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Research Article

**Parental education, divorce, and children’s
educational attainment: Evidence from a
comparative analysis**

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Parental education, divorce, and children's educational attainment: Evidence from a comparative analysis

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Abstract

BACKGROUND

Children who experience parental divorce have worse long-term educational attainment than children living in intact families. Less clear is the extent to which heterogeneity in the divorce penalty depends on parents' socioeconomic background and contextual characteristics.

OBJECTIVE

This study focuses on the negative consequences of parental divorce for children's tertiary education attainment, their heterogeneity by parental socioeconomic background, and variation across time and space.

METHOD

Single-level and multi-level linear probability models are estimated on several data sources in a comparative analysis of European countries and US regions. Different operationalizations of parental divorce are employed, including both marital and non-marital dissolutions.

RESULTS

Results show a stronger negative association between parental divorce and the probability of obtaining a university degree for children of highly educated parents. This holds across different birth cohorts in both Europe and the United States, largely irrespective of the country or region of residence, the dataset, and the operationalization of divorce and parental education. Higher divorce and university enrollment rates increase the absolute size of the divorce penalty, but do not substantially alter its pattern of heterogeneity.

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CONCLUSION

Children of high-SES families have more to lose in terms of the family resources relevant to achieving a university degree and are thus more negatively affected by parental divorce.

CONTRIBUTION

The finding that the association between parental divorce and children's educational attainment is stronger for children of highly educated parents across a variety of social and institutional environments has implications for the role of divorce in the reproduction of social inequalities.

1. Introduction

There is ample empirical evidence showing that children experiencing parental divorce fare worse than children living in intact families on different measures of well-being (Härkönen, Bernardi, and Boertien 2017; Amato 2000), as well as short-term educational performance (achievement test scores during childhood and adolescence; see, e.g., Amato and Anthony 2014) and long-term educational attainment (the probability of obtaining a tertiary degree; see, e.g., Bernardi and Radl 2014; Brand et al. 2019a, 2019b). Previous studies have labelled the negative association between parental divorce and children's educational attainment the 'divorce penalty' (Bernardi and Radl 2014).⁴

This article addresses two aspects of the divorce penalty that remain relatively under-investigated in the literature. First, it is only recently that a few studies have analyzed heterogeneity in the divorce penalty by social background; i.e., whether the negative effects of parental divorce on children's educational outcomes are stronger for children with lower or higher socioeconomic status (SES) (Amato and Anthony 2014; Bernardi and Boertien 2017; Bernardi and Radl 2014; Grätz 2015; Martin 2012). Second, large-N comparative studies of cross-country differences in the effects of divorce on children's outcomes are still relatively rare, especially those focusing on educational outcomes. The few comparative studies analyze variation in the divorce penalty in test scores or educational attainment based on the level of diffusion of divorce (or single-parent households), suggesting that the higher the diffusion of divorce, the greater its negative effect on children's educational outcomes (Bernardi and Radl 2014; De Lange, Dronkers, and Wolbers 2009; Kreidl, Štípková, and Hubatková 2017; Pong, Dronkers, and Hampden-Thompson 2003).

⁴ In the following we use the terms 'parental divorce' and 'parental separation' as synonyms, to indicate both marital and non-marital dissolutions.

In this paper we fill this gap in the divorce literature and investigate the divorce penalty in tertiary education attainment and its heterogeneity by parental education for different birth cohorts in 33 countries in geographical Europe and in 9 census regions of the United States. We pool data from the Generations and Gender Programme and the European Values Study for Europe, and the General Social Survey for the United States. First, we provide descriptive evidence of (possible) variation in the divorce penalty and its heterogeneity across European countries, US regions, and birth cohorts. Second, we employ multilevel models that include divorce and university enrollment rates as potential contextual moderators of the relations between parental education, family arrangement, and children's tertiary education attainment. The inclusion and separate analysis of US census regions is motivated by the existence of almost as much heterogeneity across US regions as among European states, especially in terms of divorce rates – an issue which has long been investigated in the literature (see, e.g., Glenn and Shelton 1985; Glass and Levchak 2014). Furthermore, recent studies on the geography of social mobility suggest that there are huge subnational variations in the processes underlying the intergenerational reproduction of inequality, especially within the United States (Chetty et al. 2014).

Compared to previous studies, we consider a much wider selection of countries and regions. To the best of our knowledge, the only previous comparative study that has explored three-way interactions between parental divorce, socioeconomic background, and contextual characteristics is based on 14 European countries (Bernardi and Radl 2014). We thus present novel evidence for many countries that have not been considered in previous research. Moreover, since we employ different data sources we are also able to perform an identical analysis of parallel data sets to test the robustness of our results (Firebaugh 2008).

In section 2 we synthesize the theoretical debate on heterogeneity in the divorce penalty in children's educational attainment by socioeconomic background, and on possible variation across time and space in the relations under study. In section 3 we present our data and variables, paying particular attention to the different operationalizations of parental divorce across surveys. The results are presented in section 4 and discussed in section 5.

2. Theoretical background and hypotheses

2.1 Heterogeneity in the divorce penalty by parental SES

The evidence concerning heterogeneity in divorce penalties in children's educational attainment by parental SES is apparently mixed. Whereas some studies do find that

socioeconomically advantaged families manage to shelter their pupils from the negative consequences of parental separation (Amato and Anthony 2014; Grätz 2015), others find the opposite (Nilsen et al. 2020). However, the variability in the results often corresponds to differences in the outcome considered, as we shall discuss. When educational attainment – and in particular tertiary education attainment – is considered, the available evidence consistently points to a higher penalty for children from high-SES families (Bernardi and Boertien 2017). How can this finding be explained? There are two main explanations that do not exclude each other but might work in combination.

Brand et al. (2019a) analyze how the impact of parental divorce on children's educational attainment in the United States varies by the parents' propensity to divorce. Their results show that parental divorce is most detrimental for the educational outcomes of children whose parents were least likely to divorce, especially as far as college attendance and completion are concerned. On the contrary, the educational outcomes of children of parents who were most likely to divorce are largely unaffected by parental separation. They interpret these results in terms of the degree of preparedness for parental dissolution: children of high-risk marriages anticipate and/or accommodate the dissolution of their parents' marriage better than children of low-risk marriages, for whom parental divorce is an unexpected event. To the extent that the risk of divorce is lower among high-SES couples – as is the case in the US cohorts considered by Brand and colleagues – one could argue that parental divorce is more frequently a more unexpected event for children in high-SES families, thus involving more negative consequences for them.

Bernardi and Radl (2014) provide a different explanation. They argue that children from advantaged families have more to lose in terms of social, economic, and cultural resources if their parents break up. Conversely, children from disadvantaged families have fewer resources to lose that are pivotal for educational attainment. They already face several obstacles to achieving tertiary education, and parental separation can only marginally disrupt their chances. This may also explain why the effects of divorce on children's socioeconomic outcomes have been found to be weaker among African Americans and ethnic minorities (Kalmijn 2010). However, parental resources are not equally relevant to all educational choices: they are especially important when it comes to more ambitious educational plans. Thus, a corollary of this argument is that the effects of parental divorce may depend on a combination of social background and the educational outcome considered (Bernardi and Comolli 2019; Guetto and Panichella 2019). For instance, in their analysis of upper secondary school choices in Italy, Guetto and Panichella (2019) study the risk of dropping out – which they refer to as a 'bad' outcome – and find that the divorce penalty is stronger for children of low-educated parents. On the contrary, when studying the chances of entering the most prestigious academic track – a 'good' outcome which implies the direct and indirect costs of

progression to tertiary education – children of tertiary-educated parents are the most affected.

Based on the two explanations, in terms of differences by SES in the propensity to divorce, and of the differences in the decline in resources associated with divorce, we can expect a stronger divorce penalty for children of high-SES parents, especially when considering a ‘good’ outcome such as tertiary education attainment. Thus, our first hypothesis is:

H1: The negative effect of parental divorce on tertiary education attainment is stronger for children of highly educated parents.

