00	−0.08
			(0.04)	(0.07)	(0.03)	(0.06)			(0.04)	(0.07)	(0.04)	(0.05)
Mother vocat. qual.			0.09**	−0.13**	0.06*	0.00			0.02	−0.06	−0.00	−0.01
			(0.03)	(0.05)	(0.03)	(0.05)			(0.03)	(0.08)	(0.03)	(0.05)
Age of child					−0.08***	0.06***					−0.02*	−0.00
					(0.01)	(0.02)					(0.01)	(0.02)
No. children					0.02*	−0.04*					0.03***	−0.06***
					(0.01)	(0.02)					(0.01)	(0.02)
Mother unemployed					−0.13***	0.20*					0.00	0.17*
					(0.03)	(0.09)					(0.05)	(0.08)
Mother in education					−0.12**	0.48***					−0.05	0.32***

Table 4 (continued)

	West Germany						East Germany					
	M1		M2		M3		M1		M2		M3	
	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time	no ECEC	full-time
					(0.04)	(0.09)					(0.04)	(0.07)
Mother part-time					−0.09*	0.19***					−0.02	0.22*
					(0.04)	(0.05)					(0.05)	(0.09)
Mother full-time					−0.09*	0.18**					−0.05	0.31***
					(0.04)	(0.06)					(0.04)	(0.08)
Log net household income					−0.05+	0.24***					−0.02	0.05
					(0.03)	(0.07)					(0.04)	(0.06)
Grandmother lives near					0.01	−0.13***					0.01	0.00
					(0.03)	(0.04)					(0.02)	(0.05)
Local ECEC attendance					−0.01**	0.01					−0.00	0.02+
					(0.00)	(0.01)					(0.00)	(0.01)
N	1,905	1,905	1,905	1,905	1,905	1,905	449	449	449	449	449	449
Pseudo R2	0.03	0.03	0.04	0.04	0.18	0.18	0.02	0.02	0.03	0.03	0.33	0.33

All models control for missing values of social assistance. Models 3 controls for the child's gender, younger siblings, the local unemployment rate and for missing values for grandmother proximity. Coefficients of lone parent, migration background, low income and social assistance are adjusted using the khb method

SOEP v.27 & FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

Table 5 Marginal effects of logistic models of attending non-formal education activities for children under 3 years in West Germany and East Germany (standard errors in parentheses)

	West Germany			East Germany		
	M1	M2	M3	M1	M2	M3
Lone parent	−0.06	−0.04	−0.11+	−0.01	−0.01	0.09
	(0.05)	(0.05)	(0.06)	(0.09)	(0.10)	(0.08)
Migration background	−0.23***	−0.16**	−0.17**			
	(0.06)	(0.06)	(0.06)			
Low income	−0.13**	−0.06	−0.05	−0.12*	−0.10	−0.11+
	(0.04)	(0.04)	(0.05)	(0.06)	(0.07)	(0.07)
Receiving social assistance	−0.17*	−0.09	0.02	−0.13	−0.12	−0.21*
	(0.07)	(0.08)	(0.07)	(0.10)	(0.10)	(0.08)
Mother low education		−0.34***	−0.30***		−0.06	−0.01
		(0.06)	(0.05)		(0.11)	(0.10)
Mother has vocational qualification		−0.14**	−0.11**		−0.09	−0.09
		(0.04)	(0.04)		(0.08)	(0.07)
Age of child			0.14***			0.11**
			(0.02)			(0.04)
No. of children			−0.10***			−0.13***
			(0.02)			(0.03)
Mother unemployed			−0.21+			−0.00
			(0.11)			(0.11)
Mother in education			−0.04			−0.04
			(0.08)			(0.17)
Mother part-time			0.05			−0.15
			(0.04)			(0.10)
Mother full-time			−0.03			0.01
			(0.05)			(0.08)
Log net household income			0.06			0.04
			(0.05)			(0.08)
Child attends formal ECEC			−0.10*			−0.11
			(0.05)			(0.07)
N	2,375	2,375	2,375	531	531	531
Pseudo R2	0.08	0.11	0.18	0.03	0.03	0.16

All models control for missing values of social assistance. Models 3 controls for the child's gender, younger siblings, and the local unemployment rate. Coefficients of lone parent, migration background, low income and social assistance are adjusted using the khb method

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

SOEP v.27 & FID v.2 2010, weighted

no significant differences for disadvantaged children in the probability of attending full-time versus part-time ECEC services. In both parts of Germany, the employment status of the mother, household income, family size and, only in West Germany, the

greater distance to a grandmother are most strongly associated with the use of full-time care. On the whole, accounting for maternal education in the second model specification reduces the observed group differences in formal ECEC attendance patterns in both age groups less than family composition, maternal employment and—only in West Germany - household income.

