FamiliesAndSocieties
Working Paper Series

45 (2015)

Changing families and sustainable societies:
Policy contexts and diversity over the life course and across generations

Do parental separation and single motherhood strengthen intergenerational inequality in educational attainment?

A decomposition analysis for Germany, Italy, the UK and the US

Fabrizio Bernardi and Diederik Boertien

A project funded by European Union's Seventh Framework Programme under grant agreement no. 320116

Do parental separation and single motherhood strengthen intergenerational inequality in educational attainment?

A decomposition analysis for Germany, Italy, the UK and the US

Fabrizio Bernardi[1] *and Diederik Boertien*[1]

Abstract:
We test the hypothesis that parental separation and single motherhood amplify children's inequality in educational attainment by social background. This hypothesis lies on two premises a) parental separation and single motherhood are more common among low Socio-Economic Status (SES) families and b) they are also associated to worse educational outcomes for children. We argue that there is a third premise that is largely overlooked in the literature, namely that c) there is no heterogeneity by social background in the consequences of growing up in a non-intact family. If the third premise does not hold and the consequences are more negative for children of high SES parents, the overall aggregate contribution of parental separation and single motherhood is difficult to predict a priori. We test the hypothesis in four countries that differ in the prevalence and consequences of parental separation and single motherhood: Germany, Italy, the UK, and the US. We use an Oaxaca decomposition approach to calculate a 'counterfactual' estimate of inequality of educational attainment by social background in the absence of non-intact families. Overall, we find very little influence of family structure on the level of inequality of educational attainment by social background in the four countries considered.

Keywords: Single Motherhood; Parental Separation; Inequality of Opportunity; Education; Social Stratification

Affiliation:
1) Department of Political and Social Sciences, European University Institute

Acknowledgement: The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 320116 for the research project FamiliesAndSocieties. We would like to thank Koen Geven for his contributions to the paper as well as Juho Härkönen, Kristian Karlson and Jan Skopek for comments on this paper and its approach.

Contents

1. Background

A central question within social demographic research has been whether the diffusion of non-intact family forms contributes to the strengthening of intergenerational inequality in life chances (Ellwood and Jencks 2004; Esping-Andersen 2007; Härkönen and Dronkers 2006; McLanahan 2004; McLanahan and Percheski 2008; Amato et al. 2015; Härkönen 2015). Recent studies have expressed concerns to whether demographic changes of the last decades have led to greater inequalities in the resources available to children and, thus, have reinforced the transmission of (dis)advantage between generations. In particular, several studies have confirmed that parental separation and single motherhood (leading to what we from here onward refer to as 'non-intact families') are more common among less educated mothers and that children who grow up in non-intact families have on average lower educational attainment (Amato 2010; Ellwood and Jencks 2004; Härkönen and Dronkers 2006; Kim 2011; McLanahan and Percheski, 2008).

In this article we estimate the contribution of non-intact families to the observed level of inequality in educational attainment by social background. To this aim, we first scrutinize the argument that the presence of non-intact families in society exacerbates inequality in children's access to economic and social resources (Amato et al. 2015). We argue that growing up in a non-intact family might entail more negative consequences for the educational attainment of children from higher Socio-Economic Status (SES) families.

In the empirical part of the article we, then, estimate both the differential prevalence of non-intact families by maternal education, as well as their differential effects on children's educational attainment by maternal education. We use a Blinder-Oaxaca decomposition approach to calculate a 'counterfactual' estimate of inequality of educational attainment by maternal education in the hypothetical absence of parental separation and single motherhood. We decompose the association between maternal and respondent's education into an unexplained part and a part that could be explained by family structure. Our analysis is similar to the one performed by Goldberg (2014), who also uses a Blinder-Oaxaca decomposition to estimate the contribution of family structure to inequality in education in the US.[1] The main difference is that we perform this analysis for four countries, Germany, Italy, the UK and the

[1] We developed our paper independently of Goldberg's unpublished paper. We have previously investigated the heterogeneity in the effect of union dissolution by social background (Authors) and sketched the idea of the decomposition for the UK in (Authors).

US. The four countries differ both in the prevalence of parental separation and single motherhood as well as in the observed disadvantage in school performance and attainment of children from non-intact families. At the analytical level, the country comparison enables us to consider different combinations of the prevalence of parental separation and its consequences for children's education in order to gain a better understanding of how each of these components contribute to the observed inequality in education by social background.

1.1. Family Structure and Inequality of Opportunity

Various authors have argued that changes in family structure, and in particular the rise in parental separation and single motherhood might widen socio-economic inequality across households and lead to greater disparities in children's resources (Esping-Andersen 2007; McLanahan and Percheski 2008; Amato et al. 2015). In this article we focus on how parental separation and single motherhood might strengthen the intergenerational transmission of inequality in educational attainment by social background (McLahanan 2004; McLanahan and Percheski 2008; Amato et al. 2015). Children born to mothers in the bottom socioeconomic strata are more likely to grow up in a single parent family and are therefore likely to be further penalized by the possible reduction or loss in financial and emotional support of their biological father (Garfinkel and McLanahan 1986).

The hypothesis that growing up in a non-intact family widens inequality in children's education by socio-economic background rests on two premises a) today, non-intact families are more common among low SES families and b) growing up in a non-intact family is associated to worse educational outcomes for children. A large body of evidence confirms indeed that both premises a) and b) are valid for most Western countries.

Single motherhood and union dissolution have been found to be higher among less educated women in the US (Martin 2004). In most European and Asian countries for which the evidence is available the correlation between women's level of education and risk of union dissolution has reversed over time from being positive to negative (Chan and Halpin 2005; Chen 2012; De Graaf and Kalmijn 2006a; Härkönen and Dronkers 2006; Hoem 1997; Matysiak, Styrc, and Vignoli 2014; Park and Raymo 2013; Ono 2009; Raymo, Fukuda, and Iwasawa 2013). Less is known about the prevalence of single motherhood (i.e. being born to a single mother) in Europe but this seems to be a relatively less common experience there with the possible exception of the UK (Kiernan 2001; Perelli-Harris et al. 2011).

Regarding premise b), several studies on the US and Europe have documented the negative association between growing up in a non-intact family and various outcomes of children ranging from behavioral problems, to test scores and educational attainment (Amato 2010; Bernardi and Radl 2014; Dronkers 1999; Furstenberg and Kiernan 2001; Jonsson and Gähler 1997; Kiernan 1997; Kim 2011; McLanahan and Sandefur 1994; McLanahan and Percheski 2008; Steele, Sigle-Rushton, and Kravdal 2009; Strohschein 2005).

There is, however, a third premise to the aforementioned hypothesis that non-intact families reinforce intergenerational inequality that has been partly overlooked in the literature, namely, that c) there is no heterogeneity by social background in the consequences of growing up in a non-intact family. If this last premise does not hold and the consequences of growing up in a non-intact family are more negative for children of high SES parents, the overall contribution of family structure to observed inequality is difficult to predict *a priori*. In this respect, previous studies on the consequences of parental separation for children have uncovered patterns of heterogeneity by parental background, but have not connected it to the general literature on disparities in life chances for children (Albertini and Dronkers 2009; Augustine 2014; Bernardi, Boertien and Popova 2014; Bernardi and Radl, 2014; Biblarz and Raferty 1993, 1999; Biblarz, Raferty and Bucur 1997; Cavanagh and Huston 2006; Elliott and Richards 1991; Fischer 2007; Jonsson and Gähler 1997; Mandemakers and Kalmijn 2014; Martin 2012; McLanahan and Sandefur 1994). Some studies have found that parental separation has more negative implications for the cognitive development and educational attainment of children from lower socio-economic backgrounds (Albertini and Dronkers 2009; Augustine 2014; Grätz 2015), but most studies have documented a larger parental separation penalty in educational attainment for children of high SES families (Bernardi and Radl 2014; Biblarz and Raferty 1993; Martin 2012; McLanahan and Sandefur 1994). There exists little evidence for why heterogeneity patterns are produced, but a major hypothesis points to a "floor effect" so that in case of parental separation children from low SES families lose less from the absence of their biological (and on average lower educated) father in terms of financial resources and academic support to do well at school, when compared to children from high SES families (Bernardi and Radl 2014; Kalmijn 2010).

In sum: whether family structure worsens social background inequality in children's educational attainment depends on the differential prevalence and differential consequences of non-intact families by parents' SES. If growing up in a non-intact family is more common

for children from lower social backgrounds, but at the same time this condition affects their educational attainment to a smaller extent when compared to children from high social background, the aggregate effect on inequality of educational attainment remains unclear.

