

Divorce, parental conflicts and child skills: A story of selection

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Abstract

This paper uses data from the UK Millennium Cohort Study (MCS) to study how parental divorce in early childhood affects a child's skill development. We estimate a dynamic model of child skill formation that accounts for the endogenous nature of parental divorce including a measure of interparental conflicts. Our results show that the skill disadvantages among children of divorce stem almost entirely from the effects of selection. Here, skill gaps materialise due to disadvantages in household characteristics that also increase divorce risk. Inter-parental conflicts, parental education, and family financial resources emerge as key pre-divorce characteristics that explain divorce gaps in children's cognitive and socio-emotional skills from age 3, through age 11. Inter-parental conflicts are often unobserved and overlooked in the literature, but our results demonstrate that they indeed play a major role, particularly for gaps in socio-emotional skills. Moreover, such gaps are found to be more pronounced among more vulnerable children, i.e. those with lower levels of socio-emotional skills.

Keywords: Divorce, Inter-parental conflicts, Cognitive and Socio-emotional skills, Decomposition, Counterfactual analysis.

JEL Classification: J12, J13, J24, C21, D1

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1 Introduction

Rising rates of marital instability in recent decades have fueled political and public debate regarding the relationship between parental divorce and child development. It is well established that shocks to family structure, such as divorce, may create consequences for children’s human capital formation and accumulation.¹ However, parental divorce is endogenous as the decision to divorce is correlated with parental and household characteristics that also influence children’s outcomes (Manski et al., 1992). Numerous empirical studies have found a negative correlation between parental separation and children’s achievements, with more mixed results when establishing causality (Ermisch and Francesconi 2001; Björklund and Sundström 2006; Sanz-de Galdeano and Vuri 2007; Björklund et al. 2007; Francesconi et al. 2010; Frimmel et al. 2024; Pronzato and Aassve 2017; Le Forner 2020, among others). A major challenge in this research is that interparental conflicts often co-occur with the decision to divorce but are typically unobserved.² Couples regularly engaged in conflicts are more likely to divorce and children that are exposed to inter-parental conflict are more likely to have behavioural problems and lower academic achievement (Buehler et al., 1998; Amato et al., 1995; Grych and Fincham, 2001). Therefore, failure to account for parental conflicts risks confounding the relationship between divorce and children’s outcomes.

In this paper, we develop and estimate a dynamic model of child skill formation that accounts for the endogenous nature of the parental divorce decision. A novel feature of our model is that we include inter-parental conflicts, a factor that itself depends on pre-divorce characteristics, but that we also use as a predictor of the parental divorce decision.³ Leveraging longitudinal data from the UK Millennium Cohort Study (MCS) we analyse skill outcomes at ages 3, 5, 7, and 11, focusing on divorces that occurred before age 3.⁴ Using our model, we conduct a counterfactual analysis to evaluate how children of disrupted families would have performed if: (i) they had identical observable characteristics as the children in intact families, including the magnitude of parental conflicts, or (ii) their parents opted not

¹McLanahan et al. (2013) provide a comprehensive survey of this literature. More generally, the family plays a crucial role in shaping child ability, through genetics, parental investments, and through the choice of child environment (Cunha and Heckman, 2007; Borghans et al., 2008; Cunha and Heckman, 2009; Almlund et al., 2011).

²There are however a few exceptions. Tartari (2015) includes a measure of parental conflicts but focuses exclusively on children’s cognitive outcomes. Amato et al. (1995), Ribar et al. (2017) and Clark et al. (2015) look at how the impact of divorce on children varies by the level of conflict.

³Our analysis includes both married and cohabiting parents, therefore we use the terms divorce (among married parents) and separation (among cohabiting parents) interchangeably.

⁴Supplementary analysis, reported in the Appendix, also considers divorces that occurred between ages 3 and 5 and between ages 5 and 7.

to divorce.

Our empirical analysis proceeds in two steps. First, we conduct an Oaxaca-Blinder decomposition of divorce skill gaps—the differences in skills between children from intact and divorced families (Oaxaca, 1973; Blinder, 1973)—splitting them into an explained (compositional) effect, due to differences in observed characteristics, and an unexplained (residual) effect, due to differences in returns to those characteristics.⁵ This part of the empirical analysis, although descriptive in nature, allows us to quantify how pre-divorce characteristics, including inter-parental conflict, contribute to skill gaps, shedding light on parental selection into divorce.

In the second step, we build on the results of our decomposition analysis to develop and estimate a dynamic model of skill development in the spirit of Cunha et al. (2010); Aucejo and James (2021), that we extend to include an endogenous divorce decision. The model captures the development of child skills via a series of production technologies over four points in time, corresponding to ages 3, 5, 7, and 11, respectively, that we observe in the MCS data. In the model we include reduced-form equations for inter-parental conflicts and the parental divorce decision where we let both depend on the child/family’s observable characteristics. This allows the model to capture selection into divorce while also providing multiple channels through which the child/family’s observable characteristics influence the child’s skill development. We estimate the parameters of the model via maximum likelihood estimation and use the parameters to conduct counterfactual analysis.

In our counterfactual analysis, we evaluate the potential effectiveness of interventions aimed at narrowing divorce skill gaps by mitigating the effects of selection. First, we document heterogeneity in intervention efficacy across the skill distribution and compare intervention outcomes to a benchmark where we exogenously change the divorce decision, keeping all other characteristics unchanged. Second, we enhance the story of selection by acknowledging that interventions (e.g. reducing inter-parental conflicts among divorced couples) can also influence the endogenous divorce decision, and therefore use our counterfactual analysis to disentangle the direct and indirect mechanisms through which each intervention operates. The validity of our counterfactual analyses relies on the usual functional form, distributional,

⁵The standard O-B decomposition approach has been extensively used in labour economics to analyze the wage gap between different sub-sample of the population, e.g. between men and women, between ethnic groups and between disable and non-disable workers. It has also been used to study child development gaps attributed to child health conditions, health gaps by socio-economic status, racial differences in health insurance. See among others, Blinder (1973); Oaxaca (1973); Blau and Kahn (1992); Doiron and Riddell (1994); Cobb-Clark and Hildebrand (2006); Grove et al. (2011); Longhi et al. (2012, 2013); Pylypchuk and Selden (2008); Salm and Schunk (2012); Johar et al. (2013); Carrieri and Jones (2017).

and exogeneity assumptions necessary for model estimation, but also on the assumptions that divorce and inter-parental conflicts are systematically linked to pre-divorce characteristics, and that the divorce decision and parental conflicts shape children’s skill development rather than the reverse. While strong, the credibility of these assumptions is reinforced by the rich data available in the MCS and the early childhood context of our study.

Economic research has long sought to understand the causal link between divorce and children’s well-being. The main challenge in this area is creating a valid counterfactual, a representation of what the child’s life would have been like had their parents not divorced. Several identification strategies have been proposed, e.g. quasi-experimental methods which exploit the introduction of changes in divorce law (Corak, 2001; Piketty, 2003; Gruber, 2004; Francesconi et al., 2010; González and Viitanen, 2018; Hertegård, 2025) sibling difference approach (Ermisch and Francesconi, 2001; Ermisch et al., 2004; Björklund and Sundström, 2006; Francesconi et al., 2010; Johnston et al., 2025), instrumental variables (Finlay and Neumark, 2010; Frimmel et al., 2024), difference-in-difference methods (Sanz-de Galdeano and Vuri, 2007) or fixed effect models (Aughinbaugh et al., 2005; Pronzato and Aassve, 2017; Fitzsimons and Villadsen, 2019; Le Forner, 2020). In general, the evidence resulting from these strategies is mixed, with some finding null effects of parental divorce on child outcomes (e.g. Björklund and Sundström 2006; Sanz-de Galdeano and Vuri 2007), while others find negative impacts (e.g. Frimmel et al. 2024; Johnston et al. 2025).

However, the absence of information on inter-parental conflicts in the context of the divorce decision could be a potential threat to many of these identification strategies. For example, changes to divorce law, often relied upon as an instrumental variable, might affect not only the divorce rate but also the level of parental conflicts, through changes in bargaining power within couples, which in turn directly impacts children (Stevenson and Wolfers, 2006; Fella et al., 2004; Halla, 2013). The same issue arises with other instruments, e.g. the sex composition in the workplace (Frimmel et al., 2024), which could influence children’s outcomes by increasing parental conflicts. Likewise, sibling differences and fixed-effects models fail to account for how the duration and intensity of parental conflicts could vary over time and across siblings. While these methods successfully address many endogeneity issues related to divorce, they also overlook the crucial role of inter-parental conflicts and other proximate causes of divorce. The recent work by Johnston et al. (2025) openly recognizes this caveat. They interpret their negative causal effect of divorce on children’s long term outcomes as including the effects of other confounding factors coinciding with the divorce decision that can both trigger divorce and directly harm children, e.g. mental health crises,

domestic violence, and heightened parental conflicts.

The highly influential and rapidly growing economic literature on child skill development clearly shows the importance of early childhood circumstances for the formation and accumulation of child skills (Cunha and Heckman, 2007; Cunha et al., 2010; Attanasio et al., 2020) & (Attanasio et al., 2020b). More recently, researchers utilising these models have incorporated extensions to include additional inputs and shocks during early childhood that can alter the accumulation of human capital, such as bullying (Sarzosa, 2024) or school interventions (Bernal et al., 2024). Parental divorce and parental conflicts are salient examples of both a shock and an input that could potentially shape the child’s human capital accumulation and, therefore, the decision to include them represents an alternative but natural extension of the framework.

This paper offers two main contributions. First, following the recent literature on child skill development we develop a model in the spirit of Cunha et al. (2010); Aucejo and James (2021), but extended to include the parental divorce decision as a negative input into the skill development process. To address the endogenous nature of the divorce decision, we model it utilising a rich set of observable pre-divorce characteristics and, critically, inter-parental conflicts. Second, we expand upon the existing literature on divorce and child development (McLanahan et al., 2013) by explicitly accounting for parental conflicts that are both likely to shape child development, as well as the decision to divorce. In doing so, we are able to demonstrate the importance of accounting for parental conflicts when estimating the effect of divorce on children outcomes and, in turn, constructing more credible counterfactuals, while relying on standard functional form, distributional, and exogeneity assumptions.

We then investigate how the divorce skill gaps vary across the distribution of cognitive and socio-emotional abilities, using a counterfactual analysis to explore these differences. Based on the diathesis-stress framework (Beck, 1967; Monroe and Simons, 1991; Hilsman and Garber, 1995), we expect children with lower socio-emotional skills to experience larger gaps, as stressful events like parental divorce may trigger socio-emotional disorders in predisposed children—an effect not necessarily observed for cognitive skills (Moroni et al., 2025).

Overall, our results suggest that the divorce skill gaps are largely driven by parental selection into divorce. Our decomposition analysis indicates that, in most cases, these gaps are fully explained by compositional effects—that is, differences in pre-divorce characteristics between children from intact and disrupted families. These findings are reinforced by our counterfactual analysis. First, exogenously altering the divorce decision while keeping pre-divorce characteristics constant yields only a negligible reduction in skill gaps, implying that

simply discouraging divorce would be ineffective in narrowing them. Second, under our functional form, distributional, and exogeneity assumptions, the gaps could be reduced by equalizing child and family pre-divorce characteristics, which influence skill formation both directly and indirectly through their effect on divorce probability.

We also find that divorce gaps in cognitive and socio-emotional skills stem from different factors. Cognitive gaps are mainly linked to parental education and family financial resources, while socio-emotional gaps are driven by inter-parental conflict and finances. Because these factors are closely tied to parental abilities, our results suggest that intergenerational transmission plays a key role. Consistent with the diathesis-stress framework, children with lower socio-emotional skills experience larger divorce gaps.