How do the groups of disadvantaged children differ from others in terms of their attendance of non-formal education activities? For children under 3 years in West Germany, Table 5 shows that in the first model all groups of disadvantaged families except lone parents are significantly less likely to attend such activities. However, once we control for the educational level of the mother, the correlation with respect to low income and social assistance receipt ceases to be significant. Children whose parents both have migration background and those with lone parents are still less likely to attend non-formal education activities by 17 and 11 percentage points, respectively. Even after including other controls, maternal education shows the strongest negative association with non-formal education activities followed by children's attendance of formal ECEC services. This suggests parents use such activities as substitutes for ECEC services for under 3 year olds.

For East German children under the age of three, low income and parental receipt of social assistance are negatively associated with the use of non-formal education activities in the first model. Even after controlling for other factors, these children have an 11 and 21 percentage point lower probability of attending such non-formal activities than non-disadvantaged children, respectively.

Table 6 summarizes the results for children aged 3 years and over. The first model shows a significantly lower probability of attending non-formal education activities for disadvantaged children with respect to migration background and income. Once we control for maternal education, these associations become weaker and less significant. After including all control variables including household income, only the correlation with low income remains significant. Children from low income families have a 13 percentage point lower probability of attending non-formal education activities. For East German children aged 3 years and over, only children of lone parents are less likely to attend non-formal care activities—this correlation stays significant over all models.

6 Discussion

Participation in early childhood education and care activities can be important for children's wellbeing—some evidence suggests that this is particularly true for disadvantaged children. Moreover ECEC services help families to combine work and family life, which is particularly crucial for lone mothers and low income families. Given these potential benefits, it is remarkable that even a universal child care system, such as the one in Germany, shows significantly different attendance patterns for various groups. This is known—but little attention has been paid to the large differences in this respect between West and East Germany and between children under three versus over 3 years of age. From our results, we conclude that in general children with *lone parents* are not underrepresented in German ECEC institutions. In

Table 6 Marginal effects of logistic model of attending non-formal education activities for children aged three to school-age in West Germany and East Germany (standard errors in parentheses)

	West Germany			East Germany		
	M1	M2	M3	M1	M2	M3
Lone parent	0.01	0.01	−0.01	−0.24+	−0.24+	−0.26*
	(0.07)	(0.07)	(0.07)	(0.12)	(0.12)	(0.13)
Migration background	−0.13**	−0.09+	−0.06			
	(0.05)	(0.05)	(0.04)			
Low income	−0.17***	−0.13**	−0.13*	−0.04	−0.03	−0.03
	(0.04)	(0.05)	(0.05)	(0.10)	(0.10)	(0.10)
Receiving social assistance	−0.22**	−0.16*	−0.12	−0.02	−0.00	−0.07
	(0.08)	(0.08)	(0.08)	(0.10)	(0.10)	(0.11)
Mother low education		−0.26***	−0.30***		−0.09	−0.11
		(0.07)	(0.06)		(0.17)	(0.13)
Mother vocat.qualification		−0.11*	−0.15**		−0.05	−0.13
		(0.06)	(0.06)		(0.11)	(0.10)
Age of child			0.08***			0.10***
			(0.02)			(0.03)
No. of children			−0.04+			−0.10**
			(0.02)			(0.04)
Mother unemployed			0.01			0.01
			(0.09)			(0.12)
Mother in education			0.29*			0.02
			(0.12)			(0.13)
Mother part-time			0.08			0.00
			(0.05)			(0.10)
Mother full-time			−0.05			−0.17+
			(0.05)			(0.09)
Log net household income			−0.00			0.07
			(0.07)			(0.12)
Child attends ECEC part-time			0.09			0.39
			(0.08)			(0.25)
Child attends ECEC full-time			−0.01			0.49+
			(0.08)			(0.26)
N	1,962	1,962	1,962	468	468	468
Pseudo R2	0.06	0.08	0.16	0.05	0.07	0.21

All models control for missing values of social assistance. Model 3 controls for child's gender, younger siblings, the local unemployment rate, and family day-care attendance. Coefficients of lone parent, migration background, low income and social assistance are adjusted using the khb method

SOEP v.27 & FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

West Germany, they are even overrepresented among the group of younger children. Although they are (over) represented in some regions, lone mothers are more likely to point to insufficient availability as a reason for not using formal ECEC services. Therefore, they are likely to benefit from the new '*Kinderförderungsgesetz'*, which entitles each child 1 year and older to a slot in a day-care center or family day-care from August 2013 (Deutscher Bundestag 2008).