2.2 Differences across time and space in the divorce penalty and its heterogeneity

The second part of the study focuses on differences in the divorce penalty across time and space by parental socioeconomic background. It could be expected that the divorce penalty and its heterogeneity changed in parallel to the diffusion of divorce and educational expansion that Western societies witnessed after WWII.

According to the institutionalization hypothesis, divorce penalties should decline as divorces become more common and socially accepted. In demographic research, Cherlin (2004) has developed the concept of (de-)institutionalization in relation to (changes in) the social norms supporting the matrimonial institution and Soons and Kalmijn (2009) applied it in their study of the well-being gap between cohabitants and married persons. They found that as cohabitation spreads and gains normative status in society, its negative consequences for cohabitants’ well-being decline. Extending this argument to the diffusion of divorce, it can be argued that the more widespread and normatively accepted divorce is in a society, the lower the stigmatization that divorced parents and their children face. This would also translate into parental divorce having fewer negative consequences for children’s educational outcomes. However, the few empirical studies that have tested the institutionalization hypothesis found exactly the opposite result (Bernardi and Radl 2014; De Lange, Dronkers, and Wolbers 2009; Kreidl, Štípková, and Hubatková 2017; Pong, Dronkers, and Hampden-Thompson 2003); i.e., a larger divorce penalty when divorce is more common. A possible explanation, first put forward by Pong and colleagues (2003), is that when the legal, social, and economic barriers to divorce are high, only families with very high parental conflict seek a divorce. In such circumstances, children might actually benefit from parental separation. When divorces become more common, relatively low-conflict families – or to use Brand et al.’s (2019a) ideation, ‘low-propensity’ families – also divorce. For these families, the negative effects of parental separation are not partly counterbalanced by the benefits of decreasing parental conflict.

With the diffusion of divorce, the argument goes, the penalty increases because there are an increasingly greater number of low-propensity divorces. Thus, our hypothesis H2 is as follows:

H2: The negative effect of parental divorce on children's tertiary education attainment is stronger in countries, regions, and cohorts with a higher diffusion of divorce.

To frame theoretically the influence of educational expansion it is useful to refer to Bernardi and Comolli (2019), who provide a structural theory arguing that the divorce penalty and its heterogeneity differ depending on the selectivity of a given educational outcome. In particular, the smallest penalty will be observed for very selective and rare outcomes (e.g., tertiary education attainment in the case of children from low-SES families) and very common outcomes (e.g., high-school completion for children of advantaged families). At the extremes, when nobody or everybody of a given social background attains a given level of education, no penalty can be associated with parental divorce. Based on this argument, we can hypothesize a U-shaped trend in divorce effects in tertiary education attainment at different levels of educational expansion. Attaining a university degree was a very selective outcome in many Western societies for the cohorts born before the 1970s. Thus, we can predict a small divorce penalty for older cohorts characterized by low university enrolment rates, as parental divorce cannot have much effect on the chances of an outcome when those chances are already very low. Notwithstanding important differences across countries, with educational expansion university enrollment becomes less selective. That is, the pool of upper secondary and university students exposed to the consequences of parental separation is less positively selected in terms of capacity and motivation. Therefore, parental separation can have more consequences on this more heterogeneous body of students. Thus, we can expect that in countries, regions, and cohorts where university enrollment rates are higher and/or increasing, children of divorced parents experience more severe consequences in tertiary education attainment. However, at more advanced stages of educational expansion, divorce penalties should start to shrink. From a purely theoretical point of view, were university enrollment rates to approach saturation levels we would again observe small or no divorce penalties. However, university enrolment rates are far from reaching saturation levels in all Western societies, especially among the cohorts selected in this study, which may make it difficult to observe empirically the hypothesized U-shaped pattern. Thus, our hypothesis H3 is as follows:

H3: The negative effect of parental divorce on children's tertiary education attainment first increases and then stabilizes with the expansion of higher education.

Hypotheses H2 and H3 provide expectations of differences across countries, regions, and cohorts in the average divorce penalty, based on the levels of diffusion of divorce and educational expansion. We refrain, however, from formulating explicit research hypotheses on how heterogeneity in the divorce penalty by parental education might change across countries and cohorts. In order to do so it would be necessary to consider trends in divorce and university enrolment rates that are specific to each educational group. We know that the educational gradient in the risk of divorce has changed over cohorts from positive to negative (Härkönen and Dronkers 2006; Matysiak, Styrac, and Vignoli 2014), which suggests that the propensity to divorce was in fact greater for high-SES parents at the very early stages of divorce diffusion. At the same time, access to tertiary education expanded for socioeconomically advantaged families, making them more vulnerable to the negative consequences of parental divorce, to be followed later by more disadvantaged families (Raftery and Hout 1993). Theorizing on the effects of these joint trends for each socio-economic group goes beyond the scope of the present paper, whose purpose is mainly descriptive.

3. Method

3.1 Data and sample selection

We employ three different nationally representative data sources. First, we use the fourth wave of the European Values Study (EVS) carried out between 2008 and 2010 (EVS 2016). Second, for 16 countries included in the EVS (Austria, Belgium, Bulgaria, Czech Republic, Estonia, France, Georgia, Germany, Hungary, Italy, Lithuania, Netherlands, Poland, Romania, Russian Federation, Sweden) we also rely on the first wave of the Generations and Gender Programme (GGP) (Gauthier, Cabaço, and Emery 2018). Interviews took place between 2002 and 2011 depending on the country. The EVS and GGP surveys are pooled together for the analyses concerning Europe. We include in the analytical sample only countries reporting at least five observations across all combinations of parental education and family arrangement (Table A-3 in the Appendix). Finally, for the United States we pooled all waves of the General Social Survey (GSS) (Smith et al. 2019) taking place yearly between 1972 and 2018. Overall, we study 33 European countries and 9 US census regions.⁵ The complete lists of the selected European

⁵ Although particularly relevant for the North American context, regional variation is often substantial within European countries as well, both in terms of educational inequalities and diffusion of divorce. However, the limited sample size – across combinations of parental education, family arrangement, and children’s educational attainment – prevented us from also exploring within-country heterogeneity for European countries.

countries and US regions with the related sample sizes can be found in Table A-1 and Table A-2 in the Appendix.

For reasons of comparability, we applied the same sample selection and analytical design across the three data sources, as in Bernardi and Radl (2014): we consider individuals older than 25 and born in the cohorts 1945–1954, 1955–1964, 1965–1974, and 1975–1984. Individuals who migrated in the country of interview after age 16 have been excluded from the analysis (roughly 7% of the sample in each survey). Also, individuals who were not living with at least one parent, for whatever reason, during childhood – roughly 2.5%, 2%, and 6.5% of the sample in the EVS, GGP, and GSS, respectively – had to be excluded for missing information on parental education (see below). After further deleting cases with missing values on the other variables of interest (a negligible amount, less than 1% of the sample), the analytical sample consists of 128,294 individuals for Europe and 26,202 individuals for the United States.

3.2 Micro-level variables

The dependent variable is the same across the three surveys, namely a binary variable for whether respondents achieved tertiary education (ISCED 5–6).

The main independent variable is whether or not respondents experienced parental divorce, operationalized in two ways. Each survey measures whether the respondent lived with only one parent during childhood ('non-intact family'), and whether and when the respondent experienced parental breakup ('parental breakup'). Concerning the latter, in the EVS and GGP we only considered breakups that happened before the respondent's 17th birthday so as to harmonize the information with the GSS specification. However, the surveys differ in the way the information was collected, as shown below (Table 1). While the EVS only considers marital dissolutions in the 'breakup' specification, the GGP includes all types of union dissolution. In the GSS, information concerning parental marriage dissolution is filtered by the 'non-intact' variable: only those individuals who did not live with both biological parents at around age 16 get to answer the 'breakup' question. In the 'non-intact' specification the three surveys are conceptually comparable, although the time frame differs slightly. Remarkably, despite the aforementioned differences, our main results are very similar across the two specifications of parental divorce and the three surveys, as we shall discuss.