The remainder of the paper is organized as follows. Section 2 describes the data, and Section 3 presents the empirical strategy and the skill formation model with endogenous divorce. Section 4 reports the decomposition of skill gaps, the contributing characteristics, and the counterfactual analysis. Section 5 presents robustness checks and Section 7 concludes.

2 Description of data

2.1 Millennium Cohort Study

This paper uses data from the UK Millennium Cohort Study (MCS), a multidisciplinary longitudinal cohort survey which comprises a representative sample of children born in the UK between September 2000 and January 2002. The cohort members are followed over time with interviews conducted in 2000, 2004, 2006, 2008 and 2012, when children are 9 months and ages 3, 5, 7 and 11.⁶ Information on both the child and parents is available. The data includes a rich set of measures regarding the child’s cognitive and socio-emotional skills. More precisely, child cognitive skills are assessed by trained interviewers using appropriate tests, whereas child socio-emotional skills are assessed by asking questions to the child’s parent, usually the mother. In addition, the survey also includes a wide variety of information on the social, demographic and economic characteristics of the child, their parents, and their family overall.

Our sample is selected to include all singleton children interviewed at 9 months with married or cohabiting natural parents. This criteria reduces our original sample size by 31.8

⁶For details on the survey design, recruitment process and fieldwork consider [Dex and Joshi \(2005\)](#).

percent, consisting of 13,131 children. We also consider a balanced panel of cohort members with non-missing information on a set of variables on family and child characteristics, excluding children whose parents separate after the age 3. Our final sample consist of 5003 observations.

In this study, the key variable is the relationship between the natural parents, i.e. whether they are in relationship or separated. Since our analysis comprises both married and cohabiting couples, it follows that, the notion of divorce will include not only legally divorced or legally separated couples, but also cases where one of the two natural parents has left the house. This choice is motivated by the fact that the shock faced by the child in case of parental split-up arises as soon as the two parents separate, that is when they stop living together, regardless of their legal marital status. Among our initial sample of 13,131 children at 9 months, 72.29% of them have married parents whilst the rest have cohabiting parents. For the remainder of the paper, the notions of divorce and separation will be used interchangeably.⁷

2.2 Children outcomes: cognitive and socio-emotional skills

The dataset offers several measures of cognitive abilities, mainly from the British Ability Scales (BAS) (Elliott et al., 1996, 1997), the Bracken School Readiness test and the National Foundation for Educational Research Progress in Maths Test (NFER), which are designed to measure verbal ability, recognition of patterns and the richness of vocabulary, among others.⁸ These are widely used age-varying tests and for each age multiple tests are available. Table A.1 in the Appendix shows the list of cognitive tests available in our dataset by age of the child.⁹

At ages 3, 5 and 7 we have more than one cognitive ability measure available. For this reason, rather than using the measures separately, we use latent factor models to reduce measurement error and to construct a single and more exhaustive measure of cognitive abilities for these ages.¹⁰ Table A.2 in the Appendix shows the corresponding factor loadings

⁷At national level, the number of divorce in England and Wales in 2013 was 114,720, involving 94,864 children under 16. Among these children, 21% were under 5 and 64% were under 11 years old. Detailed information on the institutional background in the UK is provided in the Appendix A.1.

⁸Among the three types of score available for each of the BAS tests, the raw score, the ability score and the T-score, we use the ability score that is a transformation of the raw score which takes into account the difficulty of the specific questions asked to the child.

⁹For a detailed description and interpretation of all the tests consider Connelly (2013) and Hansen (2014).

¹⁰The Cronbach's alpha values by age range from 0.62 to 0.70 for cognitive skills indicating an acceptable level of reliability.

(Column 1) and signal (Column 2), i.e. the proportion of the variance for each of the measure explained by the latent factor.¹¹ Figure A.1, Panel A shows the distribution of the latent skills that are comparable across ages and have mean 0 and standard deviation of 1.

Socio-emotional skills are derived from the Strengths and Difficulties Questionnaire (SDQ) which is designed to examine children’s behaviors and emotions in a number of settings. In each interview, starting at age 3, the parent is asked to complete the SDQ questionnaire consisting of 25 items on their psychological attributes (Goodman, 1997, 2001).¹² The 25 items are grouped in five sub-scales measuring: (i) Emotional Problems; (ii) Conduct Problems; (iii) Hyperactivity; (iv) Peer Relationship Problems and (v) Pro-social Behavior. These broader sub-scales are extensively used in the child development literature and have been shown to be valid in the UK setting (e.g., Goodman et al. 2010; Borra et al. 2012; Del Bono et al. 2016). For the sake of comparison with the cognitive measures, the socio-emotional scores are reverse coded, so that higher values mean higher level of socio-emotional skills and lower values mean lower level of socio-emotional skills.¹³

As with cognitive abilities, rather than using many different measures of socio-emotional abilities for each age, we use factor models to reduce the measurement error and combine this information and estimate a unique and more comprehensive measure of socio-emotional skills.¹⁴ The estimated factors represent a comprehensive measure of psychological traits such as anxiety, depression and withdrawal, but also aggression, irritation, conduct problems and pro-social behavior at each age. We take these factors as our measures of socio-emotional abilities for each age (factor loadings and signals shown in Table A.3 in the Appendix). Figure A.1, Panel B shows the distribution of the latent skills that are comparable across ages and have mean 0 and standard deviation of 1.

Table 1 features the descriptive statistics of children’s cognitive and socio-emotional skills as described by the factors and their differences by parental separation. The table clearly shows the existence of a *divorce skill gap*, for both cognitive and socio-emotional skills, with

¹¹We used factor analysis to construct separate outcomes of cognitive and socio-emotional skills across all ages, extracting factors based on shared variance to reduce measurement error. Factors with eigenvalues above one were retained, resulting in a single factor for each skill domain across all ages. While this approach typically requires at least three measures, for cognitive skills at age 3 we only have two measures and therefore the factor score approximates a weighted average based on correlations and factor loadings.

¹²The parent is asked whether the item is ‘true’, ‘somewhat true’ or ‘not true’ in respect of their child and, final scores are such that the higher the score the higher the level of behavioral problems.

¹³The pro-social behavior subs-scale, differently from all the other measures, does not need to be reversed to provide a consistent interpretation of higher test score higher socio-emotional abilities.

¹⁴The Cronbach’s alpha values by age range from 0.64 to 0.72 for socio-emotional skills indicating an acceptable level of reliability.

children of intact families having higher cognitive and socio-emotional skills at every age. The final column of Table 1 also shows that the magnitude of the gap is around 11 (13) percentiles for cognitive (socio-emotional) skills at age 3, and suggests that the observed percentile gaps persist throughout childhood and are increasing with child age.¹⁵

2.3 Quality of inter-parental relationship

The quality of inter-parental relationship, often referred as relationship quality (RQ) or marital conflict, is a crucial aspect in family and child developmental research, especially in the psychology literature. It has been linked to psychological and physical health of the partners (depressive symptoms, eating disorders, male alcoholism), but also with some key aspects of the family environment such as domestic violence, lower parenting skills, children’s disadvantages, parent-child conflicts, and conflict between siblings (Buehler et al., 1998; Grych and Fincham, 2001; Fincham, 2003). Partners satisfied with their relationship are healthier, communicate more effectively with each other, have higher parenting skills and tend to raise their children authoritatively, using less harsh discipline, spend more time with their children, and have less risk of a marital breakup (Jones, 2010).

The MCS provides detailed information about the quality of the relationship between parents. It includes a shortened version of the Golombok-Rust Inventory of Marital State (GRIMS, Rust et al. 1986, 1990), a questionnaire to measure the overall quality of a couple’s relationship.¹⁶ Specifically, the MCS asks each parent separately to rate several items: (i) Partner sensitive and aware of needs; (ii) Partner doesn’t listen; (iii) Sometime lonely when with partner; (iv) Relationship full of joy and excitement; (v) Wishes was more warmth and affection; (vi) Suspect on brink of separation; (vii) Can make up quickly after argument; (viii) Frequency go out as a couple; (ix) Happy/Unhappy with relationship.¹⁷

¹⁵Although the construction of the skill factors, with different loading measures across child age, makes across-time comparisons difficult, Figure A.1 shows that resulting skill distributions are indeed similar across ages, reassuring us that the percentile gaps are comparable.

¹⁶This shortened version retains the content validity of the original version which included 28 items measuring two aspects of the relationship, (1) shared interests, communication, sex, warmth, roles, decision making and coping, and (2) beliefs about and attitudes toward their relationship, behavior in the relationship and agreement with the partner (Chiorri et al., 2014).

¹⁷In the case of statements (i)-(vii), respondents indicate whether they strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with the statement (5-Point Likert-type agreement scales). In the case of statement (viii) respondents are asked to indicate how frequently they go out as couple on a 4 points scale, ranging from ‘once a week’ to ‘hardly never’. Question (ix) about happiness in the relationship is measured on a 7 point scale. These last two items of the quality of inter-parental relationship are not included in GRIMS but represent additional information on the quality of relationship. Items (ii) (iii) (v) and (ix) are reverse coded in such a way to have the same interpretation in terms of quality of relationship.

Similarly to skills, we use factor models to combine the different measures of conflicts into a single indicator. This allows us to reduce the dimensionality of the measures explaining the inter-parental conflicts without arbitrarily imposing that all the measures are related to the latent factor with equal weights.¹⁸ Table A.4 reports the factor loadings (Column 1) and the signal, i.e. share of the variance explained by the latent factor for each question (Column 2). We interpret this factor as a measure of inter-parental conflicts perceived by the mother. The use of latent factor models is motivated by the fact that the amount of information contained in each measures varies across the measures and is much lower than 1, suggesting that measurement error needs to be accounted for.

2.4 Other control variables

Our analysis also includes a set of child, parental and family variables observed before separation. The set of variables incorporated in our analysis draws from the human capital formation literature, where parental inputs are the major determinants of child outcomes, as well as from the literature aimed at establishing the impact of divorce on children outcomes. Indeed, we include also explanatory variables that may be a good predictor of divorce but that may also indirectly affect children’s abilities. This set of variables consists of: (i) *child characteristics* such as child sex and birth weight; (ii) *demographic characteristics* such as number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother’s religiosity, parents’ age and parents’ ethnicity; (iii) *parental education*; (iv) *health characteristics* like parents’ general health; and (v) *family financial resources* such as family income, housing tenure, parents’ social class based on NS-SEC (National Statistics Socio-Economic Classification).

Table 2 reports the descriptive statistics of all the explanatory variables by parental separation. According to difference in mean tests, the characteristics of children from divorced families are very different from the characteristics of children from intact ones. Children of divorce have, on average, younger, less educated parents with shorter relationships. Non-separated parents also have better health. Parental occupation is dissimilar as well, between

The higher the score, the lower the quality of their relationship, the higher the level of conflicts.

¹⁸We use the information reported by the mother to construct our measure of inter-parental conflict. Related literature on GRIMS questionnaire implemented in the MCS survey showed that women in the MCS perceive a higher relationship quality than men (Chiorri et al., 2014; South et al., 2009; Shapiro et al., 2000). This would suggest that, if inter-parental conflicts are measured with errors, they are possibly under-reported and therefore we might expect the accounting power of relationship quality to be at most under-estimated.

the two groups of children, with a higher percentage of parents from divorced families working in routine and manual occupations. Finally, family income also varies between the two groups, with an average equivalised OECD income per week significantly higher for intact families than for disrupted families.¹⁹ Overall, the control variables indicate that children of divorce grow up in more disadvantaged environment than children of intact families. If children who are brought up in more advantaged families are also less likely to experience parental breakup and also perform better at cognitive and socio-emotional tests, either because of higher innate ability or because their environmental background improves these outcomes, then the association between separation and cognitive and socio-emotional skills shown in Table 1 might well be spurious and largely explained by these observable differences between the two groups.