In line with previous studies (Geier and Riedel 2008; Spieß et al. 2008), we find that *children aged under 3 years* with migration background are underrepresented in ECEC services in West Germany, irrespective of their mothers' employment status. . Given the potential benefits of good formal education in terms of language skills, an earlier entry might be suitable for these children. In contrast to Fuchs and Peukert (2006), we do not find a lower likelihood of formal ECEC attendance among children with migration background aged 3 years or older. However, they are more likely to attend ECEC institutions full-time rather than part-time compared to non-disadvantaged children.

We find children aged under 3 years from *low income families* are underrepresented in ECEC services only in the sample of employed mothers. There is also a positive and significant association with income among employed mothers in West Germany. Given that low income mothers do not indicate that costs were among the key reasons for their children's non-attendance but are more likely than non-disadvantaged families to point to lack of available spots, the entitlement for a day-care slot from August 2013 onwards might increase the percentage of such children in ECEC services in the long run.

In the analysis of attendance of non-formal activities, we also find very different patterns in West and East Germany as well as between children under three and those aged 3 years and over, respectively. For younger children in West Germany, we observe remarkably lower attendance rates for children with migration background. Children from low income and social assistance families are also less likely to participate in non-formal activities. These differences are in line with previous studies (Schmiade and Spieß 2010; Spieß and Mühler 2008). These disparities are partly explained by their mothers' lower educational qualifications. As these groups also use ECEC services to a smaller degree, they might be 'doubly disadvantaged' in the sense that on average these children have fewer opportunities to benefit from formal and from non-formal education activities. Given the potential long-term developmental benefits for these children, policies should focus on making these education activities more attractive for parents with migration background and low incomes. If possibilities for language development are to be enhanced for children with migration background, promoting mixed group activities of German and non-German speaking parents would be crucial. For children under 3 years in East Germany, we see a clear 'income effect' of having low income or receiving social assistance on the use of non-formal education. This difference persists after accounting for other supply and demand factor for non-formal education activities.

For older children, the lower participation rates of those with migration background, low family income or social assistance receipt in West Germany are partly explained by lower maternal education. Although these groups of children are not underrepresented in full-time or part-time ECEC services, children of low income

families and of social assistance recipients are disadvantaged in the sense that they cannot benefit from additional education activities to the same extent as children from non-disadvantaged families—which means that ECEC services of high quality are particularly important for them.

For older children in East Germany the situation is different. Children with lone parents use such activities less often. This difference is hardly affected by any of the other explanatory factors on the supply and demand side. Given that they are not underrepresented in ECEC services, it is particular important that they use ECEC of high quality—as they cannot compensate formal education activities with non-formal ones.

Maternal education proved to be the most consistent predictor of children's participation in non-formal education activities across age groups, in particular in West Germany. Similar results have been found by Spieß and Mühler (2008). This may point to variations in the importance which mothers attach to such activities for child development or as differences in parenting styles and preferences. Interestingly, neither household income nor time availability of the mother seem to be very important explanations for the observed variations in children's participation in non-formal activities. In line with expectations, parents appear to regard ECEC attendance and non-formal education activities as substitutes for children under three, whereas the two activities are more likely to be seen as complementary for children aged 3 years to school-age.

Our results also point to some unobserved obstacles for explaining the lower ECEC attendance rates of some groups, which may be interpreted as persistent differences in preferences for education and care arrangements. To achieve a faster closing of social disparities in ECEC attendance, further policies might be necessary. If the future entitlement for a day care slot or family day care starting in August 2013 will lead to a higher percentage of children from families with migration background or low income in ECEC services in West Germany and more children from social assistance receiving households in East Germany remains to be seen. For the use of non-formal education activities, the relatively new '*Bildungs- und Teilhabepaket*'[17] implemented since April 2011 might increase the percentage of children from very low income families using non-formal activities in East Germany. The effectiveness of this measure will have to be examined by future studies. Given that social disparities in non-formal educational participation are considerably larger than in ECEC attendance, raising the quality of ECEC services seems also crucial in order to improve the developmental opportunities among children with lone parents, those with migration background and children in families who live off low incomes or social assistance.

In this research, data limitations did not allow us to consider explicit measures of educational or care preferences of parents. More detailed examinations of parental preferences for certain types of ECEC services or non-formal educational activities or different aspects of quality in these activities appear promising avenues for further research.

[17] Since April 2011 the federal government financially supports education activities of children from low income families, such as lunch at day-care centers and schools or music and sport classes (see http://www.bildungspaket.bmas.de/ Download: August 2012).