1.1. A Four Countries Comparison

We compare the contributions of non-intact families to inequality of educational opportunities in Germany, Italy, the UK and the US. In the UK and in the US divorce rates have already reached high levels for several decades now, and the correlation between women's education and the risk of separation has reversed over time from positive to negative. In recent cohorts lower educated women run a higher risk of being a single mother or experiencing a union dissolution. In Germany, union dissolution rates have reached high levels only recently, while in Italy they are increasing but still at a relatively low level. In both of these countries the reversal of the educational gradient of the risk of separation has not fully completed (Härkönen and Dronkers 2006; Stevenson and Wolfers 2007; Matysiak, Styrc, and Vignoli 2014). On top of these differences, the effects of growing up in a non-intact family seem to differ across these countries too. Data from the PISA studies has shown wide variation across the four countries in the relationship between living in a single-parent family and test scores (OECD 2011, 2013), with generally bigger effects in the UK and the US, and smaller ones in Italy and Germany.

If one regards only the prevalence of non-intact families and its general effects on attainment, we would expect the largest contribution of family structure to inequality of educational attainment in the United States and the United Kingdom, where single motherhood and union dissolution are relatively common, have large effects and are more prevalent in the lower socio-economic strata.

Predictions are less straightforward, however, if one also takes into account the possible heterogeneity in the effects of growing up in a non-intact family. A larger penalty in the probability of achieving a university degree associated to single parenthood has for instance been found in the UK and the US for children from highly educated parents (Biblarz and Raferty 1993; Martin 2012; Bernardi et al. 2014), and the same pattern emerged on average across a sample of 14 countries (Bernardi and Radl 2014). If this type of heterogeneity effect dominates the effects of the differential prevalence of parental divorce and single motherhood by SES, one could actually find that non-intact families are bringing about an unexpected

equalizing effect overall. This would then especially be the case in Germany and Italy, where non-intact families are not (yet) more common among lower socio-economic groups. In short, taking into account heterogeneity in effects should lead to estimates that are less likely to support the hypothesis that the presence of non-intact families exacerbates social class disparities in children's access to education.

2. Data, Variables, Method, and Robustness Checks

We select one dataset for each of the four countries that broadly cover the same birth cohorts and provide relatively comparable measures for our purposes. We employ the NLSY97 study for the US, the Pairfam data for Germany (Huinink et al. 2011; Nauck et al. 2013), the Multiscopo Aspects of Daily Life data (2003 and 2009 waves) for Italy and the British Cohort Study 1970 for Britain (Centre for Longitudinal Studies; SN: 5558). For all analyses, we exclude cases where a parent had passed away before the child reached adulthood (except for Italy where data constraints did not allow for it).

The NLSY97 followed a sample of adolescents aged 12-18 throughout their lives. The first wave took place in 1997, and we select all respondents who were interviewed in round 15 (around age 27-33) and provided information on educational attainment fielded in 2011-2012. We retrieve information on parental education and family structure from previous waves covering the period since respondents were 12-18 years old (that include retrospective information on family structure since birth).

The Pairfam data for Germany is a family panel that follows respondents from three birth cohorts and their families over time since 2008. We select all respondents from the 1981-1983 birth cohorts for Germany. Subsequently, we single out those that were interviewed in wave 3 of the survey (2010/11), which was the year in which information on parental family structure and characteristics was collected, and use that wave for information on attainment too.

The Multiscopo data for Italy consists of two cross-sectional surveys held in 2003 and 2009 on representative samples of the Italian population. We merge both surveys and select respondents who were born in 1971-1984 and were at least 27 years of age at the time of the survey.

For Britain we use the British Cohort Study, a sample of children born in a particular week in April 1970 that has been followed from birth until adulthood. We select respondents still

present in the survey at age 30 (year 2000) to collect information on the respondent's educational attainment. Parental characteristics and information on childhood family structure were retrieved from the rounds at age 5, 10, 16, 26 and 30 (including retrospective information on family structure). This selection procedure results in final sample sizes of 1 885 for Germany, 9 450 for Italy, 10 042 for the UK, and 7 230 for the US.[2]

2.1. Variables

Our dependent variable is the respondent's educational attainment operationalized as a dummy variable measuring whether the respondent attained tertiary education (International Standard Classification of Education (ISCED) categories 5-6; see Table 1).[3] We also replicate the analysis using a continuous dependent variable measuring the years of education that correspond to each educational title.[4]

Our key independent variable is the family structure in which the respondent grew up and is operationalized as a dummy variable that distinguishes intact and non-intact families. For the UK, the US and Italy we consider that respondents grew up in a non-intact family if they experienced a parental separation before age 17-18 or never lived with their biological father (i.e. their mother was a single mother from the start). For these countries, we also provide descriptive statistics on the prevalence of both types of non-intact families (parental separation and never living with the father, the latter labelled here as single motherhood). For Germany, due to data limitations intact families include respondents whose parents were still together at the time of interview, i.e. when respondents were in their late 20s. In this way we are likely to inflate the number of non-intact families in Germany.

Social background is measured firstly by a variable for mother's education and a variable for parental education in later models. For mother's education we create a categorical variable consisting of lower (ISCED 1-2; no more than lower secondary education), middle (ISCED 3-

[2] We use sample weights to correct for attrition in the panel surveys for Germany and US and for the sampling procedure in the case of the cross-sectional surveys in Italy. Sample weights are not available for the British cohort study. Previous papers have used the same data and showed that biases due to selective attrition do not influence results to a large extent (Breen and Goldthorpe 2001; Nathan 1999). Due to missing information on specific variables 5.9% of cases in Germany, 4.1% in Italy, 6.9% in the UK, and 13.4% of cases in the US were lost. In a robustness check we have imputed missing values using STATA 13's *mi* commands and the results of our analyses do not change (results available upon request).

[3] For Germany the variable indicated enrollment in tertiary education due to the relatively young age at measurement

[4] In order to construct the variable years of education we used the ISCED 97 manual and took the lowest years normally required to attain a certain qualification (OECD 1999).

4; upper secondary education and further qualifications that are not tertiary), and higher education (ISCED 5-6; tertiary education; again using the ISCED97 scheme). For parental education we create a categorical variable with the same three levels but this time based on the highest level of education attained either by the father or the mother (using the same three categories). Our analysis is done using both versions of educational background. The former allows us to include single motherhood families in the analysis, while the latter allows us to look at the influence of paternal education.

In the analysis we control for a set of variables that are not regarded as possible mediators of educational opportunity: A dummy for gender of the child, age at measurement of educational attainment (in years and centered at the average), survey year (in Italy 0 = 2003; 1 = 2009), and a dummy for non-white ethnicity (in the US and the UK, non-German ethnicity in Germany). Table 1 provides descriptive statistics for the variables we use in this study.

2.2. Method

We start our analysis by describing the different components that determine the contribution of family structure to educational inequality. First we show the prevalence of parental separation and single motherhood by maternal education. Then we study the effects of these family forms on children's educational attainment, again by maternal education (and after that, parental education). We use Linear Probability Models (LPM) and logit models when the dependent variable is the probability of attaining tertiary education and OLS regressions for the years of education.

Subsequently, we use the Blinder-Oaxaca method (Jann, 2008) to decompose the association between the respondents' and their parents' education into a part that can be explained by family structure and its differential effects by parental education on the one hand and a part that remains unexplained on the other hand. We interpret this latter unexplained part of the association as the 'counterfactual' inequality in educational attainment in the hypothetical absence of parental separation and single motherhood.

Table 1. Descriptive statistics of the samples of this study

	Germany		Italy		UK		US	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Attainment of Tertiary Education	0.37		0.18		0.27		0.33	
Years of Education	13.6	2.3	11.4	3.2	12.5	2.4	13.0	2.3
Mother ISCED 1-2	0.14		0.78		0.54		0.22	
Mother ISCED 3-4	0.66		0.18		0.43		0.44	
Mother ISCED 5-6	0.20		0.04		0.03		0.34	
Family Intact at End Childhood	0.75		0.96		0.81		0.52	
Separation during Childhood	.		0.04		0.19		0.37	
Parents never Lived Together	.		0.002		0.01		0.11	
Non-white (non-German)	0.16		.		0.03		0.39	
Age	29.0	0.9	32.1	3.1	30.0	.	29.2	1.4
Male	0.47		0.49		0.48		0.51	
Survey Year	2010/11		2003/09		2000		2011/12	
N	1 885		9450		10 042		7 230	

It is important to stress that our decomposition analysis is merely descriptive. We do not address the issue of whether family structure has a causal effect on children's educational attainment and thus of whether the presence of non-intact families contributes causally to the aggregate inequality in educational attainment. Previous studies based on causal research designs have shown negative effects of non-intact families on children educational attainment, especially in the US (McLahanan et al 2013). At the same time, these studies have also documented that the causal estimates tend to be smaller than the effects based on cross-sectional designs. This means that our decomposition probably overestimates the causal contribution of family structure to educational inequality and that our findings should be interpreted as upper bound estimates.