3 Empirical Model

The empirical model unfolds as follows: (i) First we fully characterize the selection into divorce using a decomposition method, whereby we quantify the divorce skill gap between children of intact and disrupted families and the contribution to the gap of each of the observable characteristics; (ii) second, we consider a model where divorce is endogenous and use such model to show the counterfactuals of how children of disrupted families would have performed had they had the same characteristics of children of intact families.

3.1 Oaxaca-Blinder decomposition: Mean gap

We apply the Oaxaca-Blinder (O-B) method (Oaxaca, 1973; Blinder, 1973) to decompose mean divorce skill gaps—differences in cognitive or socio-emotional skills between children of intact and divorced families—into explained (compositional) and unexplained (residual) components. Separate regressions are estimated for each group:

$$y_{ij} = \mathbf{X}_{ij}\boldsymbol{\beta}_j + \epsilon_{ij}, \quad (1)$$

where y_{ji} is cognitive or socio-emotional skills for child i at ages 3, 5, 7 and 11 in group

¹⁹Interestingly, there is no observed difference in the number of siblings between children of divorced and non-divorced parents. This can be explained by the fact that the explanatory variables were measured before the divorce occurred—specifically, when the child was between 9 months and 3 years old. At such an early stage, differences in sibling numbers may not yet have emerged.

j , with $j=0$ for non-separated (the reference group) or $j=1$ for separated parents (the comparison group), observed when the child is between 9 months and age 3 ; $\mathbf{X}_{ij}$ is a vector of K explanatory variables and a constant, β_j is a vector of parameters for group j including the intercept, and ϵ_{ij} is an error term with mean zero and homoskedastic. The mean gap is:

$$\bar{y}_0 - \bar{y}_1 = \bar{\mathbf{X}}_0\beta_0 - \bar{\mathbf{X}}_1\beta_1. \quad (2)$$

where $\bar{\mathbf{X}}_j$ is the vector of average characteristics for group j ($j=0,1$) and $\bar{y}_0 - \bar{y}_1$ is the *divorce skill gap*, expressed as a difference between mean outcomes of children of intact families minus mean outcomes of children from disrupted families. This implies that a positive divorce skills gap indicates skill disadvantages for children of divorce compared to children of intact families. To be able to identify the two components of the decomposition, a counterfactual conditional mean, for instance $\bar{\mathbf{X}}_1\beta_0$, is added and subtracted. This counterfactual reflects a situation in which children of intact families have the same mean covariates of children of disrupted families. This implies that:

$$\bar{y}_0 - \bar{y}_1 = (\bar{\mathbf{X}}_0 - \bar{\mathbf{X}}_1)\beta_0 + \bar{\mathbf{X}}_1(\beta_0 - \beta_1) \quad (3)$$

where $(\bar{\mathbf{X}}_0 - \bar{\mathbf{X}}_1)\beta_0$ describes the *composition effect* and is the mean differences in covariates $\mathbf{X}$ between the reference and the comparison group, whereas the second component $\bar{\mathbf{X}}_1(\beta_0 - \beta_1)$ describes the *residual effect*. Moreover, given the additive linearity assumption, we can compute the detailed decomposition to identify the contribution of each covariate K to the explained component:

$$(\bar{\mathbf{X}}_0 - \bar{\mathbf{X}}_1)\beta_0 = \sum_k (\bar{X}_{0k} - \bar{X}_{1k})\beta_{0k} \quad (4)$$

where β_{0k} is the parameter for variable X_k for group 0, ($\bar{X}_{0k}$ is its corresponding sample mean) and therefore $(\bar{X}_{0k} - \bar{X}_{1k})\beta_{0k}$ is the contribution of the k_{th} covariate to the composition effect. Such a detailed decomposition is one of the most appealing property of the O-B methodology.²⁰

²⁰ A similar decomposition can be applied to the residual component, capturing differences in returns and potential unobservables, such as parental investment or cooperation after divorce (Kalil et al., 2011; Page and Stevens, 2004; Le Forner, 2023; Del Boca, 2003; González and Özcan, 2013).

3.2 A model of skill development with endogenous selection into divorce

We build upon the decomposition analysis to consider how children of disrupted families would have performed if they had the same observable characteristics as children in intact families. To this end, we develop and estimate a dynamic model of child skill formation and accumulation, in the spirit of Cunha and Heckman (2007); Cunha et al. (2010); Aucejo and James (2021), but extended to incorporate an endogenous parental divorce decision.

The model captures skill development between four points in time, denoted t , with $t \in \{1, 2, 3, 4\}$, corresponding to child ages 3, 5, 7, and 11, respectively, that we observe in the MCS sample. At each age, child i is characterised by a vector $\theta_{it} = [\theta_{it}^c, \theta_{it}^e]$ of cognitive and socio-emotional *skills*, denoted by c and e , and a vector of time-invariant *inputs*, $\xi_i = [D_i, P_i]$, where D_i is a binary indicator equal to one if the child's parents are divorced, and P_i is the reported level of inter-parental conflicts.²¹ Finally, $\mathbf{X}_i$ is child i 's vector of demographic and household characteristics, highlighted in Table 2.

3.2.1 Child skill formation and accumulation

We assume that child cognitive and socio-emotional skills, $\theta_{i,t}^k$ $k \in \{c, e\}$, are formed and develop according to a series of trans-log production technologies, that depend on child i 's combined vector, $[\theta_{i,t-1}, P_i]$, of previous period skills and the level of inter-parental conflicts:

$$\ln \theta_{i,t}^k = \begin{cases} A_t^k(D_i, \mathbf{X}_i) + \pi_i^1 + \eta_{it}^k, & \text{if } t = 1; \\ A_t^k(D_i, \mathbf{X}_i) + \pi_i^k + \ln[\theta_{i,t-1}, P_i] \gamma_t^k + \ln[\theta_{i,t-1}, P_i] \mathbf{\Gamma}_t^k \ln[\theta_{i,t-1}, P_i]^T + \eta_{it}^k, & \text{if } t > 1, \end{cases}$$

for $k = c, e$.

(5)

where γ_t^k is a 3×1 parameter vector, and $\mathbf{\Gamma}_t^k$ as a 3×3 triangular parameter matrix:

$$\gamma_t^{kT} = \begin{bmatrix} \gamma_{c,t}^k & \gamma_{e,t}^k & \gamma_{p,t}^k \end{bmatrix}, \quad \mathbf{\Gamma}_t^k = \begin{bmatrix} \gamma_{cc,t}^k & \gamma_{ce,t}^k & \gamma_{cp,t}^k \\ 0 & \gamma_{ee,t}^k & \gamma_{ep,t}^k \\ 0 & 0 & \gamma_{pp,t}^k \end{bmatrix}$$

²¹We assume that inputs are time-invariant within the model so as to be consistent with our main MCS data sample where, the parent's divorce decision, the level of parental conflicts, and the demographic and household characteristics, are all determined and observed before the child is age 3.

The parameters γ_t^k and Γ_t^k are the elasticities of current skills θ_t^k , $k \in \{c, e\}$ with respect to previous period skills θ_{t-1}^k , $k \in \{c, e\}$, and conflicts, P_i , while $\eta_{i,t}^k$ is a normally distributed unobserved shock that is independent across skills $k \in \{c, e\}$ and time t .

The term $A_t^k(\cdot)$ is a linear total factor productivity (TFP) equation that takes the form

$$A_t^k(D_i, \mathbf{X}_i) = \alpha_{0t}^k + \alpha_{D,t}^k D_i + \mathbf{X}_i \boldsymbol{\alpha}_{X,t}^k \quad (6)$$

where α_{0t}^k is the location parameter for the production technologies, and $\boldsymbol{\alpha}_{X,t}^k$ is a parameter vector with length equal to the number of baseline child and mother characteristics. Note that this reduced-form specification for the TFP equation (equation 6), where the parental divorce decision is included directly as an input, captures any direct effect of divorce on the accumulation of skills at each age.²² Finally, following Cunha et al. (2010), and Aucejo and James (2021), the parameters $\pi \in \{\pi^1, \pi^c, \pi^e\}$ are random intercepts that capture any persistent unobserved heterogeneity in the skill production process.²³

3.2.2 Inter-parental conflicts and the endogenous divorce decision

Next, we outline the determination of child i 's vector of inputs $\boldsymbol{\xi}_i$, conditional on their pre-divorce characteristics $\mathbf{X}_i$. First, we use a reduced-form specification for inter-parental conflicts, P_i , given by:

$$\ln P_i = \delta_0^p + \mathbf{X}_i \boldsymbol{\delta}_X^p + \eta^p \quad (7)$$

where η^p is a, normally distributed, unobserved shock to inter-parental conflicts, and $\boldsymbol{\delta}_X^p$ is a parameter vector with length equal to the number of characteristics in $\mathbf{X}_i$. Then, we use a logit specification for the endogenous parental divorce decision, D_i , with the probability that child i 's parents choose to divorce given by:

$$\mathcal{P}(D_i = 1 | \ln P_i, X_i) = \frac{1}{1 + \exp(-(\delta_0^d + \delta_1^d \ln P_i + \mathbf{X}_i \boldsymbol{\delta}_X^d))} \quad (8)$$

where, similarly, $\boldsymbol{\delta}_X^d$ is a parameter vector with length equal to the number of characteristics in $\mathbf{X}_i$, capturing the effect of observable family characteristics on the probability of divorce. In Table 2 we illustrated the substantial differences in characteristics between children from divorced and intact families, with notably higher levels of inter-parental conflicts in divorced

²²We also note that this choice assumes, implicitly, that divorce and parental inputs are substitutes in the skill development process at each age.

²³Specifically, π is drawn from a latent class distribution, where $\pi_u = \{\pi_u^1, \pi_u^c, \pi_u^e\}$ with probability $\mathcal{P}(\pi_u)$, $u = 1, \dots, 5$, and π_1 is normalised to equal zero.

couples. The specifications for inter-parental conflicts (equation 7) and the parental divorce decision (equation 8) allow the model to reproduce these empirical selection patterns. Importantly, modeling inter-parental conflicts and the divorce decision in this way also means that we can later disentangle the indirect effects of divorce on child skills, via selection on observable characteristics, from the direct effect of divorce on child skills, via the TFP equation (equation 6), when we conduct our counterfactual analysis.

3.2.3 Identification assumptions

Identification of the model parameters is based on several key assumptions. First, given our specifications for inter-parental conflicts and the divorce decision (equations 7 and 8), we assume that neither are determined directly by the level of child skills. While this is a strong assumption, we believe that it is more plausible in this context where our focus is on divorces that occurred before the child is age 3. Second, to address the potential endogeneity of inter-parental conflicts, we use a control function approach (Heckman, 1979). Specifically, when we estimate the model we include the residuals from the conflict equation (equation 7) as an additional regressor in the TFP equation (equation 6). By doing so, we assume that, conditional on observables and the inter-parental conflict residuals, the remaining shocks to child skills η_{it}^k are independent of inter-parental conflicts P_i . Finally, we assume that, conditional on X_i , inter-parental conflicts P_i , and the unobserved heterogeneity terms π , there are no additional unobserved factors that jointly determine divorce and child skills. Formally, we assume that $[\eta^p, \eta^d]$ are independent of η_{it}^k given $[X_i, P_i, \pi]$.