Table 1: Operationalization of parental divorce in the EVS, GGP, and GSS surveys

	<i>Non-intact family</i>	<i>Parental breakup</i>
EVS	“When you were 14, did you live with your parents?”	“Did you ever experience the divorce of your parents?” (before the 17 th birthday)
GGP	“Did you live most of your childhood up to the age of 15 with both of your own biological parents?”	“Did your biological parents ever break up?” (before the 17 th birthday)
GSS	“Were you living with both your own mother and father around the time you were 16?”	Filtered by ‘non-intact’: if yes, reason why the respondent did not live with both parents (separation, divorce)

In the GGP and the EVS data, missing values on one definition of parental divorce are substituted using valid values on the other specification. In fact, in the GGP survey the ‘non-intact’ variable reports all missing values for Italy, Hungary, and Estonia, whereas Poland, Germany, and the Czech Republic report a large number of missing values on the ‘breakup’ variable; i.e., in these countries the ‘non-intact’ and ‘breakup’ variables correspond.⁶

The other main independent variable, used to operationalize parental SES, is parental educational level measured in three categories: low (ISCED 0–2), medium (ISCED 3–4), and high (ISCED 5–6). For the United States the categories are: low (less than high school), medium (high school), and high (some college). The reasons for focusing on parental education are twofold. First, it has higher comparability across countries, cohorts, and studies than occupational classifications and social class schemes; and second, parental education is a much stronger predictor of children’s educational outcomes than parental social class (Barone and Ruggera 2018). For those who lived with both biological parents we used the highest level of parental education, whereas for those who experienced parental divorce (or lived in a non-intact family) we used the level of education of the biological parent the respondent lived with. As mentioned, individuals who were not living with at least one biological parent had to be excluded from the analytical sample as they did not answer the question on parental education. In the EVS, information on parental education is totally missing if the respondent did not live with at least one biological parent at age 14, whereas the GGP and GSS provide information concerning step, foster, or adoptive parents. We decided to exclude them from the sample to harmonize the information with the EVS. Unfortunately, information on the educational attainment of the absent biological parent(s) is not available. In the results

⁶ In Figure S1 in the online supporting materials we show that this procedure does not alter our main results obtained using the raw parental divorce variables, with the advantage of preserving our sample sizes and to rely on the same analytical samples throughout the analyses.

section we also comment on a robustness check using mother's education to operationalize parental education, comparing children living with both parents and those living with a single mother.

Descriptive statistics concerning the main micro-level variables and their combinations, by European country and US region, can be found in Tables A-1, A-2, A-3, and A-4 in the Appendix.

3.3 Macro-level variables

The macro-level variables considered are the crude divorce rate and the university enrollment rate. The former is measured as the ratio of the number of divorces during the year to the average population in that year (per 1,000 persons). The latter is calculated by dividing the number of tertiary students in a given year by the size of the population in that year (per 10,000 persons). For Europe, divorce rates were retrieved from Eurostat and university enrollment rates from the Cross-National Time-Series (CNTS) Data Archive (Banks and Wilson 2020). For some countries where the indicators were not available, values were taken from Bernardi and Radl (2014), who relied on expert consultations. Indicators for the United States were obtained from the Census Bureau Statistical Abstracts. The choice of the crude divorce rate to indicate the degree of union instability is constrained by lack of comparable data including non-marital dissolutions. However, regions, countries, and cohorts with higher divorce rates are usually those that also have a higher diffusion of cohabitations (Kalmijn 2007).

Both indicators pertain to the country-cohort level for Europe, and to the region-cohort level for the United States. Each indicator refers to the year when the respondent was between 6 and 15 years old: 1960 for the 1945–1954 cohort, 1970 for the 1955–1964 cohort, 1980 for the 1965–1974 cohort, and 1990 for the 1975–1984 cohort.

While information on region of residence when the respondent was 16 years old is available for the United States, the same does not hold for European countries. Therefore, we employ information on the respondent's country of residence at the time of the interview, but we exclude individuals who were not yet living there by the age of 16. In this way, information on the country of residence at interview and in adolescence correspond.⁷

Descriptive statistics on the macro-level indicators are reported in Tables S1 and S2 in the online supporting materials. It was not possible to collect macro-level indicators for all countries included in the GGP and EVS surveys, especially for cohorts before

⁷ To assess the possible impact of geographical mobility across US regions, we replicated our results excluding respondents who moved to another state after age 16. Results remain virtually unchanged and are available upon request.

1990. In fact, countries that constituted the USSR, Yugoslavia, and Czechoslovakia were not yet independent, and Germany was divided into East and West. Values for university enrollment rates before 1990 are available for these political entities instead of the single independent states. Thus, the latter countries have been eliminated from models including the university enrollment rate as a macro-level indicator (see Equation 2, and Figure 5 below). Moreover, some countries reported missing values on the divorce rate, as displayed in Table S1. These data issues mean that models including university enrollment rates and divorce rates have different sample sizes – 82,428 and 122,119 respectively – and country composition.⁸

3.4 Analytical strategy

The analysis consists of two steps: the former employs single-level linear probability models (LPMs) in three different specifications, while the latter makes use of multilevel LPMs with two different specifications. In the first step, the base model is specified as follows:

$$\begin{aligned} tertiary_i = & \beta_0 + \beta_1 pardu_i + \beta_2 pardu_i * pardiv_i + \\ & + \beta_4 region/country_i \\ & + \beta_5 cohort_i \\ & + \beta_6 X_i + e_i \end{aligned} \quad (1)$$

In Equation (1), for each individual i , we estimate the divorce penalty in tertiary education attainment ($tertiary_i$) by level of parental education, via the inclusion of an interaction term between parental divorce ($pardiv_i$) and parental education ($paredu_i$). The analysis is carried out separately for Europe and the United States. The base model controls for region/country and birth cohort dummies. We also add a set of control variables X_i : gender and dataset (EVS or GGP) for the European countries; gender, race, and interview year for the United States.

Equation (1) is implemented in two further specifications. In the first, the term $\beta_3 pardu_i * pardiv_i$ is augmented with a three-way interaction with $cohort_i$; in the second, we include a three-way interaction with $region/country_i$. The former tests whether the divorce penalty by parental education changes across cohorts; the latter

⁸ Figure S1 in the online supporting materials compares our main results obtained, on the one hand, through models including all countries with valid information on micro-level variables, and on the other hand through models including only those countries having valid information on micro-level variables and both macro-level indicators. Results show that the loss of countries due to missing information on macro-level indicators does not alter our main conclusions concerning the associations between parental education, parental divorce, and tertiary education attainment.

explores whether the divorce penalty by parental education differs between European countries and US regions.

In the second step of the analysis the divorce penalty is estimated through a multilevel LPM, specified as follows:

$$\begin{aligned}
 \text{tertiary}_{ij} = & \beta_0 + \beta_1 \text{paredu}_{ij} + \beta_2 \text{pardiv}_{ij} + \beta_3 \text{paredu}_{ij} * \text{pardiv}_{ij} + \\
 & + \beta_4 \text{macroind}_j + \beta_5 \text{macroind}_j * \text{pardiv}_{ij} + \\
 & + \beta_6 \text{macroind}_j * \text{paredu}_{ij} + \\
 & + \beta_7 \text{paredu}_{ij} * \text{pardiv}_{ij} * \text{macroind}_j + \\
 & + \beta_8 X_{ij} + u_j + e_{ij}
 \end{aligned} \tag{2}$$

In Equation (2), the probability of having obtained tertiary education for person i in region/country-cohort j depends on level-1 predictors defined as in Equation (1) and random intercepts u_j for level-2 units defined by region/country-cohort combinations.⁹ The model also contains a random slope for parental divorce – all random parameters follow the conventional assumptions of random effects modeling. Compared to single-level models, the multilevel LPM adds macroind_j , the crude divorce rate and the university enrollment rate, as level-2 predictors which are included in the model in two separate specifications, in both linear and quadratic fashion, and with a three-way interaction term with parental divorce and parental education. The analysis is carried out separately for Europe (104 and 72 country-cohort combinations, depending on the macro-indicator) and the United States (36 region-cohort combinations).