To formalize *R* represents the absolute difference in the expected probability of tertiary educational attainment E(Y) of individuals in Group *H* and Group *L* (i.e. children with higher and lower educated parents)

$$R = E(Y_H) - E(Y_L) \quad (1)$$

The question is how much of *R* can be explained by variable *X* that distinguishes intact and non-intact families. For this purpose R can also be expressed as:

$$R = (\beta_{0H} - \beta_{0L}) + \{E(X_H) - E(X_L)\}\,\beta_{1L} + \mathrm{E}(X_L)(\beta_{1H} - \beta_{1L}) + \{E(X_H) - E(X_L)\}\,(\beta_{1H} - \beta_{1L}) \quad (2)$$

Here $\{E(X_H) - E(X_L)\}\ \beta_{1L}$ represents the difference in educational attainment due to the distinct prevalence of divorce and single motherhood for Groups H and L; $E(X_L)(\beta_{1H} - \beta_{1L})$ is the difference due to different effects of family structure for Groups H and L; and $\{E(X_H) - E(X_L)\}\ (\beta_{1H} - \beta_{1L})$ is a part that is explained by an interaction effect between both and hard to interpret directly (Jann, 2008).

The part $(\beta_{0H} - \beta_{0L})$ refers to the baseline difference between both groups which cannot be accounted for by the parts described above. This unexplained group difference will give us a 'counterfactual' estimate of the difference in the absence of divorce and single motherhood (i.e. if $E(X_H) = E(X_L) = 0$). Comparing the 'counterfactual' estimate with the actual difference gives us an estimate of the extent to which family structure is related to increased or decreased inequality of opportunity. The estimates of the different coefficients in the equation (2) are based on two LPM models ran separately for respondents with higher educated mothers, and subsequently for those with lower educated mothers.

We also perform the decomposition using a non-linear extension of the Blinder-Oaxaca method proposed by Yun (2004). In this case the coefficients in equation (2) are based on two logit models.[5] Finally, we replicate the analysis for years of education as dependent variable, using a standard linear Blinder-Oaxaca decomposition. In this specification, E(Y) refers to the expected years of education and we estimate two OLS models for the children of higher and lower educated parents.

We present our results for the probability of tertiary education attainment and for the Oaxaca-decomposition based on LPM. The results for years of education as the dependent variable and for the non linear decomposition based on logit models are discussed in the robustness check section.

3. Results

In Table 2 we show the prevalence of single motherhood, parental separation and intact families of origin at about age 18 by maternal education. Due to data limitations for Germany, we only present the proportion of intact families of origin at about age 27. It can be noted that

[5] We have used STATA 13's *oaxaca* commands, with the logit option to produce the Blinder-Oaxaca decomposition based on Yun (2004).

the diffusion of single motherhood for the birth cohorts studied here was extremely low in Italy, low in the UK, and only sizeable in the case of the United States.[6] The proportion of respondents that grew up in an intact family is the lowest in the US where about only one respondent in two did so. In Germany and the UK about 75-80% of the respondents grew up in intact families, but the figure for Germany is likely to be underestimated given the later age at which this information was collected. The proportion amounts to 95% for Italy.

Table 2. The prevalence of intact and non-intact families by maternal education

	Mother ISCED 1-2 %	Mother ISCED 3-4 %	Mother ISCED 5-6 %	Total %
% *Single Motherhood*				
Germany	.	.	.	.
Italy	0.1	0.2	0.3	0.2
United Kingdom	1.3	0.8	0.7	1.1
United States	14.9	9.3	6.7	9.3
% *Experienced Parental Divorce before Age 18*				
Germany	.	.	.	.
Italy	2.7	5.7	5.4	3.2
United Kingdom	19.7	17.1	14.6	18.5
United States	42.7	36.6	29.4	35.0
*% Families Intact at Age 18**				
Germany	77.1	73.0	77.8	74.7
Italy	97.3	94.3	94.6	96.6
United Kingdom	78.9	82.0	84.7	80.4
United States	42.4	54.1	63.7	55.7

Note. Single Motherhood defined as never having lived with both biological parents. * At age 27-29 for Germany

The gradient of intact families is positive in the UK and the US with the highest prevalence of intact families for respondents with highly educated mothers, and negative in Italy where those with a highly educated mother are more likely to have grown up in a non-intact family. In Germany, children of middle educated women are most likely to have grown up in a non-intact family. This is in line with earlier findings regarding the educational gradients of divorce in different countries (Härkönen and Dronkers 2006).

In Table 3 we present the association between growing up in a non-intact family and the probability of attaining tertiary education, as well as heterogeneity in the association by

[6] In our analytical sample for the UK we underestimate the prevalence of single motherhood due to attrition. Based on information provided in the first wave of the BCS at age 0 the prevalence of single motherhood was about 3%. This estimate is consistent with the figures on out-of-wedlock births by Kiernan (2004) after accounting for cohabiting mothers. If selective attrition within the group of single mothers takes place we are, then, likely to underestimate the negative association between lone motherhood and children's educational attainment.

parental education. Given that only in the US it is relatively common that children are born into a single motherhood family, we present only the analysis that compares intact and non-intact families (where non-intact families include both single motherhood and parental separation).[7] In all countries growing up in a non-intact family is related to an on average lower probability of attaining tertiary education (Models 2). The penalty is substantial and ranges from about 10 percentage points Germany and UK to about 20 percentage points in US. In Italy the penalty is smaller (4%) and also not precisely estimated.

Table 3. Linear Probability Models Explaining Attainment of Tertiary Education by Country

	Germany			Italy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]
Maternal Education (Ref. ISCED 1-2)						
Mother ISCED 3-4	0.16**	0.16**	0.18**	0.21**	0.21**	0.21**
	[0.08/0.24]	[0.07/0.25]	[0.08/0.29]	[0.16/0.25]	[0.16/0.26]	[0.16/0.26]
Mother ISCED 5-6	0.37**	0.37**	0.36**	0.43**	0.43**	0.43**
	[0.27/0.47]	[0.26/0.48]	[0.24/0.49]	[0.32/0.53]	[0.32/0.53]	[0.32/0.54]
Non-intact family		-0.11**	-0.05		-0.04	-0.01
(Reference intact family)		[-0.17/-0.05]	[-0.23/0.12]		[-0.12/0.03]	[-0.09/0.06]
Non-intact *ISCED 3-4			-0.10			-0.09
			[-0.28/0.10]			[-0.28/0.10]
Non-intact * ISCED 5-6			0.02			-0.11
			[-0.21/0.25]			[-0.51/0.30]
Constant	0.22**	0.25**	0.24**	0.16**	0.16**	0.16**
	[0.13/0.30]	[0.16/0.34]	[0.13/0.34]	[0.13/0.18]	[0.13/0.19]	[0.13/0.18]
N	1 885	1 885	1 885	9 450	9 450	9 450
	UK			US		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]	Coef. [CI]
Maternal Education (Ref. ISCED 1-2)						
Mother ISCED 3-4	0.23**	0.22**	0.24**	0.14**	0.12**	0.13**
	[0.21/0.24]	[0.21/0.24]	[0.22/0.25]	[0.11/0.17]	[0.09/0.15]	[0.09/0.18]
Mother ISCED 5-6	0.58**	0.58**	0.58**	0.39**	0.36**	0.41**
	[0.53/0.63]	[0.53/0.63]	[0.52/0.63]	[0.36/0.42]	[0.33/0.39]	[0.36/0.45]
Non-intact family		-0.10**	-0.07**		-0.19**	-0.14**
(Reference intact family)		[-0.12/-0.07]	[-0.09/-0.04]		[-0.21/-0.17]	[-0.19/-0.10]
Non-intact * ISCED 3-4			-0.07**			-0.01
			[-0.11/-0.03]			[-0.07/0.04]
Non-intact * ISCED 5-6			0.02			-0.11**
			[-0.12/0.16]			[-0.17/-0.05]
Constant	0.16**	0.18**	0.17**	0.27*	0.43**	0.39**
	[0.14/0.17]	[0.16/0.19]	[0.16/0.19]	[0.03/0.51]	[0.19/0.66]	[0.16/0.63]
N	10 042	10 042	10 042	7 230	7 230	7 230

Note. Sample weights included in Germany, Italy, and US. Controls included but not shown for non-whites, age, gender and in Italy also for survey year. ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$; CI= 95% Confidence Interval; Coef.= OLS Regression Coefficients

[7] For the US we also performed an analysis distinguishing between different non-intact families and we found that the association with educational attainment (as well as its heterogeneity) is similar for parental divorce and single motherhood (results available upon request).