Together, these assumptions allow us to separately identify the contributions of the observable pre-divorce characteristics, inter-parental conflicts, and the divorce decision on child skill development. They also underpin the validity of the counterfactual analysis reported in Section 4. In Section 6 we return to each of these assumptions and discuss the implications for our results in the event that they do not hold.

3.2.4 Estimation

Let $\Psi \in \{\delta, \alpha, \gamma, \Gamma, \eta\}$ denote the vector of parameters for the conflict equation (equation 7), the divorce equation (equation 8), and the skill production technologies (equation 5). Moreover, $f_P(\cdot)$ and $f_\theta(\cdot)$ denote the density functions for inter-parental conflicts and child skills, respectively, while $f_D(\cdot)$ denotes the probability mass function for the divorce equation and $\mathcal{P}(\pi_u)$ is the discrete distribution of the unobserved heterogeneity types. Conditional

on child i 's vectors of skills $\boldsymbol{\theta}_i$ and inputs $\boldsymbol{\xi}_i$, the likelihood of the observed skill paths for child i is given by:

$$L_i(\Psi) = f_P(\ln P_i | \mathbf{X}_i) \cdot f_D(D_i | \ln P_i, \mathbf{X}_i) \cdot \dots \int_{\pi} \prod_t \prod_{\rho \in \{\ln \theta^c, \ln \theta^e\}} f(\rho_{it} | \ln \boldsymbol{\theta}_{i,t-1}, \ln P_i, D_i, \mathbf{X}_i) \mathcal{P}(\pi_u) d\pi \quad (9)$$

Where we implement the control function approach to ensure that the conditional distribution of skills is evaluated net of the residuals from the inter-parental conflict equation. Then, given data on n children, we estimate the parameter vector Ψ by maximimising the integrated log-likelihood function $LL(\Psi)$:

$$LL(\Psi) = \sum_{i=1}^n \ln L_i(\Psi) \quad (10)$$

We maximise $LL(\Psi)$ numerically with respect to all parameters, Ψ , and compute standard errors and confidence intervals by non-parametric bootstrap over 250 replications. In Section 4.4 we demonstrate the model fit by comparing the simulated and observed divorce skill gaps at each age, by gender, and the skill distributions at each age, by divorce status.

4 Empirical results

This section describes all of our results from the decomposition and counterfactual analysis. We start by describing the results of the standard (Section 4.1) and detailed O-B decomposition (Section 4.2). Then we report results from the counterfactual analysis where the selection into divorce is modeled endogenously (Sections 4.3-4.5).

4.1 Decomposing the mean divorce skill gaps

Table 3 summarises the results of the O-B decomposition at the mean of the explained (compositional) and unexplained (residual) components for cognitive (Panel A) and socio-emotional skills (Panel B) respectively, both standardized with mean 0 and standard deviation 1. The first rows in both panels show what we define as the *divorce skill gap*, the second rows reports the amount of the divorce skill gap that is explained by the O-B decomposition method and the third rows show the unexplained component.

Cognitive skill gaps (Table 3, Panel A) are entirely captured by compositional differ-

ences in covariates between the two groups of children, where the residual components are never statistically significant in the short or long-term.²⁴ A 3 year old child whose parents divorced during early childhood (between 9 months and age 3) has, on average, 25% of a standard deviation lower cognitive skills compared to a child of an intact family. Of this, 22.9 percentage points are explained by differences in the characteristics between the two groups of children, where the unexplained component remains insignificant. Similar results are found at ages 5, 7, and 11, respectively. These magnitude of the divorce cognitive skill gaps are substantial and comparable to earlier studies that utilise the MCS to analyse child development (Del Bono et al., 2016).²⁵

Panel B in Table 3 features the mean socio-emotional skill gaps by child age, which appear to be quantitatively larger than the corresponding gaps for cognitive skills.²⁶ Socio-emotional skill gaps appear to increase over time, widening from 0.337 at age 3 to 0.537 at age 11. Overall, similar to our findings for cognitive skills, the divorce socio-emotional skill gap appears to be largely explained by compositional differences.²⁷ However, a portion of the gap remains unexplained at ages 7 and 11, at 18.7 percentage points (pp) and 17.7 pp respectively.²⁸

4.2 Which characteristics account for the mean divorce skill gaps?

Given the major role played by the *compositional effects* in explaining divorce skill gaps, we report the detailed decomposition of the explained divorced skill gaps, by age, in Table 4.²⁹

Starting with cognitive skills (Table 4, Panel A), the most notable fact is that, regardless

²⁴Notice that we consider a balanced panel over time, so that the results across ages are comparable.

²⁵Del Bono et al. (2016) find that a 1 standard deviation increase in maternal time investment increases cognitive outcomes, significantly, by 13% of a standard deviation at age 3. Similarly, their results also show that having a mother with at least a university degree is associated with an increase in cognitive abilities by 33% of a standard deviation compared to having a mother without qualifications.

²⁶Both cognitive and socio-emotional skills have been standardised to have mean 0 and standard deviation of 1, hence these results are directly comparable.

²⁷Decomposition by gender reveals that boys have larger divorce skills gaps across all ages, especially for socio-emotional skills (See Appendix Tables A.5 and A.6)

²⁸The unexplained component represents the part of the decomposition that is attributable to differences in returns to characteristics between the two groups. The unexplained component also includes differences in the intercepts between the two groups which - if significant - suggests the presence of unobserved characteristics that are explaining the gap that could be attributable to divorce itself. In Table A.7 in the Appendix we show that the difference in the intercepts is never significant.

²⁹Similar analysis is provided for divorce occurring at later stages (between age 3 and 5, between age 5 and 7). Results are very similar irrespective of the timing of divorce and therefore are not part of the main analysis but are shown in Table A.8 and A.9. Moreover, Figure A.2 in the Appendix shows the effect of timing of divorce only among children of separated parents and further illustrates that, at least during childhood up to age 7, the timing of divorce does not appear to have a significant relationship with child development.

of the age at which the gap is observed, the groups of variables that appear to contribute the most to the explained component of cognitive skill gaps are parents' education and the financial resources of the family. The contribution of parental education to the explained gap is similar across ages and it is around 35%.³⁰ Looking at family financial resources, the differences between divorced and intact families contribute to the explained gap by about 60%.³¹ None of the remaining groups of variables seem to play a sizable role in accounting for the explained divorce cognitive gaps.

In Panel B of Table 4, we present detailed decompositions of the explained divorce socio-emotional skill gaps over time. As highlighted earlier, the gap in socio-emotional skills is larger, and unlike cognitive skills, almost all groups of variables contribute significantly to explaining the gap.³² Furthermore, for socio-emotional skills the key factors to explain the gaps appear to be inter-parental conflicts and the financial resources of the family, each accounting for 35% of the explained gap and this is similar across ages.³³ Therefore, it appears that inter-parental relationship quality is able to largely explain the differences in behavioral problems between children of disrupted and intact families.³⁴ In contrast to the results for cognitive skill development, parents' education does not seem to play a major role in explaining the socio-emotional skill gaps.

Our results therefore indicate that failing to control for inter-parental conflicts when trying to establish the impact of separation on child, adolescent, or later outcomes may result in an upward bias. This is because, although conflicts appear to impact only child socio-emotional outcomes, there is consistent evidence in the literature showing that both cognitive and socio-emotional skills are determinants of later life outcomes such as education and labour market participation (Almond and Currie, 2011). This finding may also offer

³⁰For example, considering cognitive skills at age 3 (column 1), differences in parents' education between children of intact and disrupted families account for 8.4 out of 22.9 percentage points of the explained divorce gap. This would mean that if the average differences in parental education between children of intact and disrupted families were removed, the divorce skill gap would be reduced by 33.6% ($0.084/0.250 = 0.336$, all else equal).

³¹For example, financial resources explain 0.143 out of 0.250 of the explained gap in cognitive skills at age 3.

³²This is consistent with the notion of higher malleability of socio-emotional skills when compared to cognitive skills (Heckman, 2000).

³³Interparental conflicts maintain its explanatory power over time: it affects only socio-emotional skills, and its contribution to the explained gap in socio-emotional skills remains similar over time (Table A.8 and A.9).

³⁴It may be noted that inter-parental conflicts might be correlated with mother's psychological distress as well as children's outcomes. In Appendix Table A.10 we additionally include mother's mental distress as an additional control. Our results show that, despite mother's mental distress contributing positively to the explained component of the socio-emotional skill gap, the proportion of the compositional effect explained by inter-parental conflicts remains large and significant for socio-emotional skills.

an explanation for the mixed results found in the literature on the impacts of divorce on children’s long-run outcomes.³⁵

4.3 Model parameter estimates

In this section we report the full set of parameter estimates for our model of skill development with endogenous divorce. Table 5 shows the estimates for the interparental conflicts and divorce equations and confirms the important role of the observable characteristics in shaping family structure. Higher levels of inter-parental conflicts are predictive of divorce incidence, alongside lower parental education, weaker financial resources, and shorter relationship duration. These results are consistent with the descriptive patterns reported in Section 2 and highlight the importance of accounting for both conflicts and socioeconomic background in the endogenous divorce decision.

The parameters of the skill production technologies, reported in Table 6, are consistent with the literature on dynamic skill formation. Lagged skills are strong predictors of current skills, with large positive elasticities, highlighting the persistence and cumulative nature of cognitive and socio-emotional skill development. We also find evidence of cross-skill complementarities where cognitive skills affect socio-emotional development and vice versa, although the latter effect is smaller in magnitude, reinforcing the multidimensional nature of skill development. Interestingly, the impact of inter-parental conflict differs across skills where it is a significant negative predictor of socio-emotional skills across each age, with a more limited impact on cognitive skills. This pattern aligns with our decomposition results, where conflicts emerged as the central driver of socio-emotional skill gaps.

The parameters on the divorce decision and the child/family background characteristics that enter the TFP term of the skill production technologies (reported in Tables A.11 and A.12) suggest that the direct effect of the divorce decision is negligible and statistically insignificant for both cognitive and socio-emotional skills. In contrast, parental education and financial resources play large roles in shaping cognitive skills, with a more modest influence on socio-emotional skill development. Finally, the unobserved heterogeneity and error variance parameters (reported in Table A.13) indicate the presence of multiple discrete types (with non-zero probability), providing evidence of persistent differences in skill development

³⁵Table A.7 in the Appendix shows the detailed decomposition of the unexplained components when significant. It appears that higher levels of conflict prior to separation decrease the unexplained component, meaning that conflicts are more harmful for children in intact families than for children of divorce, possibly because children of divorce are no longer exposed to conflicts after the parents separate.

across children and emphasising the importance of their inclusion for the model to accurately capture the evolution of skills. Overall, the parameter estimates suggest that the model successfully replicates the mechanisms that were implied by our decomposition exercise.

4.4 Model fit

An important step in assessing the credibility of our counterfactual analysis is to evaluate how well our model replicates the moments and the distribution of skills that we observe in the data. In Appendix Table A.14 we compare the observed and predicted divorce skill gaps by gender and age, both in terms of the mean gap and the percentile gaps in the skill distribution. The table shows that our model closely matches the empirical patterns, reproducing not only average gaps but also the heterogeneity in gaps by gender. This provides us with reassurance that the model is capturing the main mechanisms that drive differences in child development between intact and disrupted families.