The results of all models are shown graphically in terms of differences in the probability of achieving tertiary education between individuals who experienced parental breakup (or lived in a non-intact family), and those who did not. Full results of the main models are shown in Tables S3, S4, and S5 in the online supporting materials.

4. Results

4.1 The divorce penalty in tertiary education attainment across time and space

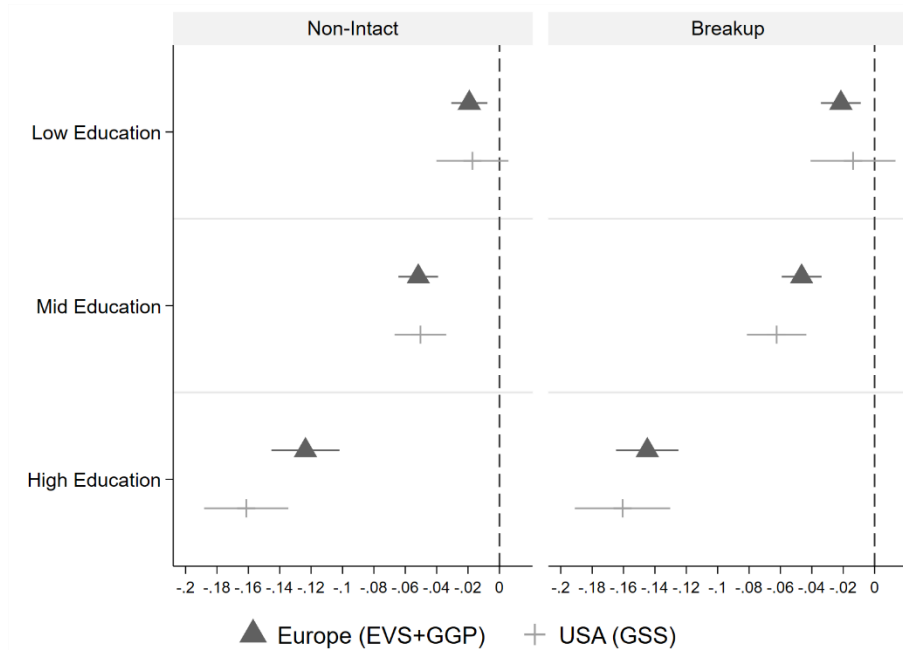
First, we investigate the divorce penalty in tertiary education attainment in Europe and the United States, by parental education. In Figure 1, triangles show results from Equation

⁹ We did not account for the clustering of region/country-cohort combinations within regions/countries. The number of US census regions ($N = 9$) and European countries ($N = 18$ for the model with university enrollment rates as macro-indicator) is below the threshold suggested to estimate reliable random effects in multilevel modeling (Bryan and Jenkins 2016). Nevertheless, we performed a robustness check by including European countries as a third level in our multilevel models, which led to virtually identical results.

(1) applied to European data (pooled EVS and GGP) and the crosses indicate results from the same equation applied to US data (GSS). These first results are in line with our hypothesis H1: regardless of the definition of parental divorce and of the geographical area, divorce penalties are of similar intensity and stronger for children of highly educated parents, roughly 13pp in Europe and 16pp in the United States. Children of middle-educated parents are also found to experience stronger penalties, of about 5–6pp in both areas, compared to children of low-educated parents, for whom penalties are virtually null.

Robustness checks included in Figure S1 in the online supporting materials show that a replication of results for Europe analyzing the EVS and GGP datasets separately gives results that are virtually identical. This parallel analysis on different datasets (Firebaugh 2008) thus confirms the robustness of our findings. Also, in additional models (available upon request) we replicated Figure 1 considering maternal education only, for both intact and non-intact families. Approximately 80% of children in single-parent households live with their mother. The pattern of heterogeneity remained unchanged, although the divorce penalties turned out to be slightly stronger, especially for children of highly educated mothers, in line with recent evidence by Nilsen et al. (2020). Finally, the divorce penalties in the log odds of tertiary education attainment by parental education, estimated through logistic regression models, are fully consistent with the results obtained using LPMs.

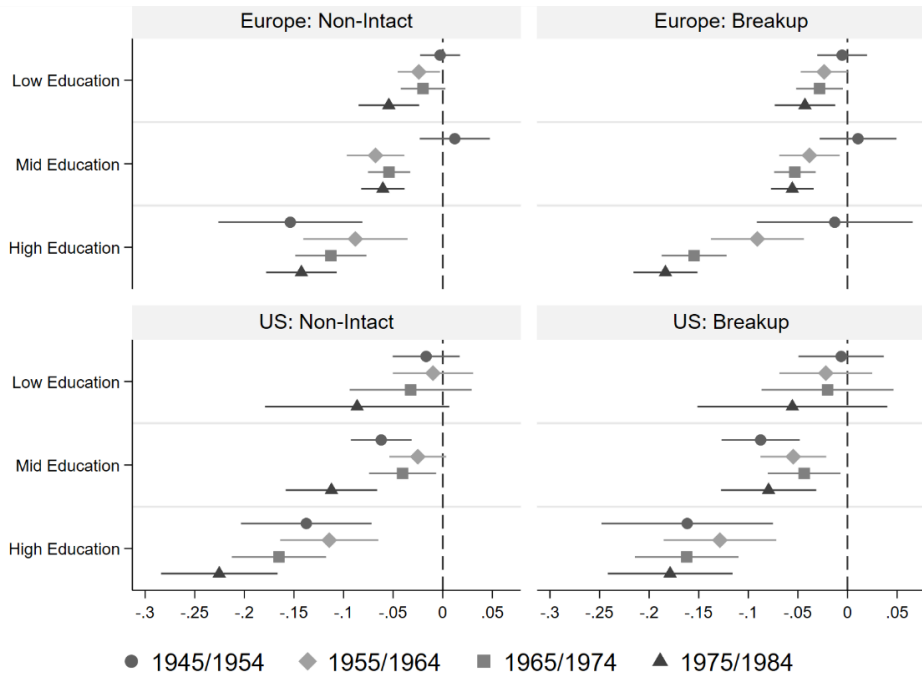
Figure 1: Divorce penalties in the probability of tertiary education attainment, by parental education



Note: 95% CI. Results from LPMs. Models for Europe control for gender, dataset, birth cohort, and country; models for the United States control for gender, race, survey year, birth cohort, and region.

Before moving on to the results of the multilevel models, we provide a first descriptive account of possible differences in the patterns described in Figure 1, across countries (Europe), regions (United States), and cohorts. In the second specification of Equation (1) we investigate the three-way interaction between parental divorce, parental education, and birth cohort. Figure 2 shows an overall increase in the penalties for the younger cohorts, across all the educational groups, in both Europe and the United States, consistent with our hypotheses H2 and H3 that educational expansion and the diffusion of divorce are associated with increased divorce penalties. However, these processes of social change do not seem to have altered the heterogeneity in the divorce penalty to any significant extent. The exception occurs for the oldest European cohort in the 'breakup' specification, for which we find no divorce penalty at all. The experience of parental divorce was in fact rather uncommon for European respondents born in the aftermath of WWII (see Table S1).