The third models for each country show the heterogeneity in the effects of family structure by maternal education. In line with some previous studies, we also find that having grown up in a non-intact family entails a larger reduction in the probability of attaining a university degree for those with a highly educated mother in the US and Italy, although in the latter country this effect is not statistically significant. In Germany and the UK children with mothers who have ISCED 3-4 education show the largest 'penalties' associated to growing up in a non-intact family. It should be pointed out that in the UK, only 2.8% of children have a mother with ISCED 5-6 education (See Table 1), and therefore the general pattern seems similar to that of the US with the lowest educated children having the smallest 'penalties'.

Finally, we put the previous steps of the analysis together and estimate the extent to which parental divorce and single motherhood contribute to the overall level of inequality of educational attainment. We decompose the observed inequality using the Oaxaca-Blinder decomposition described in the Method section and account for the contributions of the differing prevalence of non-intact families by maternal education (see Table 2) and the differing effects of non-intact families by maternal education (Tables 3 and 4). Netting out these factors allows us to calculate the 'counterfactual' level of inequality in the hypothetical situation that all respondents would have grown up in intact families. Figures 1 to 4 display the results of the decomposition analysis of the inequality in tertiary education attainment by maternal education. The black bars refer to the actual observed difference in the probability of tertiary education between respondents born to a lower educated mother and, respectively, those with a middle educated mother and those whose mothers who have a tertiary degree. The white bars refer to the 'counterfactual' inequality, i.e. $(\beta_{0H} - \beta_{0L})$ of equation 2 discussed above.

The results indicate, overall, very little differences between actual and counterfactual inequality. The only small differences are found between the counterfactual and actual inequality for children of middle educated mothers compared to those of lower educated mothers in Germany and the US. In the hypothetical absence of non-intact families, inequality is expected to be slightly higher in Germany (absolute difference in probabilities of 0.02), and slightly lower in the United States than it is now (absolute difference of -0.01). The main story is however that despite the sizeable effects of parental separation and single motherhood on children's attainment as shown in Table 3, the overall contribution of non-intact families to educational inequality measured in absolute terms is null or minimal.

Figures 1-4. Actual and Counterfactual Differences in the Probability to Attain Tertiary Education Compared to Children of Lower Educated Mothers (ISCED 1-2)

Figure 1. Germany

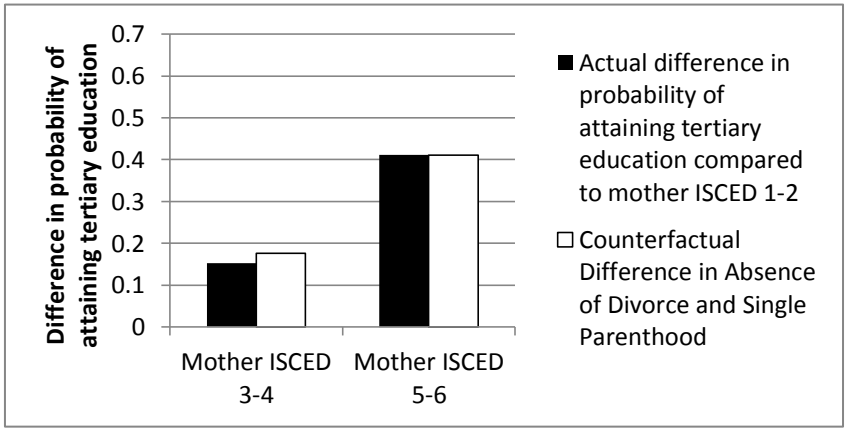


*Figure 2.*Italy

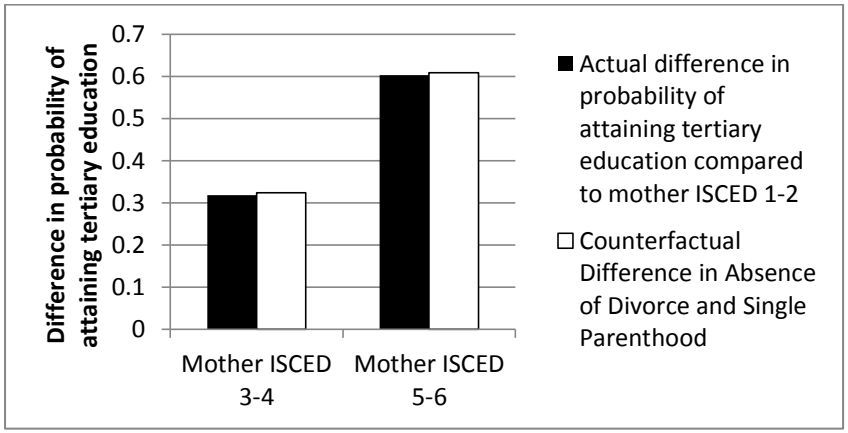


*Figure 3.*UK

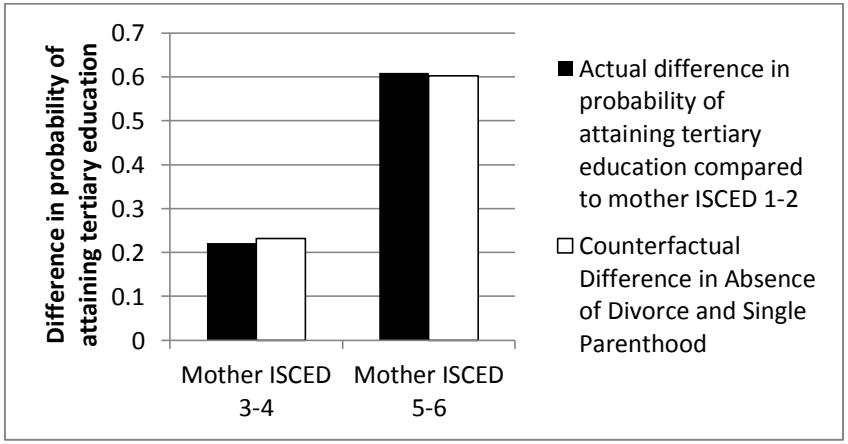
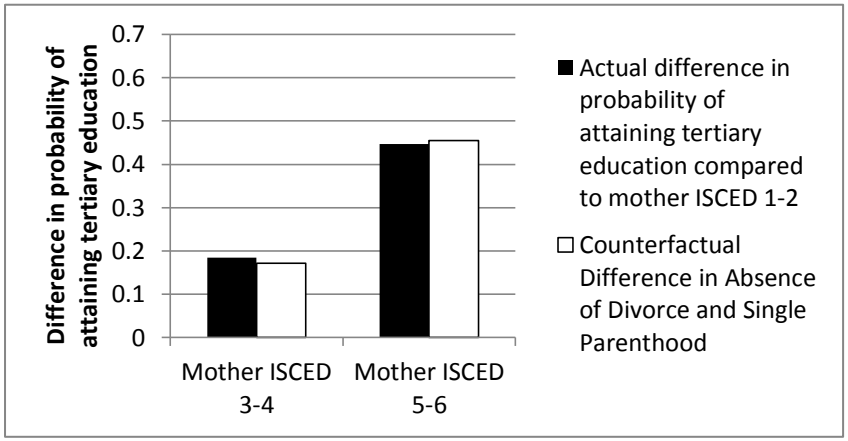


*Figure 4.*US



Note. Counterfactual difference based on part unexplained by Blinder-Oaxaca decomposition once accounting for family structure and its effects by parental education. Adjusted for gender, age (centered on average), ethnicity, and survey year (in Italy).

Why is this the case? In Italy, the prevalence of divorce and single motherhood is too low to affect inequality of opportunity in a major way. In the UK and Germany the socio-economic differences in the risk of growing up in a non-intact family were not very large for this cohort. In the US, the prevalence of non-intact families is high and growing up in a non-intact family is associated to a large reduction (about 20 percentage points) in the probability of attaining a tertiary education. In addition, the likelihood of growing up in a non-intact family is larger for respondents with lower educated mothers. However, the negative consequences of growing up in non-intact families for educational attainment are larger (in absolute terms) for respondents with highly educated mothers. These latter two effects cancel each other out.