To explore this further, we provide additional evidence on model fit in Appendix Figures A.3 and A.4, which plot the densities of cognitive and socio-emotional skills, separately by age and divorce status, for both the observed skills and the simulated skills obtained from our model. In each case, the predicted distributions closely track the empirical ones, including both the central mass of the distributions and the tails. The ability of the model to replicate the shape of the distributions, rather than just mean outcomes, is important given our focus on divorce gaps across the entire skill distribution.

In the next section, we utilise the model to conduct a counterfactual analysis where we evaluate how divorce skill gaps would evolve if we were able to offset any differences in observable characteristics between children of divorce and children in intact families.

4.5 Counterfactual analysis: offsetting differences in observable characteristics

We now report results from our counterfactual analysis where we consider how children of disrupted families (children with $D_i = 1$, which we define as group $j = 1$) would have performed, if they had similar observable characteristics as children in intact families (children with $D_i = 0$, which we define as group $j = 0$). To achieve this, we take our original sample of MCS families, together with the estimated vector of model parameters Ψ , and simulate skill formation and accumulation across multiple counterfactual scenarios.

We begin with scenarios where we change a different subset of the child/family characteristics. For characteristics with continuous measures, we increase the value of each measure, for all children in group $j = 1$, by the corresponding average between group difference.³⁶ Moreover, for characteristics with discrete measures, we set the value of the measure, for all children in group $j = 1$, to equal the modal value of the measure observed in group $j = 0$. Finally, we compare our results to a benchmark scenario where we exogenously change the divorce decision for families in group $j = 1$ to match that of group $j = 0$, leaving all other observable characteristics unchanged. The results for both cognitive and socio-emotional skills are shown in Figure 1.

In Figure 1, each coloured bar highlights the skill gap that remains between children in group $j = 0$ and group $j = 1$, at different quantiles of the skill distribution, for the counterfactual scenario where we remove differences in: parental education $\mathbf{X}^e$ (blue), financial resources $\mathbf{X}^f$ (red), inter-parental conflicts P (green), and the decision to divorce (yellow). In addition, the horizontal dashed lines (purple) show the corresponding skill gaps observed in the raw data. The top panel of figures shows the skill gaps for cognitive skills at each age, while the bottom panel shows corresponding skill gaps for socio-emotional skills.

For cognitive skills, the figure shows that, consistent with our previous analysis, children of intact families score higher on cognitive tests at all quantiles of cognitive skill distribution, demonstrated by positive quantile gaps materialising at all ages (purple dashed line). The figure also suggests that there does not seem to have any clear pattern of pronounced inequality across the cognitive skill distribution.

Moreover, the results indicate that removing differences in parental education and family financial resources are most efficacious in narrowing skill gaps, particularly for children at the lower tail of the distribution. Increases to parental education diminish the gap for group $j = 1$ children across all skill quantiles and ages, completely removing the gap for children below the 50th quantile. While offsetting differences in family financial resources show similar overall effectiveness, their impact appears to attenuate with child age for children in the upper quantiles of the distribution. Overall, the figure confirms the descriptive evidence provided by the O-B mean decomposition that the major set of factors contributing to the cognitive skill gaps are family financial resources and parents' education, with limited contribution of

³⁶The vector of average between group differences for all measures of observable characteristics is shown in column (3) of Table 2. For example, the average between group difference in OECD equivalised income is £124.33. Therefore, when we simulate outcomes under changes to family financial resources, in addition to changes in the other measures of financial resources, we increase the OECD equivalised income for all children in group $j = 1$ by £124.33.

interparental conflicts.

A different pattern arises when looking at socio-emotional skills. As noted in the descriptive O-B analysis, the divorce socio-emotional skill gaps are in general larger than the corresponding cognitive skill gaps, and the counterfactual analysis across the distribution shows that this is especially true for skills at the bottom of the distribution (25th and 50th quantile). In addition, differently to cognitive skills, we find a pronounced pattern of decreasing differentials across the distribution of socio-emotional abilities, whereby the divorce socio-emotional skill gap decreases from the 25th quantile to the 90th quantile for all ages. These results can be interpreted in light of the diathesis stress framework (see [Beck 1967](#); [Monroe and Simons 1991](#); [Hilsman and Garber 1995](#)) whereby a child’s predisposition to behavioral problems manifests in the presence of stressful events, e.g. parental separation.³⁷

Analogous to cognitive skills, removing differences in parental education and financial resources reduces the gap for group $j = 1$ children across all skill quantiles and ages. However, in general, reducing inter-parental conflicts appears to be most effective at narrowing socio-emotional skill gaps at all quantiles of socio-emotional skill distribution.

Examining the effects across age highlights notable differences between cognitive and socio-emotional skills. For cognitive skills, the gap remains relatively stable as children grow older. The contribution of observable characteristics to this gap also appears stable, with the exception of financial resources. Financial resources play a substantial role in reducing the divorce skills gap up to age 7 and across the skills distribution, but only during early childhood. By age 11—and particularly above the median of the skills distribution, eliminating differences in financial resources is no longer sufficient to close the gap. By contrast, the socio-emotional skills gap associated with divorce widens with age, especially at the lower end of the skills distribution. Furthermore, none of the observable characteristics considered are able to fully account for this widening gap. This evidence is important, as it suggests that socio-emotional skills are especially persistent, particularly at lower levels, thereby amplifying inequalities as children get older.

Finally, exogenously changing the divorce decision (yellow bar), keeping all other observable characteristics unchanged, is important as it isolates the direct impact of divorce on skill outcomes within the model. For cognitive skills, this leads to negligible reductions in skill gaps at all ages and at all quantiles of the distribution. For socio-emotional skills, changing the divorce decision does reduce skill gaps, particularly for children at the lower skill quan-

³⁷We also provide the same counterfactual analysis by gender. Appendix Figure [A.5](#) reports results for boys while Appendix Figure [A.6](#) shows results for girls.

tiles, however, the reductions are never statistically different from corresponding reductions that occur from changing observable characteristics. Overall, this implies that discouraging divorce would be an ineffective strategy for offsetting skill gaps and that resources would be better allocated towards targeting characteristics of at-risk families, further emphasizing the role of selection.

5 Sensitivity analyses

In this section we first address some of the limitations of the O-B decomposition (Section 5.1). We address them by carrying out a set of sensitivity analyses similar to Longhi et al. (2012, 2013) and Nandi and Nicoletti (2014) by (i) estimating the re-weighted O-B decomposition, (ii) changing the counterfactual (iii) imposing a common support and (iv) changing the groups of covariates. Then, we consider the sensitivity of the divorce skill gaps obtained when equalising pre-divorce characteristics (Section 4.5), when we account for the effects of the improved characteristics on the endogenous divorce decision (Section 5.2).

5.1 O-B sensitivity analysis

The decomposition of the explained component using the O-B method is valid only if composition effects from the re-weighted and unweighted versions are similar. We estimate mean divorce skill gaps with the re-weighted methodology (DiNardo et al., 1996; Fortin et al., 2011), which more clearly separates composition from residual effects.³⁸ Table A.15 reports results for cognitive and socio-emotional skills (Panels A and B). Overall, the re-weighted estimates confirm that composition effects account for most of the differences.³⁹

A second limitation of O-B decompositions is their dependence on the reference group. Our baseline counterfactual—children of intact families with the mean covariates of children of divorce (see Equation 3)—treats intact-family children as the reference, which we argue appropriately represents the counterfactual outcomes absent divorce. We also test two

³⁸We construct a counterfactual sample of intact-family children re-weighted to match the characteristics of children of divorce. Differences with the original intact sample represent the true divorce skill gaps, free from misspecification due to non-linear conditional expectations. We compute weights with a logit model using the same covariates as in the main analysis. See Longhi et al. (2012, 2013); Nandi and Nicoletti (2014); Fortin et al. (2015) for applications.

³⁹While not statistically different from generalized O-B estimates, the larger re-weighted effects suggest an over-explanation of the divorce gap, implying that children from intact families should perform even better relative to children of divorce, underscoring the strong role of some factors.

alternatives: (i) children of divorce with the covariates of intact-family children, and (ii) coefficients from a pooled regression of both groups. Results in Tables A.16 and A.17 closely match those in Table 3, indicating robustness to the choice of counterfactual.

Third, to address common support concerns, we follow Dehejia and Wahba (2002) and Słoczyński (2015) and apply two rules to improve overlap. First, we exclude divorced children whose estimated propensity score falls outside the range of intact-family children. Second, we exclude intact-family children whose score lies outside the range of divorced children. Table A.18 reports the results with these restrictions for cognitive (Panel A) and socio-emotional skills (Panel B). The findings are virtually identical to those in Table 3, which is unsurprising given that very few observations are dropped. This indicates substantial overlap in divorce propensities across the two groups.

Finally, we test robustness by re-grouping some observable characteristics. Specifically, we include relationship duration and being married at birth under interparental conflicts which we now label as relationship quality, and planned pregnancy under child characteristics. Results in Appendix Table A.19 shows that this re-grouping does not alter our conclusions: parental education and financial resources primarily explain the cognitive skills gap, while financial resources and interparental conflicts play a larger role for socio-emotional skills.

5.2 Counterfactual sensitivity analysis: accounting for changes in the endogenous divorce decision

In this exercise we exploit that changes to observable characteristics influence the parental propensity to divorce within our model. Specifically, when we evaluated divorce skill gaps resulting from offsetting differences in observable characteristics (Section 4.5), group $j = 1$ was comprised of families belonging to two distinct subgroups: $j = 1'$, the group $j = 1$ families that remained divorced in that counterfactual, and $j = 1''$, the group $j = 1$ families who no longer divorced in the counterfactual. We now assess the sensitivity of the counterfactual skill gaps observed in Section 4.5 by considering outcomes separately for each subgroup. This comparison adds a new layer to the story and reinforces the need for a model of skill development because, even when differences in observable characteristics are offset, endogenously changing the divorce decision will shift the child onto a different trajectory that is amplified over time by the persistence of and cross-complementarities between skills. These dynamic effects are not, for example, captured by the O-B decomposition.

Figure A.7 shows the skill gaps between children in group $j = 0$ and children in group $j = 1''$. Specifically, this comparison answers the question: if we were to equalise observable characteristics to the extent that this would also change the divorce decision, what are the resulting skill gaps for children in those families? Figure A.7 shows that in all scenarios, the skill gaps are either eliminated or negligible for both skills, at all quantiles of the distribution, and at all ages. This is noteworthy for two reasons. First, it again reinforces that skill gaps for this subgroup can be fully explained by selection on observable characteristics, leaving negligible room for selection on unobservables. Second, it highlights that the divorce decision appears to only impact skill gaps through the lens of selection too. Indeed, Figure A.7 shows that if we were to instead cancel the divorce decision exogenously for group $j = 1''$ families (yellow bars), with no other change to their observable characteristics, large and significant skill gaps would remain, for both skills, at all ages, and all quantiles of the distribution.

Figure A.8 shows the corresponding skill gaps between children in group $j = 0$ and children in group $j = 1'$. This comparison is also important because it highlights the effect of offsetting observable characteristics among a subgroup of families where doing so would be insufficient to change their divorce decision. While the overall patterns are similar to those in Figure 1, suggesting that equalising observable characteristics can also reduce the divorce skill gaps for the children in these families, the gaps that remain are larger on average. This subgroup represents a higher divorce-risk margin so, although our exercise offsets the difference in one characteristic, this subgroup typically begin with relatively lower levels of the other characteristics overall and, because of the persistence of skills and complementarities between inputs, our single characteristic offset is insufficient to eliminate their divorce skill gaps.