Figure 2: Divorce penalties in the probability of tertiary education attainment, by parental education and birth cohort



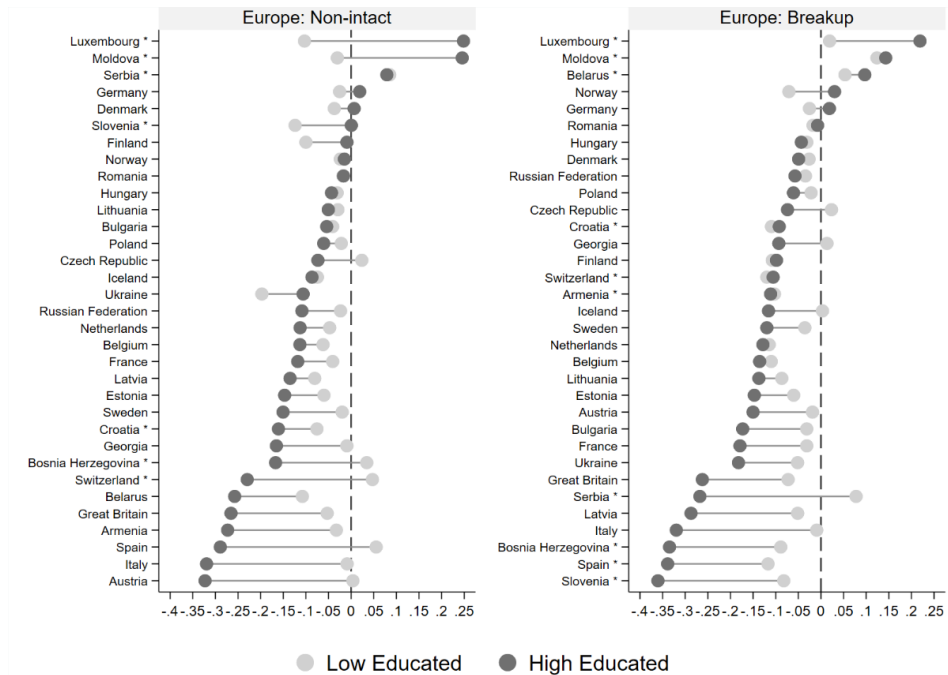
Note: 95% CI. Results from LPMs. Models for Europe control for gender, dataset, and country; models for the United States control for gender, race, survey year, and region.

The results of our third specification of Equation (1), which considered the three-way interaction between parental divorce, parental education, and country/region, are shown in Figures 3 and 4, referring to European countries and US regions, respectively. For the sake of simplicity, we focused on the cross-country/region comparison of divorce penalties between children of low-educated vs. highly educated parents. In some European countries there were less than ten observations across all combinations of parental education and family arrangement (see Table A-3 in Appendix), which is indicated with an asterisk in Figure 3. The analysis of the heterogeneity in the divorce penalty across countries/regions and especially across country-cohort combinations will benefit the most from the multilevel modeling.

Starting from Europe, results suggest that notwithstanding the differences in its overall magnitude, the divorce penalty was stronger for children of highly educated parents in almost all countries, particularly so for parental breakups. Apart from countries

with relatively smaller sample sizes (marked by an asterisk; e.g., Luxembourg and Moldova), exceptions to this overall pattern are Germany, Ukraine, and the Nordic countries (but not Sweden), Finland in particular. Whereas results for Germany are in line with the study by Grätz (2015), the results for the other countries are more difficult to interpret, especially differences across Nordic countries that share similar trends and patterns of divorce. Exceptions might be due to the operationalization of divorce in terms of having grown up in a 'non-intact family' or having experienced a parental 'breakup'. For instance, Finland and Ukraine show a substantially larger share of children living in a 'non-intact family', which may be the result of events other than divorce, including the dissolution of cohabitation or parental death (Table A-1 in the Appendix).

Figure 3: Divorce penalties in the probability of tertiary education attainment, by parental education and European country



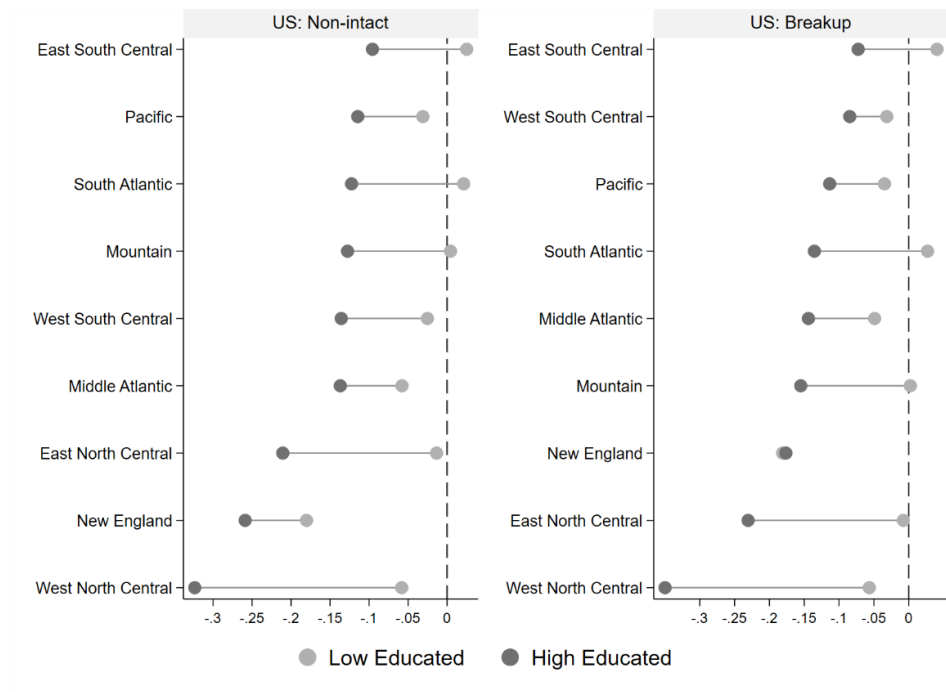
Note: Results from LPMs. Asterisks identify countries with less than 10 observations across all combinations of parental divorce and parental education. Models control for gender, dataset, and birth cohort.

The results concerning US regions (Figure 4), less affected by small sample size issues than European countries, were even clearer in showing stronger divorce penalties

for children of highly educated parents, the only exception being New England in the operationalization of parental divorce which only considered marital dissolutions ('breakup'). The magnitude of the divorce penalty as well as differences by parental education are also remarkably similar between regions characterized by very different levels of divorce diffusion (e.g., Pacific and Middle Atlantic, see Table S2).

These results already suggest that despite differing in magnitude across time and space, the pattern of heterogeneity in the divorce penalty by social background is relatively stable as compared to the enormous social, cultural, and institutional changes.

Figure 4: Divorce penalties in the probability of tertiary education attainment, by parental education and US region



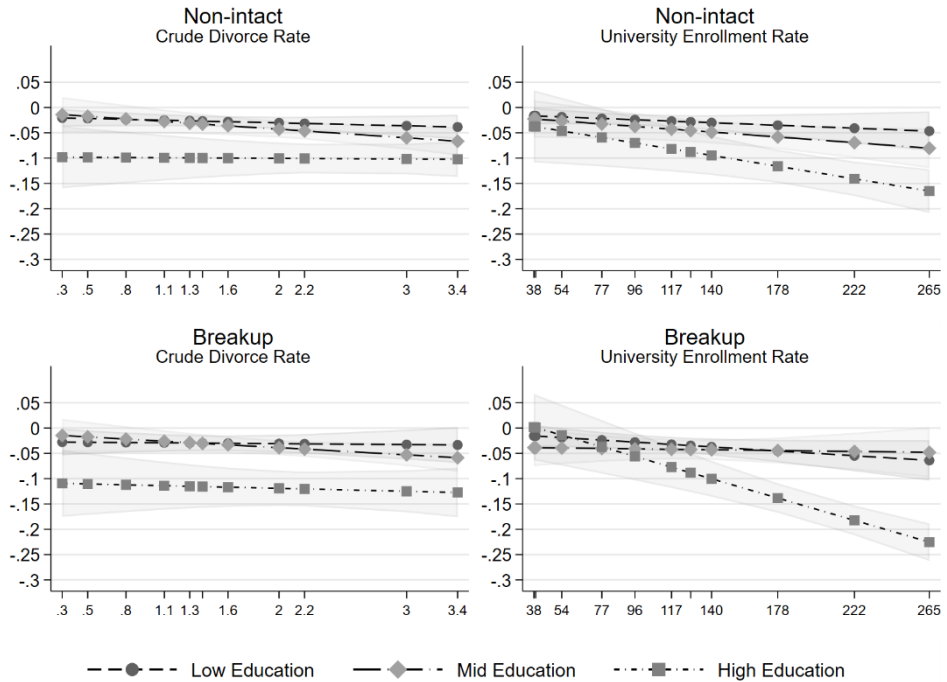
Note: Results from LPMs. Models control for gender, race, survey year, and birth cohort.