3.1. Robustness Checks

The results of several robustness checks are available in the online appendix, which display the robustness of results to the method chosen and the operationalization of dependent and independent variables. First, Figures A1 to A4 in the Online Appendix display the corresponding results of the Oaxaca-Blinder linear decomposition when looking at years of education. Also when using this different specification of the dependent variable there is no amplifying effect of non-intact families on the observed educational inequality in the four countries (Figures A1 to A4, Online Appendix). Second, results are robust when using the dummy for tertiary education attainment as the dependent variable but employing logit models and the non-linear Oaxaca-Blinder decomposition based on Yun (2004). The results are similar to those of the Oaxaca-Blinder decomposition using LPM (See Figures B1 to B4 in the Online Appendix).

Third, when taking into account father's education in addition to mother's education, results do not change. For this analysis cases of lone motherhood are excluded. Parental education is defined as the highest level of education obtained by either the respondent's father or the mother (ISCED 1-2; ISCED 3-4; or ISCED 5-6). Figures C1-C4 in the Online Appendix summarize these sets of results. In another specification the consequences of parental separation are investigated depending on educational homogamy/heterogamy of the parents (with categories: both ISCED 1-2, both ISCED 3-4, both ISCED 5-6, father more educated, and mother more educated). Our main conclusion that non-intact families contribute little to observed differences in the probability of university attainment by maternal education holds also if one considers

parental education defined as the highest level of education of the father and mother and considering homogomous versus heterogamous types of parental education.

4. Discussion

The contents of this paper have given insight into the possible role family structure plays in creating higher levels of inequality in educational attainment by social background. Growing up without both parents present in the household has become increasingly common in Western societies, and is more usual for children with lower educated parents in many countries today. The widely documented relationship between non-intact families and children's lower educational outcomes has raised concerns that family structure might have become a factor amplifying inequality of opportunity by social background (Ellwood and Jencks 2004; Härkönen and Dronkers 2006; McLanahan 2004; McLanahan and Percheski 2008). The results of this paper show, however, that family structure does not widen the level of inequality of educational attainment by social background for birth cohorts from the 1970s and 1980s in Germany, Italy, the UK, and the US. This is not to suggest that demographic change is not important for children's educational outcomes. Quite to the contrary, the results of our study do confirm that growing up in a non-intact family is related on average to lower educational attainment. Furthermore, it is clear that many already disadvantaged children are put at an extra disadvantage by growing up in a non-intact family. However, when looking at differences in educational attainment for children with high and low educated parents, the gaps between such groups in general seem not to be bigger due to variations in family structure. These results are robust to different specifications of the dependent variable and to the decomposition method employed.

While growing up in a non in intact family is more common for children with lower educated parents in the UK and the US and it is related to lower educational attainment, its consequences for educational attainment tend to be more negative for children from higher educational backgrounds. The differential prevalence of non-intact families by parental social background and the differential consequences of growing up in non-intact families by social background cancel each other out, leading to an overall neutral role of non-intact families for the observed educational inequality in the UK and the US. In Italy divorce levels were that low that their contribution to the overall level of educational inequality can only be minimal, while in Germany

a small equalizing effect was found for the comparison between children of middle-educated parents and children with low-educated parents.

The results of this paper therefore show that taking into account heterogeneity in effects of parental separation and single motherhood is necessary before being able to make claims about the overall effects of family structure on intergenerational inequality. An inequality amplifying effect of family structure is likely to be observed if a high prevalence of non-intact families and a negative educational gradient in the prevalence of non-intact families are combined with an absence of heterogeneity in the negative effects of growing up in a non intact family for educational attainment. These three conditions do not hold at the same time for the birth cohorts in the four countries considered in the paper. Future research might, then, focus on other countries or birth cohorts where these conditions might be fulfilled. For instance, the latter condition (no heterogeneity) was found to hold in the case of the German birth cohorts under study, but the former two (high prevalence and negative educational gradient) were not. As divorce spreads and the educational gradient of divorce is expected to change from positive to negative (Härkönen and Dronkers 2006), an amplifying effect on inequality might be found in more recent cohorts in Germany. This would be the case, however, only if the condition of no heterogeneity is maintained.

The latter remark also spurs the question of how the prevalence of non-intact family forms is related to their implication for children's educational attainment. This issue has not been touched in the present paper. The prevalence of non-intact family forms by SES might, however, also drive the heterogeneity of the effect of non-intact families by SES. For instance, when separation or lone-motherhood becomes rarer among high SES strata, those from high SES strata who separate or become a lone-mother are likely to be selected on some traits that might also affect the educational attainment of their children. Exploring the inter-relationship between prevalence of non-intact families and heterogeneity in their impact on children's educational attainment seems a valuable area for future research.

Future studies could also investigate other children's outcomes. We only looked at educational inequality, and it could well be that family structure amplifies inequality if one considers

occupational attainment or the distribution of income or wealth. Notwithstanding, this paper has provides a set of robust results showing that non-intact families are not associated with an amplification of inequality of educational attainment in Germany, Italy, the UK, and the US. These results question the common concerns that the diffusion of non-intact families and its socio-economic correlates widen intergenerational inequality, at least as far as educational attainment is concerned.

References

Albertini, Marco, Dronkers, Jaap. 2009. "Effects of Divorce on Children's Educational Attainment in A Mediterranean and Catholic Society." *European societies* 11: 137-159. Doi: 10.1080/14616690802248042

Amato, Paul R. 2010. "Research on divorce: Continuing trends and new developments." *Journal of Marriage and Family* 72: 650-666.

Amato, Paul, Booth, Alan, McHale, Susan M., Hook, Jennifer Van (eds.). 2015. Families in an Era of Increasing Inequality. National Symposium on Family Issues, Volume 5. Switzerland: Springer International Publishing.

Augustine, Jennifer M. 2014. "Maternal Education and the Unequal Significance of Family Structure for Children's Early Achievement." *Social Forces* 93(2): 687-718.

Bernardi, Fabrizio, Boertien, Diederik, Popova, Daria. 2014. "Differential Effects of Parental Separation on Child Outcomes. Are Children from Higher Social Backgrounds Affected More?" *EUI working papers*, MWP 2014/06.

Bernardi, Fabrizio, Radl, Jonas. 2014. "Parental Separation, Social Origin, and Educational Attainment: The Long-Term Consequences of Divorce for Children." *Demographic Research* 30: 1653 - 1680. Doi: 10.4054/DemRes.2014.30.61

Biblarz, Timothy J., Raferty, Adrian E. 1993. "The Effects of Family Disruption on Social Mobility." *American Sociological Review* 58: 97-109.

Biblarz, Timothy J., Raferty, Adrian E. 1999. "Family Structure, Educational Attainment, and Socioeconomic Success: Rethinking the Pathology of Matriarchy." *American Journal of Sociology* 105: 321-365. Doi: 10.1086/210314

Biblarz, Timothy J., Raftery, Adrian E., Bucur, Alexander. 1997. "Family structure and social mobility." *Social Forces* 75(4): 1319-1341.

Breen, Richard, Goldthorpe, John H. 2001. "Mobility and Merit: The Experience of Two British Cohorts." *European Sociological Review* 17 (2): 81-101. Doi: 10.1093/esr/17.2.81

Cavanagh, Shannon E., Huston, Aletha C. 2006. "Family Instability and Children's Early Problem Behavior." *Social Forces* 85: 551-581.

Chen, Wan-Chi. 2012. "The Changing Pattern of Educational Differentials in Divorce in the Context of Gender Egalitarianization: The Case of Taiwan." *Population Research and Policy Review* 31(6): 831-853.

Chan, Tak W., Halpin, Brendan. 2005. *The instability of divorce risk factors in the UK.* Presented at the British Society for Population Studies annual conference, Canterbury, UK.

De Graaf, Paul M., Kalmijn, Matthijs. 2006. "Change and stability in the social determinants of divorce: A comparison of marriage cohorts in the Netherlands." *European sociological* review 22(5): 561-572.

Dronkers, Jaap. 1999. "The Effects of Parental Conflicts and Divorce on the Well-being of Pupils in Dutch Secondary Education." *European Sociological Review* 15: 195-212.