Overall, while our results in Section 4.5 suggested that offsetting the effects of selection by targeting pre-divorce characteristics appears to be effective at reducing divorce skill gaps, our sensitivity analysis enhances this story by showcasing the mechanisms through which a potential intervention would operate. Taken together, the implication is that the narrowing of divorce skill gaps is attributed to both the direct effects of improved characteristics, operating via the skill production technologies, but also the indirect effects of those characteristics that operate by reducing the divorce probability. Consequently, for families with multiple adverse characteristics (e.g. group $j = 1'$), fully closing the divorce skill gap would require coordinated improvements across several inputs (in turn reduced their divorce probability) rather than modest shifts in any single input.

6 Discussion

As emphasised in Section 3.2.3, our counterfactual analysis and its interpretation rely on a set of assumptions and restrictions. Here, we discuss the plausibility of these assumptions, their role in identifying the parameters of interest, and the potential consequences if they were to not hold in practice.

First, our model imposes that child skills do not influence either the probability of divorce or the level of inter-parental conflicts. This is a strong simplification, but one that we consider reasonable for our empirical setting as we restrict our attention to separations that occur before age three, where children’s abilities and behaviours are only beginning to manifest. In contrast, it is more likely that shocks to child skill development at later ages could exacerbate parental stress and indirectly raise the risk of marital breakdown. Since our analysis does not model this type of feedback, our findings should be interpreted as applying primarily to divorces that occur in early childhood.

Second, in our estimation, we addressed the potential endogeneity of inter-parental conflict by employing a control-function approach. Specifically, we included the residual from the inter-parental conflicts equation as an additional regressor in the TFP equation for the skill production technologies to account for any correlation between the unobserved determinants of conflicts and the unobserved shocks to skill formation. The validity of this approach requires that, conditional on the residual term, the remaining errors in the skill equations are independent of inter-parental conflicts. If this condition does not hold then the estimated contribution of conflict could be biased. Our sensitivity checks however suggest that the role of inter-parental conflicts remains relatively stable when additional controls such as mother’s mental health are introduced, which provides us with increased confidence in this approach.

Finally, our central identifying assumption is that, conditional on the rich set of pre-divorce characteristics X_i , inter-parental conflicts P_i , and the discrete heterogeneity terms π , there are no further unobservables that jointly determine divorce and child skills. We believe that this assumption is more plausible in our setting because the MCS provides unusually rich information on family background, and in particular on relationship quality, which is typically absent from survey data. Nevertheless, if unmeasured factors remain then our model could over-attribute the observed differences in child outcomes to the observable pre-divorce characteristics, thereby understating any direct effect of divorce. In that case, the counterfactual results would represent a lower bound on the effect of divorce itself.

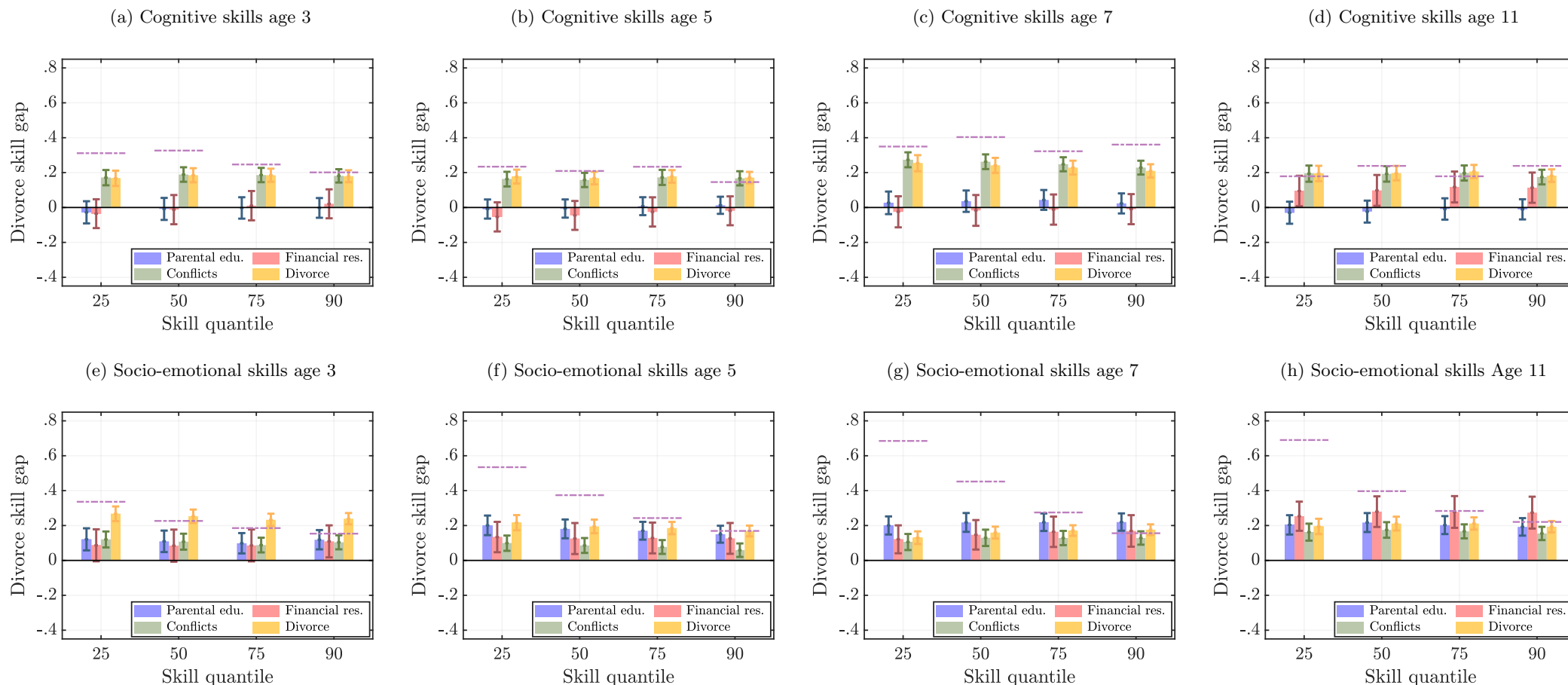
7 Conclusion

This paper utilises the UK Millennium Cohort Study (MCS) to model and analyse parental selection into divorce and its relationship with child cognitive and socio-emotional skill development from ages 3 to 11. We leverage the richness of the MCS data to calculate divorce skill gaps and perform a decomposition exercise, quantifying the relative contributions of various pre-divorce characteristics in explaining the gaps. Based on the decomposition analysis, we construct a model of child skill formation and accumulation that includes an endogenous parental divorce decision. Importantly, the divorce decision depends on all pre-divorce characteristics considered in the decomposition exercise, including inter-parental conflicts, that are often unobserved in the literature. The model provides the foundation for our analysis, where we assess the impact of counterfactual interventions aimed at reducing divorce skill gaps. Specifically, we consider alternative counterfactual scenarios where children of disrupted families (i) have identical observable characteristics as the children in intact families, or (ii) their parents chose not to divorce.

Our analysis indicates that the factors driving divorce skill gaps vary across skill domains. Cognitive gaps are primarily explained by parental education and family financial resources, with inter-parental conflict contributing little beyond these factors. In contrast, socio-emotional skill gaps are strongly influenced by inter-parental conflict, alongside differences in financial resources. These findings help reconcile previously mixed evidence on the effects of parental separation on children outcomes which did not account for parental conflicts. Extending beyond mean gaps, our results also show that divorce skill gaps are more pronounced among children with lower skill levels.

Overall, our decomposition and counterfactual analysis indicate that differences in cognitive and socio-emotional skills between children of divorced and non-divorced parents are almost entirely driven by parental selection into divorce. Exogenously altering the divorce decision, while holding other characteristics constant, has only a negligible impact on skill gaps, showing that discouraging divorce alone would be ineffective. Instead, under our model assumptions, equalizing pre-divorce characteristics could reduce gaps both directly, by affecting skill formation, and indirectly, by lowering the probability of divorce. These findings suggest that interventions to reduce the divorce skills gap are most effective when they simultaneously improve child skill development and address factors influencing parental stability.

Figure 1: Counterfactual analysis: offsetting differences in observable characteristics between groups $j = 0$ and $j = 1$



Source: UK Millennium Cohort Study.

Notes: This figure plots the divorce skill gap that remains between children in group $j = 0$ and group $j = 1$, in each counterfactual scenario, at different quantiles of the skill distribution. The purple dashed line corresponds to the divorce skill gap in the raw data at the respective quantile of the skill distribution. The blue bars correspond to the scenario where we offset differences in parental education, the red bars are the scenario where we offset differences in family financial resources, and the green bars are the skill gaps that remain in the counterfactual where we offset differences in inter-parental conflicts. The yellow bars are the corresponding gaps when we change only the divorce decision. The top panel of sub-figures a, b, c, and d show counterfactual divorce skill gaps for cognitive skills at ages 3, 5, 7, and 11 respectively. The bottom panel, sub-figures e, f, g, and h, show corresponding divorce skill gaps for socio-emotional skills. 95% confidence intervals from 100 bootstrap replications are indicated by the error bars.

Table 1: Descriptive statistics of the outcome variables, by divorce

	(1)		(2)		(3)	
	Non divorced		Divorced		Difference	Percentile Difference
	Mean	sd	Mean	sd		
Cognitive skills (Age 3)	0.195	0.939	-0.055	0.988	0.250***	11
Cognitive skills (Age 5)	0.216	0.855	-0.004	0.880	0.220***	11
Cognitive skills (Age 7)	0.192	0.913	-0.162	0.948	0.354***	16
Cognitive skills (Age 11)	0.153	0.898	-0.113	0.975	0.266***	19
Socio-emotional skills (Age 3)	0.146	0.915	-0.190	1.154	0.337***	13
Socio-emotional skills (Age 5)	0.188	0.858	-0.254	1.122	0.443***	16
Socio-emotional skills (Age 7)	0.204	0.839	-0.299	1.137	0.503***	19
Socio-emotional skills (Age 11)	0.191	0.868	-0.346	1.193	0.537***	19
Observations	4666		337		5003	

Sources: UK Millennium Cohort Study

Notes: Sample includes all singleton children interviewed at 9 months and ages 3,5,7 and 11, for whom the main respondent is the natural mother and the partner respondent is the natural father, who are either married or cohabiting and that have no missing observations in our set of relevant variables. Column (3) indicates the mean difference between the two groups with statistical significance difference at the 1, 5 and 10 percent levels indicated by ***, ** and *.