4.2 The moderating role of divorce rates and university enrollment rates on the divorce penalty and its heterogeneity

In this second part of the empirical analyses we studied whether the differences between regions/countries and cohorts in the divorce penalty and its heterogeneity could be explained by the diffusion of divorce and the expansion of tertiary education. Figures 5 and 6 show divorce penalties in the probability of tertiary education attainment by parental education, at different deciles of the distributions of divorce and university enrollment rates, for Europe and the United States respectively. Predictions derive from multilevel LPMs specified as in Equation (2).

Results for Europe (Figure 5) show that all lines have a negative slope, which confirms our hypotheses H2 and H3 that divorce penalties tend to increase with the diffusion of divorce and especially university enrollment. However, increasing divorce rates only marginally altered the result of a stronger penalty for the children of highly educated parents, although we could see some convergence in the top-left quadrant (non-intact/crude divorce rate specification), but only between children of middle-educated and highly educated parents. A more clear-cut three-way interaction was found for increasing participation in higher education: where university enrollment was rare the divorce penalty was small and homogeneous, whereas educational expansion increased the divorce penalty, especially for children of the highly educated. This result holds for all types of union dissolution, although it is more evident for marital dissolution ('breakup' specification) and is consistent with the idea that even children of advantaged families had little to lose from parental divorce while university enrollment remained a rare event. We also replicated Figure 5, augmenting Equation (2) with a quadratic term for the macro-indicators to capture the possible non-linear influence of educational expansion. The results did not change dramatically. Figure A-1 in the Appendix suggests that in those countries and cohorts where divorce and university enrollment were both rare events there was no divorce penalty even for children of highly educated parents. At increasing levels of educational expansion – e.g., university enrollment rates above 150 – the divorce penalty for children of highly educated parents and the overall heterogeneity by parental education tend to stabilize.

Figure 5: Divorce penalties in the probability of tertiary education attainment in Europe, by parental education and deciles of the macro-level indicators

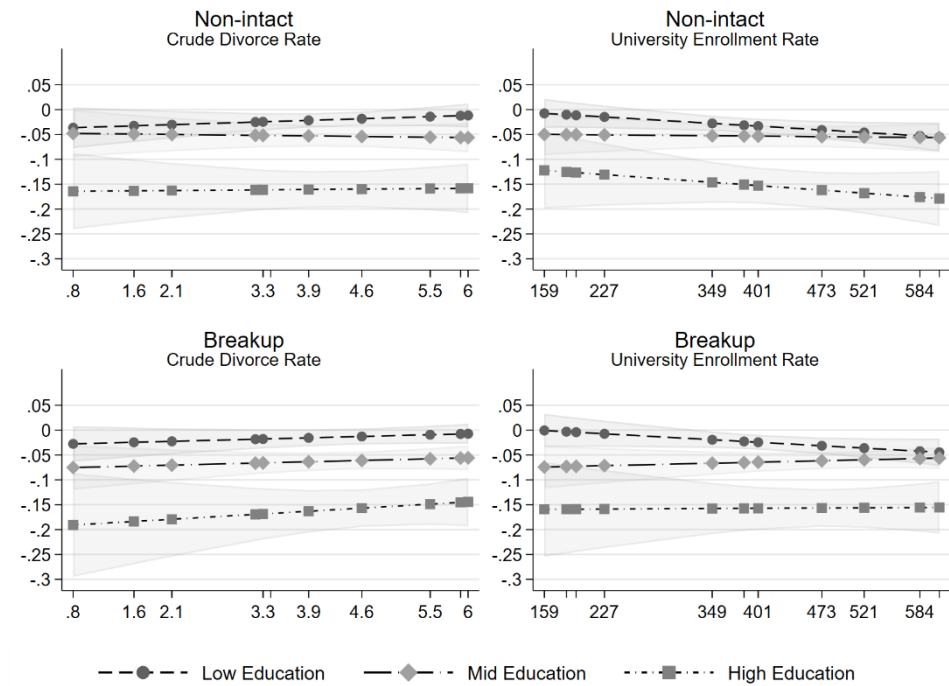


Note: 95% CI. Results from random-intercept and random-slope multilevel LPMS. Models control for gender and dataset and include 104 and 72 country-cohort combinations depending on the macro-level indicator (divorce rates and university enrollment rates, respectively).

As for the United States, Figure 6 suggests that even considering the large variation in the divorce rate across regions (ranging from .8 to 6, the first and the tenth decile respectively), children of highly educated parents were always the most affected by parental divorce. Contrary to our hypotheses H2, divorce penalties were rather stable, notwithstanding the diffusion of divorce. Similar to European countries, educational expansion was associated with higher divorce penalties, in line with our hypothesis H3. However, the effect was of smaller intensity, and the divorce penalty for children of highly educated parents remained substantially higher than for their less-educated counterparts, regardless of the university enrollment rate. These differences could be attributed to the higher levels of participation in higher education in the United States compared to Europe throughout our observational window, in line with our hypothesis

H3. The results suggested a slight convergence in the divorce penalties with increasing educational expansion (right quadrants), at least when comparing children of low- and middle-educated parents, in both operationalizations of parental divorce. Models augmented with a quadratic term for the macro-indicators (Figure A-2 in the Appendix) did not show substantially significant deviations from the pattern of results shown in Figure 6. That is, notwithstanding the much higher university enrolment rates in some US regions and cohorts compared to their European counterparts, the divorce penalty only shows weak signs of reduction – as suggested by a U-shaped trend hypothesis – but rather it stabilizes.

Figure 6: Divorce penalties in the probability of tertiary education attainment in the United States, by parental education and deciles of the macro-level indicators



Note: 95% CI. Results from random-intercept and random-slope multilevel LPMs. Models control for gender, race, and survey year, and include 36 region-cohort combinations.

5. Discussion

In this paper we analyzed how the divorce penalty in children's educational outcomes varies by their parental education. When it comes to tertiary education attainment, there are theoretical arguments suggesting that children from high-SES families are more strongly affected by parental separation than their low-SES counterparts. In fact, children of high-SES families have more to lose in terms of the resources that are particularly relevant to achieving a university degree (Bernardi and Comolli 2019; Guetto and Panichella 2019). Moreover, for the latter, parental divorce may be an unexpected and thus more disruptive event, given its lower prevalence among more socio-economically advantaged families (Brand et al. 2019a).