Elliott, B. Jane, Richards, Martin P.M. 1991. "Children and Divorce: Educational Performance and Behavior before and after Parental Separation." *International Journal of Law and the Family* 5: 258-276. Doi: 10.1093/lawfam/5.3.258

Ellwood, David T., Jencks, Christopher. 2004. "The Uneven Spread of Single-Parent Families." In Social Inequality, edited by Kathryn Neckerman. New York: Russell Sage.

Esping-Andersen, Gøsta. 2007. "Sociological Explanations of Changing Income Distributions." *American Behavioral Scientist* 50: 639-658. Doi: 10.1177/0002764206295011

Fischer, Tamar. 2007. "Parental Divorce and Children's Socio-Economic Success." *Sociology* 41: 475-495. Doi: 10.1177/0038038507076618

Fomby, Paula, Osborne, Cynthia. 2010. "The Influence of Union Instability and Union Quality on Children's Aggressive Behavior." *Social Science Research* 39(6): 912-924.

Furstenberg, Frank F., Kiernan, Kathleen E. 2001. „Delayed parental divorce: How much do children benefit?" *Journal of Marriage and Family* 63(2): 446-457. doi:10.1111/j.1741-3737.2001.00446.x

Garfinkel, Irwin, McLanahan, Sara S. 1986. Single mothers and their children: A new American dilemma. Washington, DC: Urban Institute Press.

Goldberg, Julia S. 2014. *Family Structure and the Reproduction of Inequality: A Decomposition Approach.* Paper presented at the Annual Meetings of the Population Association of America, May 2014.

Grätz, Michael. 2015. "When Growing Up Without a Parent Does Not Hurt: Parental Separation and the Compensatory Effect of Social Origin." *European Sociological Review,* advance access.

Härkönen, Juho. 2015. *Diverging destinies in international perspective: Education, family structure, and child poverty.* Working paper.

Härkönen, Juho, Dronkers, Jaap. 2006. "Stability and Change in the Educational Gradients of Divorce: A Comparison of 17 Countries." *European Sociological Review* 22: 501-17. Doi: 10.1093/esr/jcl011

Hoem, Jan M. 1997. "Educational gradients in divorce risks in Sweden in recent decades." *Population studies* 51(1): 19-27.

Huinink, Johannes, Brüderl, Josef, Nauck, Bernhard, Walper, Sabine, Castiglioni, Laura, Feldhaus, Michael. 2011. "Panel analysis of intimate relationships and family dynamics (pairfam): Conceptual framework and design." *Zeitschrift für Familienforschung-Journal of Family Research* 23(1).

Jann, Ben. 2008. "The Blinder-Oaxaca decomposition for linear regression models." *The Stata Journal* 8(4): 453-478.

Jonsson, Jan O., Gähler, Michael. 1997. “Family dissolution, family reconstitution, and children's educational careers: Recent evidence for Sweden.” *Demography* 34(2): 277-293. doi:10.2307/2061705

Kalmijn, Matthijs. 2010. “Racial differences in the effects of parental divorce and separation on children: Generalizing the evidence to a European case.” *Social Science Research* 39(5): 845-856. doi:10.1016/j.ssresearch.2010.05.002

Kiernan, Kathleen E. 1997. *The Legacy of Parental Divorce: Social, Economic and Demographic Experiences in Adulthood.* Working paper, LSE, Centre for Analysis of Social Exclusion.

Kiernan, Kathleen E. 2001. “European Perspectives on Nonmarital Childbearing.” In Out of Wedlock: Causes and Consequences of Nonmarital Fertility, edited by Larry Wu and Barbara Wolfe. Russell Sage Foundation.

Kiernan, Kathleen E. 2004. “Unmarried Cohabitation and Parenthood: Here to Stay? European Perspectives.” In The Future of the Family, edited by Daniel P. Moynihan, Timothy Smeeding, and Lee Rainwater. Russell Sage Foundation.

Kim, Hyun S. 2011. “Consequences of parental divorce for child development.” *American Sociological Review* 76(3): 487-511. doi:10.1177/0003122411407748

Mandemakers, Jornt J., Kalmijn, Matthijs. 2014. “Do Mother’s and Father’s Education Condition the Impact of Parental Divorce on Child Well-being?” *Social Science Research* 44: 187-199. Doi: 10.1016/j.ssresearch.2013.12.003

Martin, Molly A. 2012. “Family Structure and the Intergenerational Transmission of Educational Advantage.” *Social Science Research* 41: 33-47. Doi: 10.1016/j.ssresearch.2011.07.005

Matysiak, Anna, Marta Styrc, Vignoli, Daniele. 2013. “The Changing Educational Gradient in Marital Disruption: A Meta-analysis of European Research Findings.” *Population Studies* 68 (2): 197-215.

McLanahan, Sara S. 2004. “Diverging Destinies: How Children are Faring under the Second Demographic Transition.” *Demography* 41: 607-627. Doi: 10.1353/dem.2004.0033

McLanahan, Sara S., Sandefur, Gary. 1994. Growing up with a single parent - what hurts, what helps. Harvard Press. doi:978-0674364080

McLanahan, Sara, Percheski, Christine. 2008. “Family Structure and the Reproduction of Inequalities.” *Annual Review of Sociology* 34: 257-276. Doi: 10.1146/annurev.soc.34.040507.134549

McLanahan, Sara, Tach, Laura, Schneider, Daniel. 2013. ”The Causal Effects of Father Absence.” *Annual Review of Sociology* 39: 399-427.

Nauck, Bernhard, Brüderl, Josef, Huinink, Johannes, Walper, Sabine. 2013. *The German family panel (pairfam).* GESIS Data Archive, Cologne. ZA5678 Data file Version, 4(0).

Nathan, Gad 1999. *A Review of Sample Attrition and Representativeness in Three Longitudinal Surveys.* Government Statistical Service Methodology Series, No. 13.

OECD. 1999. Classifying Educational Programmes: Manual for ISCED-97 Implementation in OECD Countries, 1999 Edition. Paris: OECD.

OECD. 2011. PISA 2009 at a Glance. Paris: OECD

OECD. 2013. PISA 2012 Results: Excellence through Equity (Volume II). OECD: Paris.

Ono, Hiromi. 2009. “Husbands' and wives' education and divorce in the United States and Japan, 1946-2000.” *Journal of Family History* 34(3): 292-322.

Park, Hyunjoon, Raymo, James M. 2013. “Divorce in Korea: Trends and Educational Differentials.” *Journal of Marriage and Family* 75 (1): 110-126.

Perelli-Harris, Brienna, Kreyenfeld, Michaela, Sigle-Rushton, Wendy, Keizer, Renske, Lappegård, Trude, Jasilioniene, Aiva, Berghammer, Caroline, Di Giuilio, Paola. 2011.. “Changes in Union Status during the Transition to Parenthood in Eleven European Countries, 1970s to Early 2000s.” *Population Studies* 66 (2): 167-182.

Raymo, James M., Fukuda, Setsuya, Iwasawa, Miho. 2013. “Educational Differences in Divorce in Japan.” *Demographic Research* 28 (6): 177-206.

Steele, Fiona, Sigle-Rushton, Wendy, Kravdal, Øystein. 2009. ”Consequences of family disruption on children's educational outcomes in Norway.” *Demography* 46 (3): 553-574. doi:10.1353/dem.0.0063

Stevenson, Betsey, Wolfers, Justin. 2007. “Marriage and Divorce: Changes and their Driving Forces.” *Journal of Economic Perspectives* 21: 27-52.

Strohschein, Lisa. 2005. “Parental divorce and child mental health trajectories.” *Journal of Marriage and Family* 67(5): 1286-1300. doi:10.1111/j.1741-3737.2005.00217.x

Yun, Myeong-Su. 2004. “Decomposing differences in the first moment.” *Economics Letters* 82: 275-280.