Table 2: Descriptive statistics of the explanatory variables, by divorce

	(1) Non divorced		(2) Divorced		(3) Difference
	Mean	sd	Mean	sd	
Child characteristics					
Female	0.514	0.500	0.510	0.501	0.004
Birth weight (Kg)	3.448	0.542	3.360	0.564	0.088**
Demographic characteristics					
Number of siblings	0.847	0.920	0.766	0.897	0.081
Cohabitation	0.201	0.401	0.576	0.495	-0.375***
Duration of relationship	5.709	3.829	3.706	3.118	2.003***
Planned pregnancy	0.710	0.454	0.487	0.501	0.223***
Mother's religion	0.617	0.486	0.418	0.494	0.199***
Mother's age	30.649	4.840	26.243	5.808	4.405***
Father's age	32.978	5.528	29.223	6.651	3.756***
Mother's ethnicity					
White	0.931	0.254	0.970	0.170	-0.040***
Mixed	0.004	0.064	0.006	0.077	-0.002
Indian, Pakistani, Bangladeshi, Black	0.055	0.228	0.018	0.132	0.037***
Other	0.010	0.101	0.006	0.077	0.004
Father's ethnicity					
White	0.929	0.256	0.944	0.231	-0.014
Mixed	0.006	0.079	0.006	0.077	0.000
Indian, Pakistani, Bangladeshi, Black	0.057	0.231	0.047	0.213	0.009
Other	0.008	0.089	0.003	0.054	0.005
Mother's education					
GCSE/O-level(or eq)	0.314	0.464	0.475	0.500	-0.161***
A level or more but below university	0.153	0.360	0.178	0.383	-0.025
University degree or higher	0.488	0.500	0.231	0.422	0.256***
No qualification	0.045	0.207	0.116	0.320	-0.071***
Father's education					
GCSE/O-level(or eq)	0.311	0.463	0.427	0.495	-0.117***
A level or more but below university	0.160	0.367	0.190	0.393	-0.030
University degree or higher	0.465	0.499	0.211	0.408	0.254***
No qualification	0.064	0.245	0.172	0.378	-0.108***
Parents' health					
Mother health:Good	0.878	0.328	0.789	0.408	0.089***
Father health:Good	0.881	0.324	0.816	0.388	0.065**
Financial resources					
OECD equivalised income	398.893	206.631	274.561	158.517	124.332***
House tenure					
Own	0.849	0.358	0.493	0.501	0.356***
Rent	0.130	0.336	0.466	0.500	-0.336***
Other	0.021	0.145	0.042	0.200	-0.020
Mother's occupational status					
Managerial and Professional	0.442	0.497	0.187	0.390	0.255***
Intermediate	0.251	0.434	0.193	0.395	0.058**
Routine and manual	0.284	0.451	0.558	0.497	-0.274***
Not in work	0.023	0.148	0.062	0.242	-0.040**
Father's occupational status					
Managerial and Professional	0.493	0.500	0.231	0.422	0.262***
Intermediate	0.182	0.386	0.151	0.359	0.031
Routine and manual	0.315	0.464	0.599	0.491	-0.285***
Not in work	0.010	0.099	0.018	0.132	-0.008
Quality of parental relationship					
Interparental conflicts	-0.182	0.878	0.589	1.168	-0.771***
Observations	4666		337		5003

Sources: UK Millennium Cohort Study

Notes: Sample includes all singleton children interviewed at 9 months and age 3,5,7 and 11, for whom the main respondent is the natural mother and the partner respondent is the natural father, who are either married or cohabiting and that have no missing observations in our set of relevant variables. Column (3) indicates the mean difference between the two groups with statistical significance difference at the 1, 5 and 10 percent levels indicated by ***, ** and *.

Table 3: Mean divorce skills gaps, by child age

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.053)	0.220*** (0.048)	0.354*** (0.054)	0.266*** (0.051)
Decomposition				
Explained	0.229*** (0.032)	0.213*** (0.025)	0.282*** (0.029)	0.242*** (0.030)
Unexplained	0.022 (0.055)	0.007 (0.048)	0.072 (0.057)	0.024 (0.058)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.063)	0.443*** (0.061)	0.503*** (0.058)	0.537*** (0.061)
Decomposition				
Explained	0.358*** (0.029)	0.340*** (0.030)	0.316*** (0.026)	0.360*** (0.031)
Unexplained	-0.022 (0.064)	0.102 (0.063)	0.187*** (0.060)	0.177*** (0.063)
Observations	5003	5003	5003	5003

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are: (i) *child characteristics* that are child sex and birth weight; (ii) *demographic characteristics* which are number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parents age, parents ethnicity; (iii) *parental education*; (iv) *health characteristics* that are parents general health; and (v) *family financial resources* which are family income, housing tenure, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi) *interparental conflicts*. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table 4: Detailed decomposition of the mean divorce skills gaps, by child age

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.053)	0.220*** (0.048)	0.354*** (0.054)	0.266*** (0.051)
Explained				
Child Characteristics	0.012 (0.008)	0.011** (0.005)	0.012** (0.005)	0.005 (0.004)
Demographic Characteristics	-0.033 (0.022)	-0.000 (0.017)	-0.017 (0.019)	0.023 (0.020)
Parent's Education	0.084*** (0.014)	0.070*** (0.013)	0.100*** (0.015)	0.092*** (0.015)
Parent's Health	0.006 (0.005)	0.003 (0.005)	0.007 (0.006)	-0.006 (0.005)
Financial Resources	0.143*** (0.024)	0.117*** (0.018)	0.163*** (0.024)	0.109*** (0.020)
Interparental Conflicts	0.017 (0.012)	0.013 (0.012)	0.018 (0.012)	0.018 (0.012)
Total	0.229*** (0.032)	0.213*** (0.025)	0.282*** (0.029)	0.242*** (0.030)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.063)	0.443*** (0.061)	0.503*** (0.058)	0.537*** (0.061)
Explained				
Child Characteristics	0.005 (0.006)	0.004 (0.007)	0.003 (0.007)	0.005 (0.007)
Demographic Characteristics	0.036* (0.019)	0.034* (0.018)	0.035** (0.016)	0.060*** (0.018)
Parent's Education	0.054*** (0.012)	0.025** (0.012)	0.017 (0.012)	0.044*** (0.012)
Parent's Health	0.020*** (0.008)	0.019*** (0.007)	0.021*** (0.007)	0.031*** (0.009)
Financial Resources	0.114*** (0.022)	0.120*** (0.022)	0.127*** (0.020)	0.105*** (0.021)
Interparental Conflicts	0.130*** (0.015)	0.138*** (0.015)	0.113*** (0.014)	0.116*** (0.015)
Total	0.358*** (0.029)	0.340*** (0.030)	0.316*** (0.026)	0.360*** (0.031)
Observations	5003	5003	5003	5003

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are: (i) *child characteristics* that are child sex and birth weight; (ii) *demographic characteristics* which are number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parents age, parents ethnicity; (iii) *parental education*; (iv) *health characteristics* that are parents general health; and (v) *family financial resources* which are family income, housing tenure, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi) *interparental conflicts*. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table 5: Inter-parental conflicts (P_i) and parental divorce (D_i) parameter estimates

	(1)	(2)
	Inter-parental conflicts	Divorce
Inter-parental conflicts	-	0.63***
female	0.00	-0.07
birth weight (Kg)	0.00	-0.17
Number of siblings	-0.01	0.17
Cohabitation	0.17***	0.70***
Duration of relationship	0.02***	-0.08**
Planned pregnancy	-0.12***	-0.20
Mother's religion	-0.05*	-0.30**
Mother's age	0.00	-0.07***
Father's age	0.00	-0.00
Mother white	0.13	0.83
Father white	-0.22***	-0.06
Mother GCSE	0.16**	-0.21
Mother A-level	0.17**	-0.13
Mother University degree	0.17**	-0.38
Father GCSE	-0.15***	-0.20
Father A-level	-0.21***	-0.16
Father University degree	-0.19***	-0.49
Mother good health	-0.40***	-0.02
Father good health	-0.14***	-0.08
OECD equiv. income	-0.12***	-0.06
Own house	0.05	0.78***
Rent house	0.05	0.68*
Mother managerial occ.	0.00	0.06
Mother intermediate occ.	0.03	0.12
Mother routine occ.	0.10	0.17
Father managerial occ.	0.07*	-0.24
Father intermediate occ.	0.06	0.14
Father routine occ.	0.16	0.15
constant	0.82***	2.69**

Source: UK Millennium Cohort Study.

Notes: In this table the coefficients correspond to estimates of the parameters δ^d and δ^p in the reduced-form equations for inter-parental conflicts and parental divorce, equations 7 and 8 respectively. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors omitted for brevity and are available upon request.

Table 6: Skill production function elasticity parameters, γ_t^k and Γ_t^k

	(1)	(2)	(3)	(4)	(5)	(6)
	Cognitive skills			Socio-emotional skills		
	Age 5	Age 7	Age 11	Age 5	Age 7	Age 11
γ_c^k	0.28*** (0.02)	0.45*** (0.02)	0.18*** (0.02)	-0.05*** (0.01)	-0.02* (0.01)	-0.01 (0.01)
γ_{cc}^k	-0.03*** (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02*** (0.01)	-0.01 (0.01)
γ_{ce}^k	-0.01 (0.01)	-0.08*** (0.02)	-0.07*** (0.02)	0.02 (0.01)	0.01 (0.02)	-0.00 (0.02)
γ_{cp}^k	0.02 (0.01)	-0.01 (0.02)	-0.01 (0.02)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)
γ_e^k	-0.05*** (0.01)	-0.01 (0.02)	-0.04* (0.02)	0.35*** (0.02)	0.39*** (0.02)	0.37*** (0.02)
γ_{ee}^k	0.00 (0.01)	0.03*** (0.01)	0.01 (0.01)	0.02 (0.01)	0.07*** (0.01)	0.08*** (0.02)
γ_{ep}^k	0.01 (0.01)	0.01 (0.01)	0.01 (0.02)	0.05*** (0.01)	0.04** (0.02)	0.04** (0.02)
γ_p^k	-0.02 (0.02)	-0.02 (0.01)	-0.02 (0.02)	-0.12*** (0.01)	-0.07*** (0.01)	-0.10*** (0.01)
γ_{pp}^k	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.02*** (0.01)	0.02* (0.01)	0.01 (0.01)

Source: UK Millennium Cohort Study.

Notes: In this table the coefficients correspond to estimates of the elasticity parameters γ_t^k and Γ_t^k of the skill production functions in equation 5. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

A Appendices

A.1 Institutional background

This section describes the institutional background characterizing the UK and our sample. The most important divorce reform in the UK was the Divorce Reform Act 1969, strengthened in the Matrimonial Causes Act 1973 which still contains the divorce law UK is subject to today. This reform yielded remarkable changes because, in addition to the three grounds of divorce of adultery, behavior and desertion, already present in the previous Matrimonial Causes Act 1937, it adds grounds for divorce, based on two years' consensual separation, or five years' if one of the party is non-consensual. This legislation removed the concept of 'matrimonial offences' and introduced some elements of no-fault divorce, although a formal 'no fault' divorce has not been introduced yet in the UK with a still ongoing debate. The divorce reform, together with the change in attitudes and expectations toward marriage, and the higher women's employment rate⁴⁰, has followed by a sharp increase in the number of divorced couples from around 50,000 per year in the early '70s to 150,000 in the '80s.⁴¹ Then the number of divorces remain stable for 20 years until recently, when it has fallen steadily, together with the number of marriages.⁴² More precisely, the number of divorcing couples in England and Wales in 2013 was 114,720, involving 94,864 children under 16. Among these children, 21% were under 5 and 64% were under 11 years old.⁴³

In addition to the divorce law the UK has implemented, there are other policies indirectly related to divorce, e.g. pro-marriage policies. In 2015 the UK has introduced a new public policy called *Married couples allowance*, aimed to reduce the tax bill each year if a couple is married or in a civil partnership.⁴⁴ This policy promotes marriages and civil partnerships and discourages divorce, without considering the possible drawback of reshaping the incentive to divorce and convincing conflictual couples to stay married.⁴⁵ If these policies are motivated by promoting two-parents families as the best environment for child development, we need to establish that the negative association between parental separation and children outcomes cannot be entirely explained by selection.

⁴⁰Evidence on no-fault divorce law and female labour supply is provided for US (Genadek et al., 2007).

⁴¹González and Viitanen (2009) analyze the effect on divorce rate of no-fault divorce reform in Europe and find a sizeable effect of the reform in increasing the divorce rate.

⁴²A similar figure characterizes the US (Rotz, 2016).

⁴³Source: Office from National Statistics.

⁴⁴A similar policy, the *Temporary Assistance to Needy Families* (TANF) introduced in 1997 can be found in the US.