In line with these theoretical arguments, we found a stronger negative association between parental divorce and the probability of obtaining a university degree for the children of highly educated parents, whereas among children of the low-educated the size of the divorce penalty turned out to be negligible. This result holds across both European countries and the 9 census regions in the United States. Our estimates of the divorce penalty in the probability of attaining tertiary education for children of advantaged social background are similar, 13 and 16 percentage points respectively, and consistent in size with previous studies (see Bernardi and Radl 2014 for Europe; Brand et al. 2019a for the United States). Also, the finding is robust to changes in the operationalization of parental divorce and parental education, and as far as European countries are concerned, across different data sources. Thus, marital and cohabitation dissolutions seem to be accompanied by similar negative consequences for children's tertiary education attainment. We did find exceptions to this generalized pattern, most notably in Ukraine and among the Nordic countries (but not Sweden), and in particular in the case of Finland. We mentioned the possible role of the different incidence of cohabitation and forms of family disruption other than divorce, but future studies focusing on these countries and making use of wider national samples are needed to confirm and provide possible explanations for these findings.

Studying the relationship between parental divorce and children's tertiary education attainment is complicated by the huge social changes in both the diffusion of divorce and the expansion of tertiary education in all Western countries.

For these reasons, we analyzed whether and how the divorce penalty and its heterogeneity by parental education vary depending on the incidence of divorce and the degree of participation in higher education at the macro-level. We found that the rise in divorce and university enrollment rates increased the absolute size of the divorce penalty, especially in the very early stages of their diffusion, as suggested by the results for Europe. However, the finding of a higher divorce penalty for children of higher SES is remarkably stable over cohorts in Europe, and especially in the United States.

In light of our results, the diffusion of divorce may be interpreted as an 'equalizing mechanism' in the reproduction of social inequalities in tertiary education attainment. Due to parental separation, children of advantaged families lose some of the (economic) resources that contribute to their better educational outcomes (Bernardi and Boertien 2016; Brand et al. 2019b). However, it should be kept in mind that children of highly educated parents remain substantially advantaged compared to their low-SES counterparts, even in the case of parental divorce. Our models (Table S3) suggest that their advantage in the case of parental divorce declines from 48 to 35 percentage points, on average. That is, although differences by parental education in the probability of tertiary education attainment are greater among intact families than among divorced families, the magnitude of the socioeconomic inequality is much larger than that of the divorce penalty. In addition, the evidence that the socioeconomic heterogeneity of the divorce penalty is even stronger when operationalized using mothers' education instead of the dominance principle suggests that mechanisms other than the loss of the non-resident parent's economic resources may be relevant to explaining the higher divorce penalty for children of highly educated parents. As already argued in other studies that found a similar result (Martin 2012; Nilsen et al. 2020), a possible underlying mechanism is the 'double burden' suffered by highly educated (single) mothers regarding work pressure and childrearing responsibilities. That is, highly educated mothers who divorce are less able to transfer their educational advantage than their counterparts who have not divorced, because of reduced time to invest in their children.

Our empirical findings are descriptive and cannot uncover the mechanisms underlying divorce effects. This holds true also for our attempt to identify contextual moderators, whose effects are difficult to disentangle from those of many other possible cultural and institutional factors. In addition, higher-order interactions between categorical variables involving rare combinations are exposed to huge problems of sample size, and our case is no exception. These limitations notwithstanding, in this article we document the existence of a robust empirical regularity across time and space. Establishing a "social phenomenon" is a fundamental step in sociological (Goldthorpe 2016) and demographic research (Billari 2015). Our estimates that indicate a stronger divorce penalty in tertiary education attainment for children of highly educated parents represent a useful benchmark for studies tailored to address possible sources of bias due to selectivity and unobserved confounders. Also, future studies should try to address the impact of the different selectivity of tertiary education on the heterogeneity in the divorce penalty using more direct and country-specific measures of educational expansion and inequality of educational outcomes. Finally, our findings clearly suggest that more in-depth studies on the (causal) mechanisms underlying the negative consequences of parental divorce for children's educational attainment should seriously consider their heterogeneity by social origin and the educational outcome considered.

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Appendix

Table A-1: Descriptive statistics by country, Europe

Country	Tertiary	Parental divorce		Parental education			N
	%	Non-intact %	Breakup %	Low %	Medium %	High %	
Armenia	31.38	9.45	2.17	28.99	51.36	19.65	921
Austria	19.58	8.21	9.91	26.86	64.6	8.54	4,240
Belarus	38.03	14.45	6.47	32.14	52.6	15.26	865
Belgium	41.33	7.13	8.4	52.25	25.22	22.52	5,190
Bosnia Herzegovina	14.23	7.41	2.67	54.25	40.22	5.53	1,012
Bulgaria	24.33	5.04	5.25	49.83	37.35	12.82	9,025
Croatia	23.67	7.16	4.37	47.57	40.78	11.65	824
Czech Republic	16.24	10.62	10.62	15.82	75.58	8.6	6,695
Denmark	43.18	13.43	13.33	29.42	47.33	23.24	938
Estonia	32.46	16.35	16.35	42.75	41.31	15.94	4,667
Finland	62.45	17.02	12.89	50.69	28.16	21.15	799
France	33.24	8.92	9.3	60.24	26.87	12.9	6,365
Georgia	34.77	6.94	3.07	24.33	53.07	22.6	7,296
Germany	27.81	9.05	9.05	14.15	63.77	22.08	6,666
Great Britain	37.14	16.85	14.86	69.2	9.96	20.83	552
Hungary	18.76	9.55	9.55	42.04	46.56	11.4	9,717
Iceland	42.38	15.24	14.13	34.39	47.21	18.4	538
Italy	14.05	1.48	1.48	80.54	14.93	4.53	7,677
Latvia	32.13	22.7	15.14	44.79	41.81	13.4	806
Lithuania	29.76	12.53	9.2	52.14	34.34	13.52	6,183
Luxembourg	28.98	12.48	9.21	50.29	39.35	10.36	521
Moldova	21.44	9.81	2.62	60.21	33.64	6.16	877
Netherlands	39.12	3.77	4.25	61.32	19.61	19.07	5,595
Norway	50	12.83	11.95	58.75	21.14	20.12	686
Poland	22.33	6.79	6.79	43.6	48.1	8.3	14,307
Romania	12	6.58	4.56	68.49	27.55	3.96	8,559
Russian Federation	44.2	16.01	13.47	44.69	31.07	24.24	6,460
Serbia	23.95	11.29	5.7	52.53	35.86	11.6	948
Slovenia	25.06	13.34	6.23	72.07	18.2	9.73	802
Spain	22.96	9.08	3.76	82.23	11.28	6.49	771
Sweden	39.11	10.19	16.93	62.99	2.49	34.52	6,303
Switzerland	25.89	9.92	8.53	22.95	61.55	15.5	645
Ukraine	45.14	13.98	7.94	35.9	38.39	25.71	844
Total	27.39	8.76	8.13	46.99	38.55	14.46	128,294

Note: EVS (2008–2010) and GGP (2002–2011) pooled together. N = 128,294

Table A-2: Descriptive statistics by region, United States

Region	Tertiary	Parental Divorce		Parental Education			N
	%	Non-intact %	Breakup %	Low %	Medium %	High %	
New England	37.2	20.7	13.2	13.6	54.2	32.3	1,318
Middle Atlantic	36.8	22.7	14.6	19.8	53.2	27.0	4,278
East North Central	29.7	22.8	15.3	18.5	58.5	23.0	5,488
West North Central	33.9	21.2	13.4	15.4	58.0	26.6	2,017
South Atlantic	26.2	28.6	18.4	27.4	48.4	24.3	4,208
East South Central	22.6	28.8	17.1	37.9	44.2	17.9	1,776
West South Central	25.5	28.7	19.7	32.4	45.4	22.2	2,501
Mountain	31.0	24.9	17.9	18.0	51.1	31.0	1,375
Pacific	29.0	29.1	22.3	16.3	52.6	31.2	3,241
Total	30.1	25.3	17.0	22.0	52.4	25.6	26,202

Note: GSS (1972–2018). N = 26,202

Table A-3: Number of cases in divorced families (two definitions), by parental education, Europe