Appendix

Online Appendix A. Estimates for Years of Education

Figures A1-A4. Actual and Counterfactual Differences in Years Of Education Compared to Children of Lower Educated Mothers (ISCED 1-2)

Figure A1. Germany

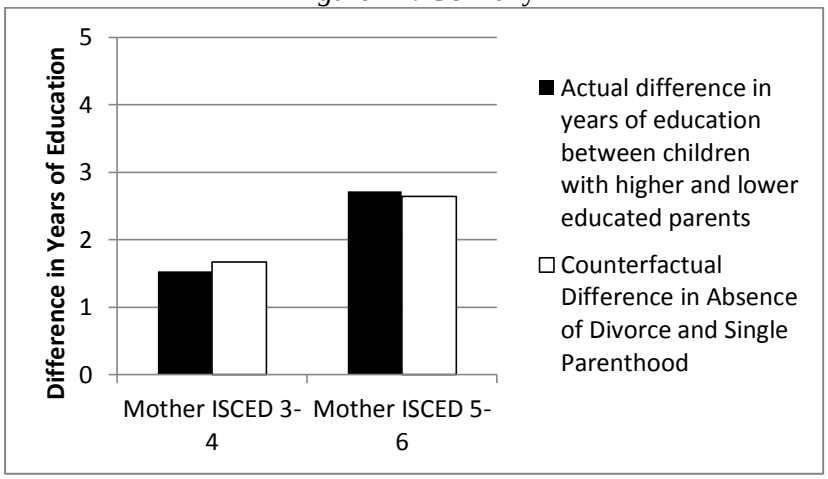


Figure A2. Italy

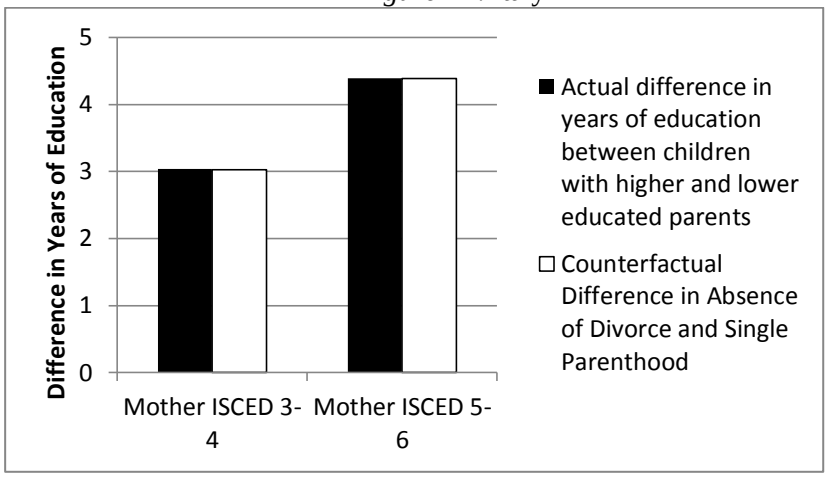


Figure A3. UK

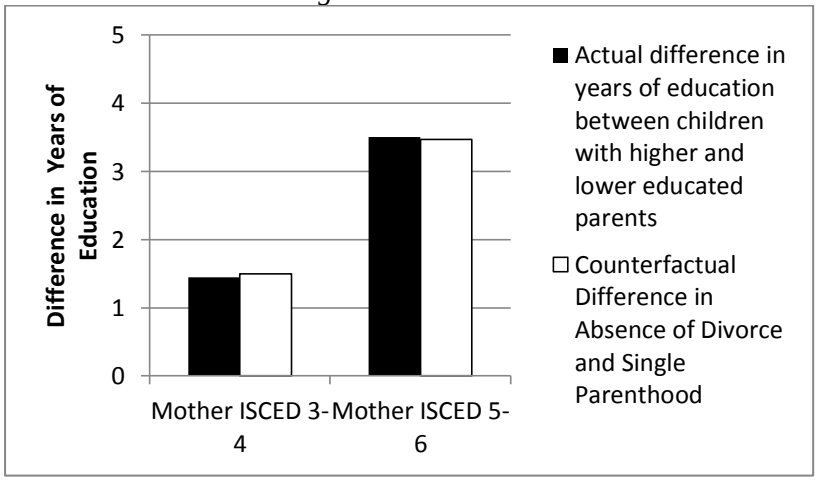
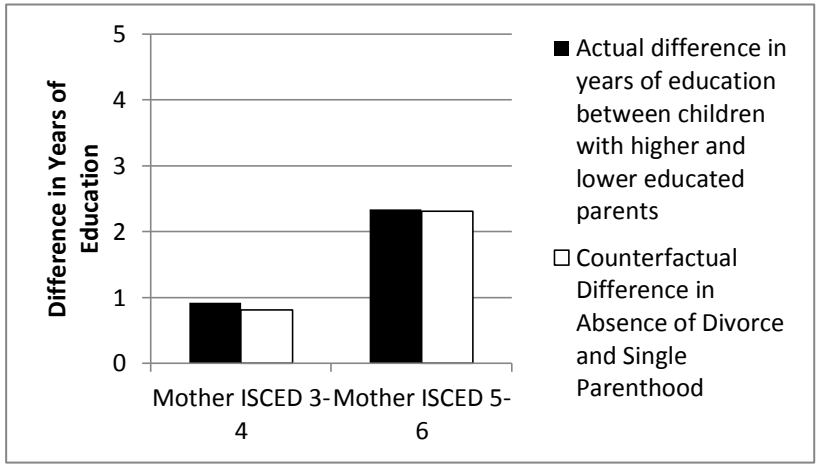


*Figure A4.*US



Note. Counterfactual difference based on part unexplained by Blinder-Oaxaca decomposition once accounting for family structure and its effects by parental education. Adjusted for gender, age (centered on average), ethnicity, and survey year.

Online Appendix B. Estimates Based on Non-Linear Models

Figures B1-B4. Actual and Counterfactual Probabilities of Attaining Tertiary Education for Educational Background Compared to Children of Lower Educated Mothers (ISCED 1-2), based on non-linear Oaxaca Decompositions (Yun 2004).