Appendix

Table 7 Descriptive statistics

	West Germany		East Germany	
	Mean/Perc.	SD	Mean/Perc.	SD
Child under 3 attends ECEC	21.81		44.1	
Child under 3 attends non-formal education activities	39.22		23.66	
Child 3+ attends ECEC part-time	48.9		10.62	
Child 3+ attends ECEC full-time	42.06		84.23	
Child 3+ attends non-formal education activities	59.37		48.97	
Reason: Child too young	77.41		76.29	
Reason: Child has a chronic disease/disorder	1.45		2.92	
Reason: Want to raise child by myself	71.18		60.83	
Reason: At home anyway and can take care	71.93		67.17	
Reason: Child should spend time with siblings	22.99		17.51	
Reason: Costs are too high	24.98		13.89	
Reason: No spots available	21.11		19.95	
Reason: Distance too far	3.39		2.52	
Reason: Opening hours not suitable	6.70		4.50	
Reason: Transfers too time-consuming	3.92		2.39	
Lone parent	0.10	0.30	0.20	0.40
Migration background	0.27	0.44	0.04	0.20
Low income	0.30	0.46	0.46	0.50
Parents receive social assistance	0.10	0.30	0.22	0.41
Mother low education	0.19	0.39	0.14	0.35
Mother vocational qualification	0.56	0.50	0.61	0.49
Mother college degree	0.25	0.43	0.25	0.43
Age of child in years	3.11	1.90	3.16	1.92
No. children in household	2.01	0.94	1.99	0.99
Child has younger sibling	0.25	0.43	0.22	0.41
Child is female	0.47	0.50	0.48	0.50
Mother not working	37.41		27.30	
Mother unemployed	6.90		11.27	
Mother in education	2.73		5.08	
Mother part-time	27.25		22.54	
Mother full-time	25.70		33.81	
Net household income	3,146.83	1,664.22	2,521.86	1,444.74
Grandmother lives near	0.75	0.43	0.82	0.39
Local under 3 ECEC attendance rate	18.12	7.50	48.47	6.40
Local 3+ ECEC attendance rate	92.10	3.96	95.46	2.60
Local unemployment rate	7.81	3.21	13.40	2.41
N	4,245		980	

SOEP v.27 & FID v.2 2010, weighted

Table 8 Marginal effects of logistic model of mothers' agreement with reasons for not using formal ECEC services for children aged under 3 years in West Germany (standard errors in parentheses)

	Want to raise child by myself		At home anyway and can take care		No spots available		Child should spend time with siblings	
	M1	M2	M1	M2	M1	M2	M1	M2
Lone parent	0.01	0.06	0.03	0.02	0.06	0.00	−0.12*	−0.05
	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
Migration background	−0.05+	−0.03	−0.07*	−0.07+	0.01	0.00	0.05+	0.03
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Low income	−0.07+	−0.03	0.03	−0.00	0.02	−0.02	−0.02	0.00
	(0.03)	(0.06)	(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.04)
Receiving social assistance	−0.01	0.01	0.01	−0.00	0.06	0.07	−0.01	−0.05
	(0.06)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)
Mother low education		0.01		−0.01		−0.07+		0.09+
		(0.06)		(0.04)		(0.04)		(0.05)
Mother vocat. qual.		0.05		0.02		−0.06		0.11**
		(0.04)		(0.03)		(0.04)		(0.04)
Age of child		−0.02		0.00		0.06***		−0.02
		(0.02)		(0.02)		(0.02)		(0.02)
No. of children		−0.00		0.03+		−0.01		0.10***
		(0.02)		(0.02)		(0.01)		(0.02)
Mother unemployed		0.02		−0.01		−0.03		−0.02
		(0.06)		(0.07)		(0.04)		(0.06)
Mother in education		−0.11		−0.04		0.05		−0.05
		(0.09)		(0.09)		(0.06)		(0.07)
Mother part-time		−0.10**		−0.18***		0.03		−0.10**
		(0.04)		(0.05)		(0.04)		(0.04)
Mother full-time		−0.23*		−0.32**		0.01		−0.04
		(0.09)		(0.11)		(0.07)		(0.07)
Log net household income		0.07+		−0.05		−0.09+		0.02
		(0.04)		(0.05)		(0.05)		(0.04)
Grandmother lives near		0.04		0.05+		0.02		0.06*
		(0.03)		(0.03)		(0.03)		(0.03)
Local ECEC attendance rate		−0.01**		−0.00		0.00+		0.00
		(0.00)		(0.00)		(0.00)		(0.00)
N	1,476	1,476	1,477	1,477	1,466	1,466	1,466	1,466
Pseudo R2	0.01	0.05	0.01	0.05	0.02	0.05	0.01	0. 01

All models control for missing values of social assistance. Model 3 controls for the child's gender, whether the child has a younger sibling the local unemployment rate and for missing values of grandmother proximity. Coefficients of lone parent, migration background, low income and social assistance are adjusted using the khb method

FID v.2 2010, weighted

*** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

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