	Non-intact = 1				Breakup = 1			
	Par. Ed.: Low	Par. Ed.: Mid	Par. Ed.: High	Total	Par. Ed.: Low	Par. Ed.: Mid	Par. Ed.: High	Total
Armenia	33	41	13	87	5	10	5	20
Austria	157	170	21	348	117	261	42	420
Belarus	39	74	12	125	11	39	6	56
Belgium	226	84	60	370	204	131	101	436
Bosnia Herzegovina	41	27	7	75	5	15	7	27
Bulgaria	227	176	52	455	167	232	75	474
Croatia	30	23	6	59	10	21	5	36
Czech Republic	213	474	24	711	213	474	24	711
Denmark	38	53	35	126	30	59	36	125
Estonia	246	378	139	763	246	378	139	763
Finland	71	43	22	136	41	43	19	103
France	363	145	60	568	324	179	89	592
Georgia	168	247	91	506	47	114	63	224
Germany	215	317	71	603	215	317	71	603
Great Britain	70	6	17	93	49	12	21	82
Hungary	278	544	106	928	278	544	106	928
Iceland	39	31	12	82	34	26	16	76
Italy	65	35	14	114	65	35	14	114
Latvia	66	94	23	183	44	58	20	122
Lithuania	424	271	80	775	222	261	86	569
Luxembourg	37	20	8	65	27	14	7	48
Moldova	58	20	8	86	8	10	5	23
Netherlands	153	36	22	211	148	48	42	238
Norway	52	19	17	88	49	17	16	82
Poland	452	451	68	971	452	451	68	971
Romania	413	134	16	563	244	126	20	390
Russian Federation	497	322	215	1,034	303	318	249	870
Serbia	68	30	9	107	26	22	6	54
Slovenia	81	17	9	107	34	10	6	50
Spain	52	8	10	70	18	5	6	29
Sweden	439	25	178	642	658	32	377	1,067
Switzerland	27	28	9	64	10	36	9	55
Ukraine	39	50	29	118	16	32	19	67
Total	5,377	4,393	1,463	11,233	4,320	4,330	1,775	10,425

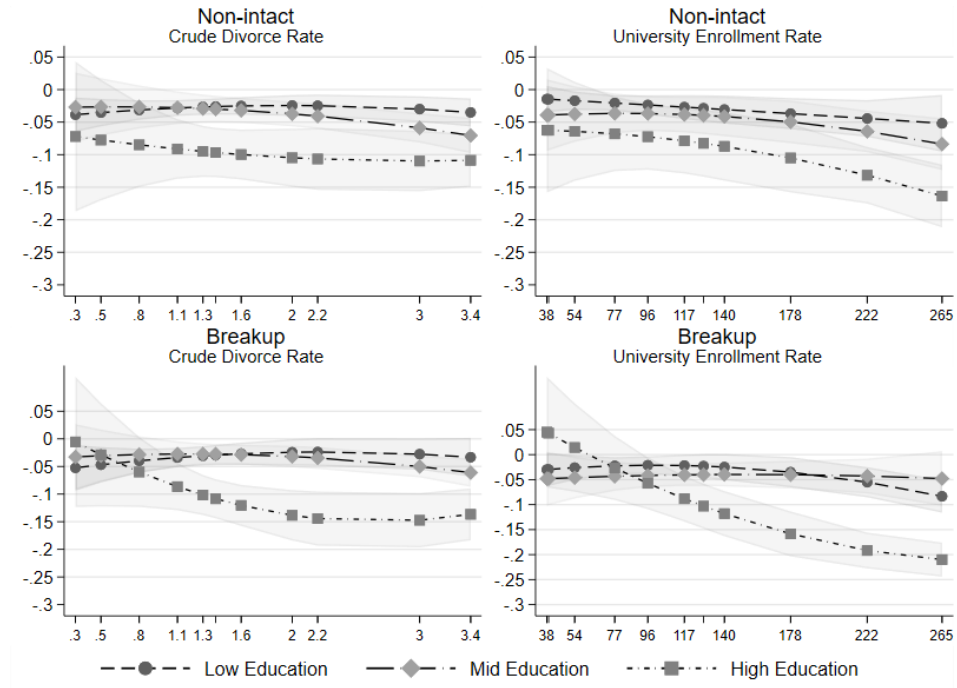
Note: EVS (2008–2010) and GGP (2002–2011) pooled together. Par. Ed.= parental education

Table A-4: Number of cases in divorced families (two definitions), by parental education, United States

	Non-intact = 1				Breakup = 1			
	Par. Ed.: Low	Par. Ed.: Mid	Par. Ed.: High	Total	Par. Ed.: Low	Par. Ed.: Mid	Par. Ed.: High	Total
New England	45	165	64	274	31	107	36	174
Middle Atlantic	304	511	160	975	186	322	115	623
East North Central	351	717	192	1,260	210	494	137	841
West North Central	97	256	77	430	48	164	58	270
South Atlantic	404	599	211	1,214	218	402	154	774
East South Central	236	221	60	517	122	139	42	303
West South Central	287	342	93	722	176	243	73	492
Mountain	87	167	90	344	56	119	71	246
Pacific	215	525	211	951	144	402	175	721
Total	2,026	3,503	1,158	6,687	1,191	2,392	861	4,444

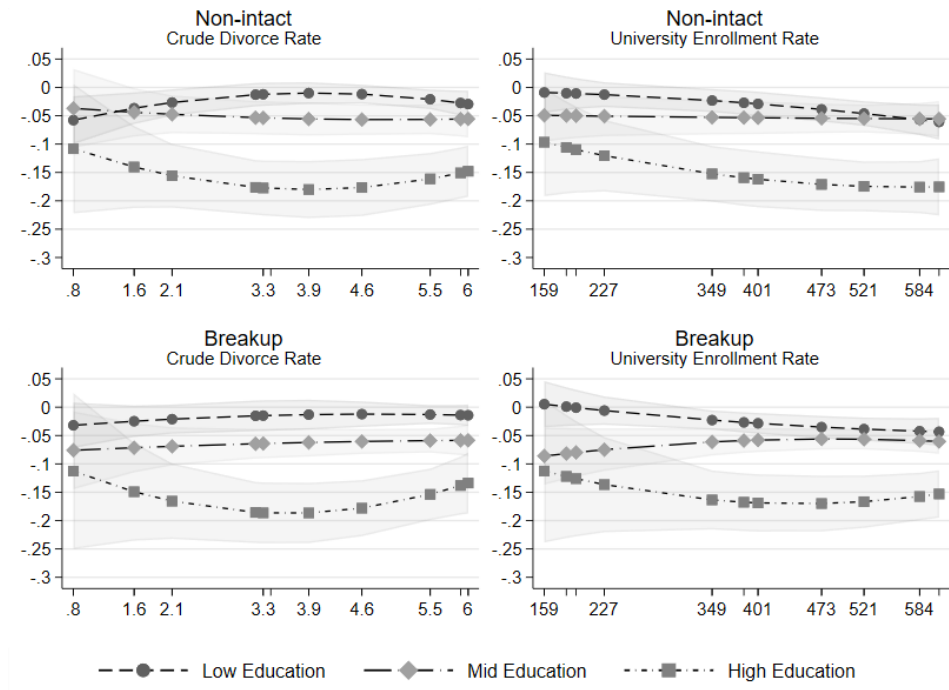
Note: GSS (1972–2018). Par. Ed.= parental education

Figure A-1: Divorce penalties in the probability of tertiary education attainment in Europe, by parental education and deciles of the macro-level indicators (with quadratic term)



Note: 95% CI. Results from random-intercept and random-slope multilevel LPMs. Models control for gender and dataset.

Figure A-2: Divorce penalties in the probabilities of tertiary education attainment in the US, by parental education and deciles of the macro-level indicators (with quadratic term)



Note: 95% CI. Results from random-intercept and random-slope multilevel LPMs. Models control for gender, race, and survey year.