Figure B1. Germany

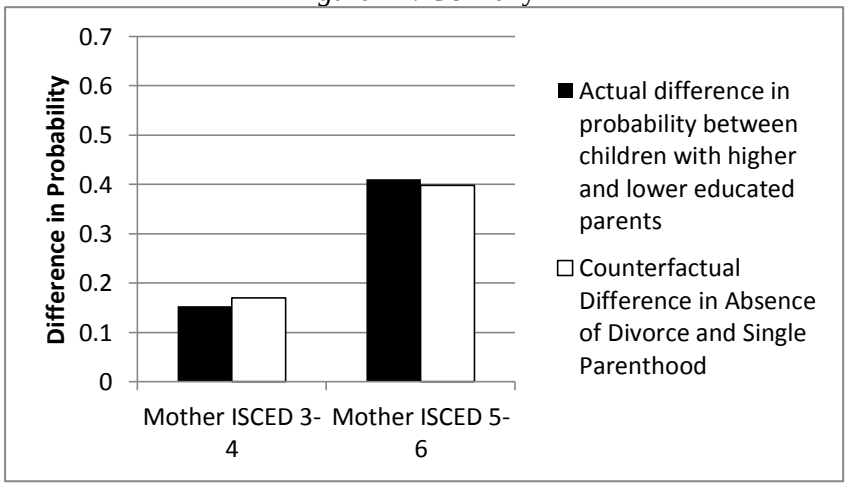


Figure B2. Italy

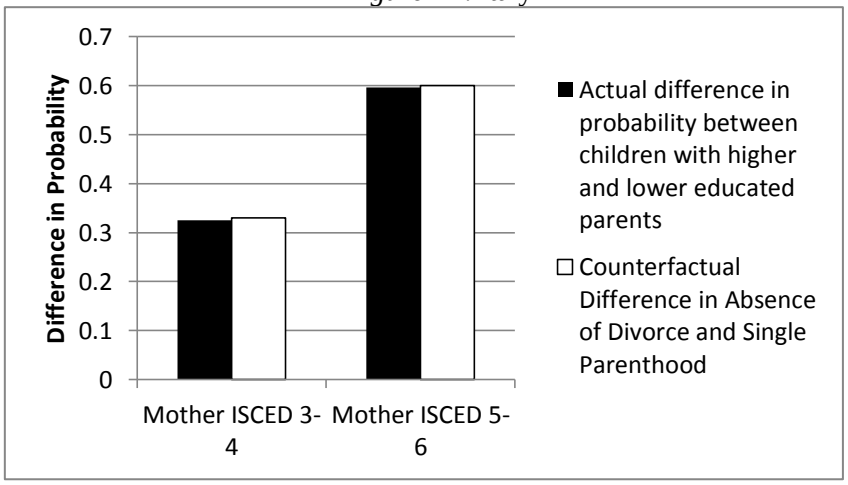


Figure B3. UK

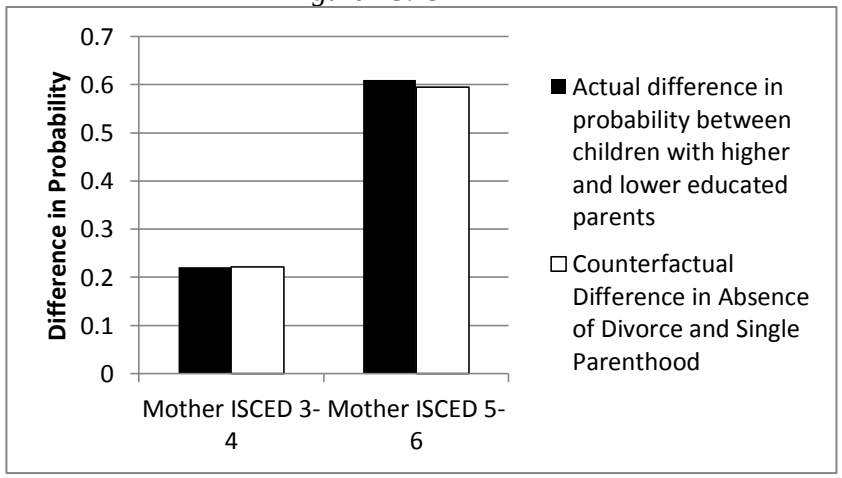
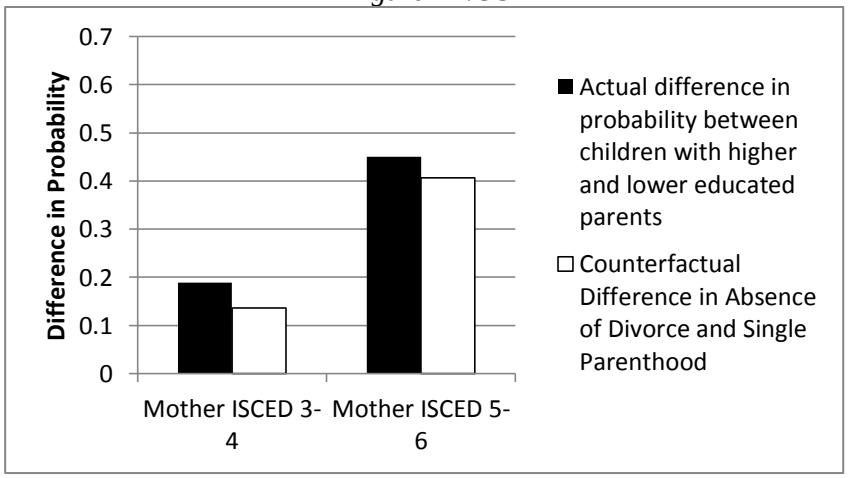


*Figure B4.*US



Note. Counterfactual difference based on part unexplained by Blinder-Oaxaca decomposition once accounting for family structure and its effects by parental education. Adjusted for gender, age (centered on average), ethnicity, and survey year.

Online Appendix C. Estimates Combining Education of Both Parents and Excluding Mothers Who Gave Birth Unpartnered
Figures C1-C4. Actual and Counterfactual Differences in Probability of Attaining Tertiary Education Compared to Both Parents ISCED 1-2

Figure C1; Germany N = 1 796

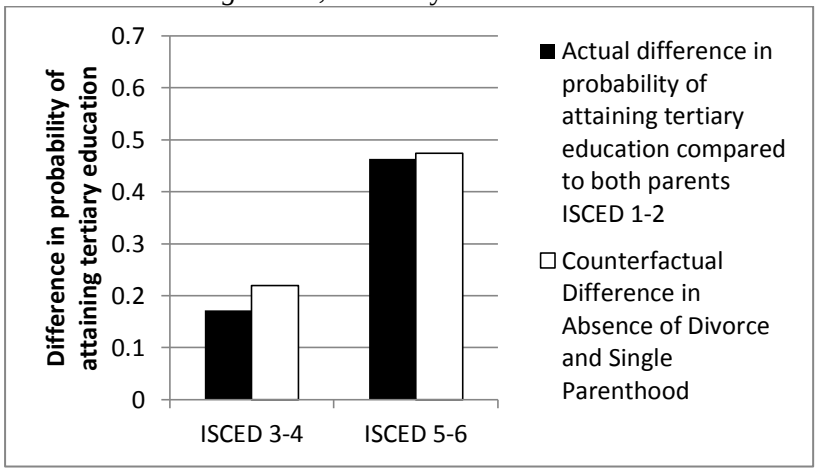


Figure C2; Italy N = 9 380

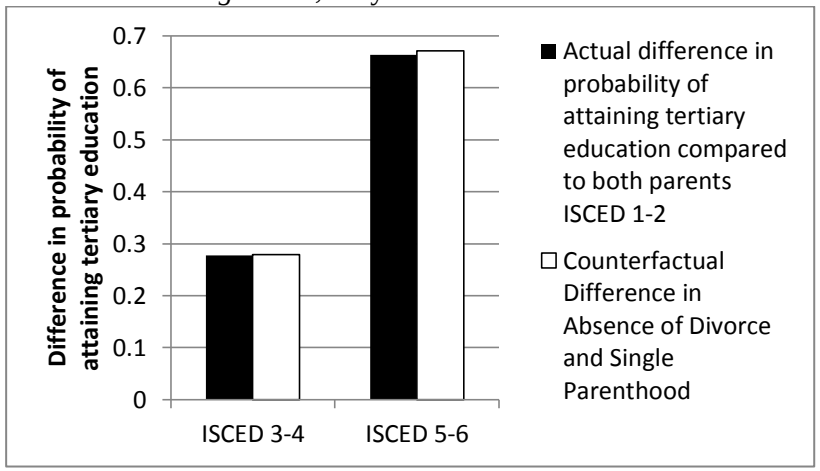


Figure C3; UK N = 9 907

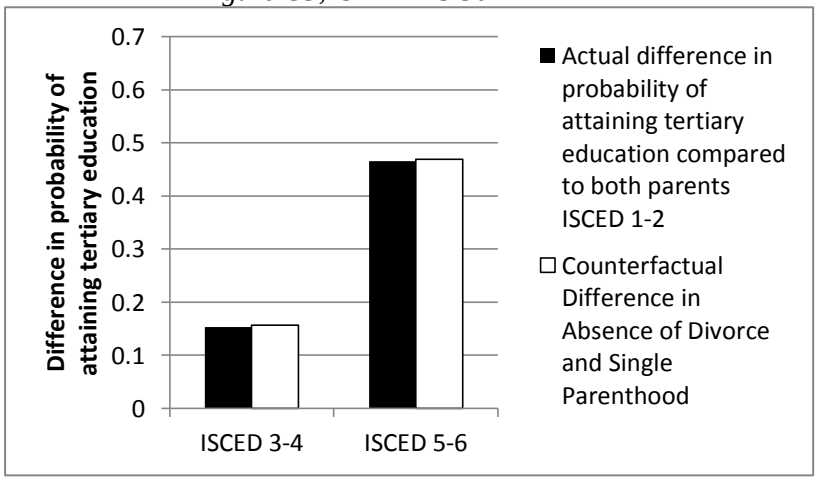
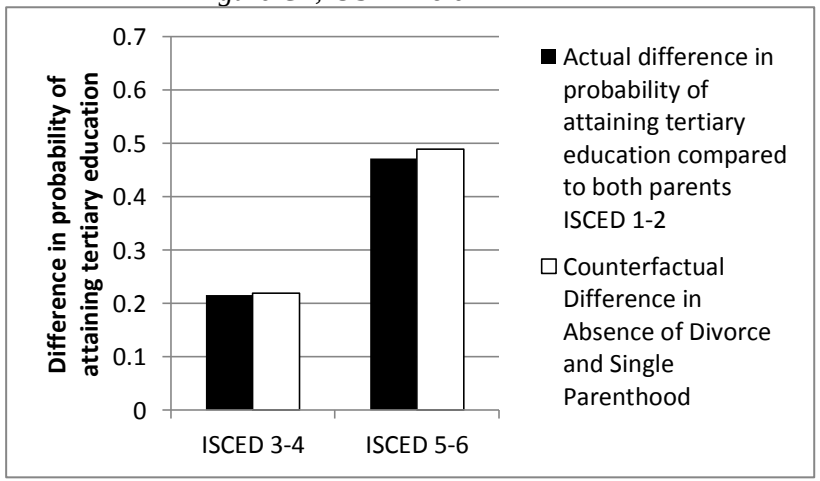


Figure C4; US N = 6 072



Note. Counterfactual difference based on part unexplained by Blinder-Oaxaca decomposition once accounting for family structure and its effects by parental education. Adjusted for gender, age (centered on average), ethnicity, and survey year.