⁴⁵Consider McLanahan (2007), Amato and Furstenberg (2007), and Frimmel et al. (2014) for evaluation of pro-marriage policies.

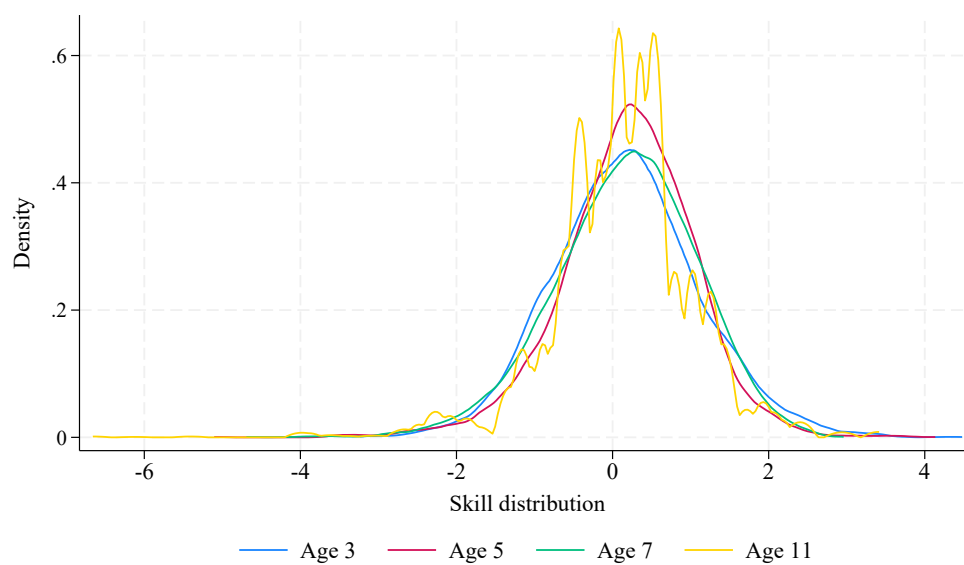
Finally, Child Maintenance policies may indirectly affect divorce decisions (Walker and Zhu 2006 for the UK and Nixon 1997 for the US). During our sample period (2000-2012) child maintenance has been regulated by the Child Support Agency (CSA) introduced in 1993, a reform that mandated child support payment for the first time. In 2003 a simplified scheme was introduced, where the amount of financial support provided by the non-resident parent depend on his/her net weekly income. In addition, this scheme included the possibility of shared care for parents, meaning that the non-resident parent pays lower maintenance if he/she stays with the child for at least 52 nights a year.⁴⁶ More recently, the Children and Families Act 2014 replaced the CSA with the Child Maintenance Service which includes the possibility of 50-50 shared parenting and requires the parents to attend a Mediation Information and Assessment Meeting before applying to court.⁴⁷ This procedure is aimed at encouraging cooperation between the parents and at reducing conflicts in the best interest of the child. Although this scheme does not regard our sample it is important to mention it for policy implication purposes.

⁴⁶Source: www.csa.gov.uk

⁴⁷Source: www.gov.uk

Figure A.1: Decomposition across the skills distribution

(a) Cognitive skills



(b) Socio-emotional skills

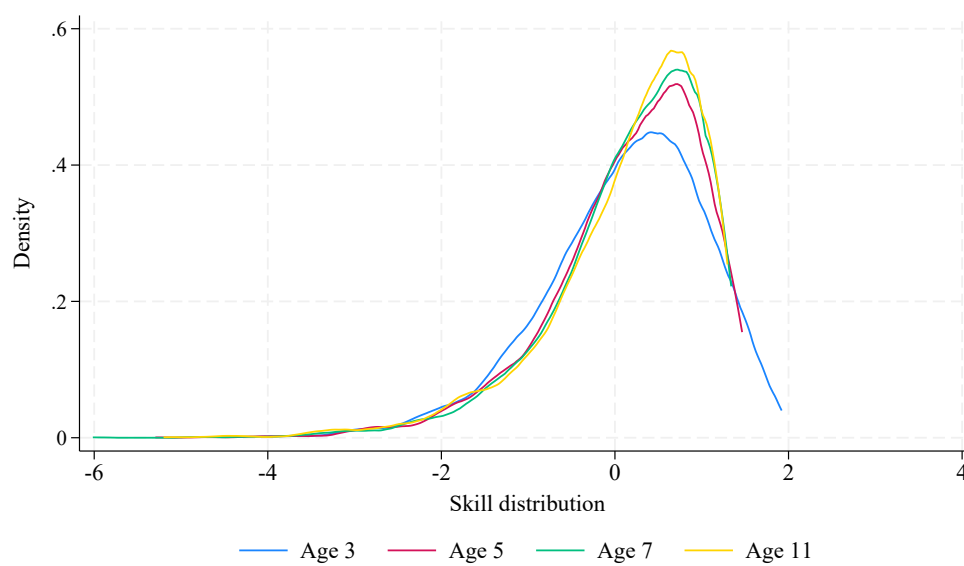
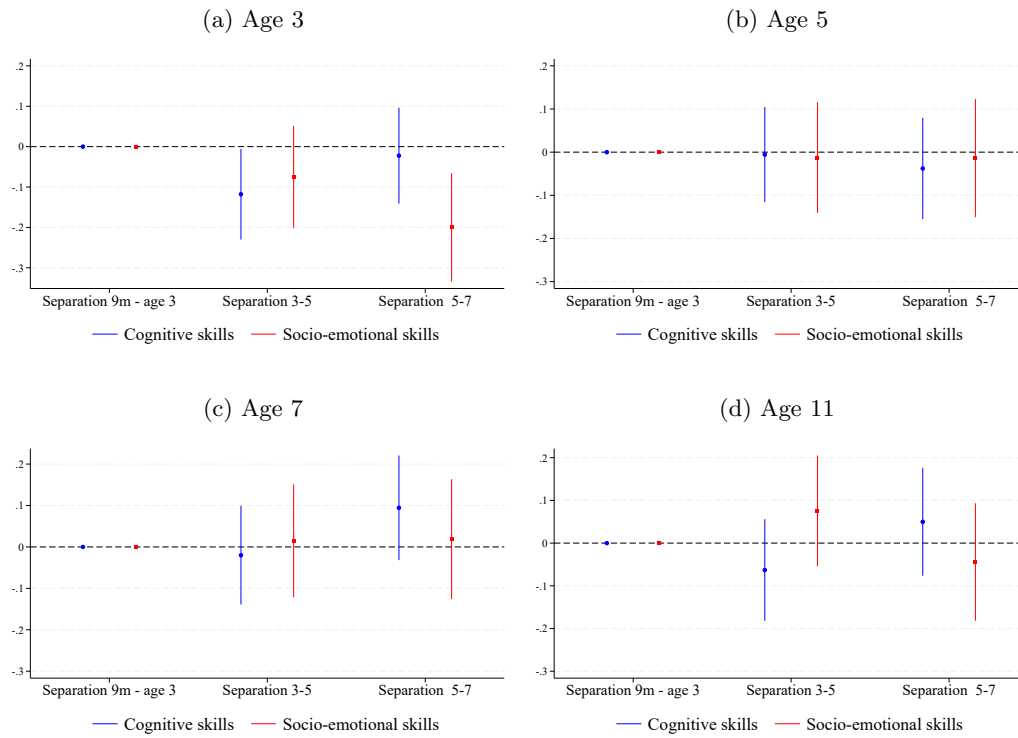
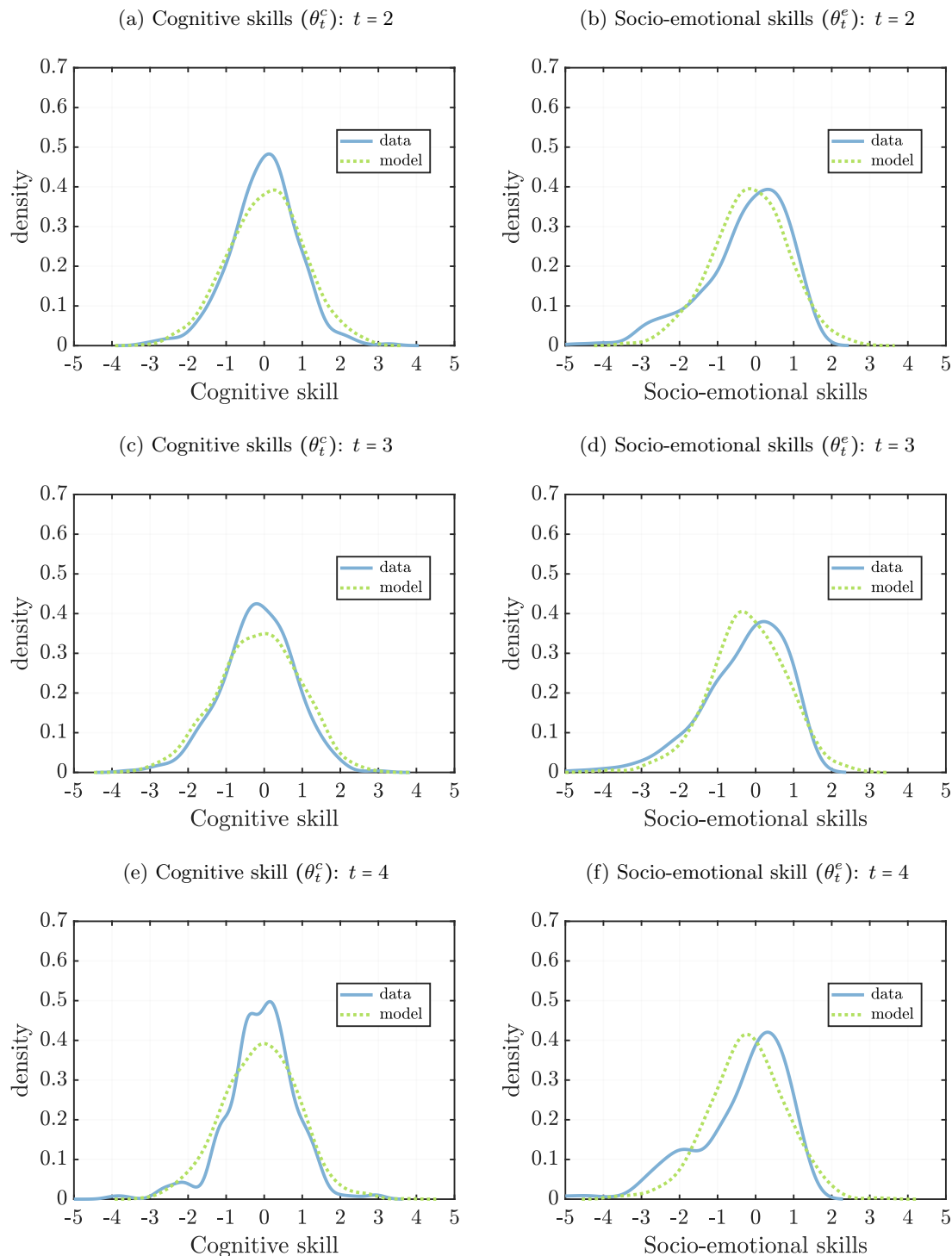


Figure A.2: The effect of timing of divorce on children cognitive and socio-emotional skills



Note: The figure shows the effect of divorces occurring between ages 3 and 5 and between ages 5 and 7, relative to divorces between 9 months and age 3, on cognitive and socio-emotional skills at ages 3 (Panel a), 5 (Panel b), 7 (Panel c), and 11 (Panel d). The model only includes children with divorced parents and controls for the full set of characteristics—including interparental conflict—as in the decomposition analysis.

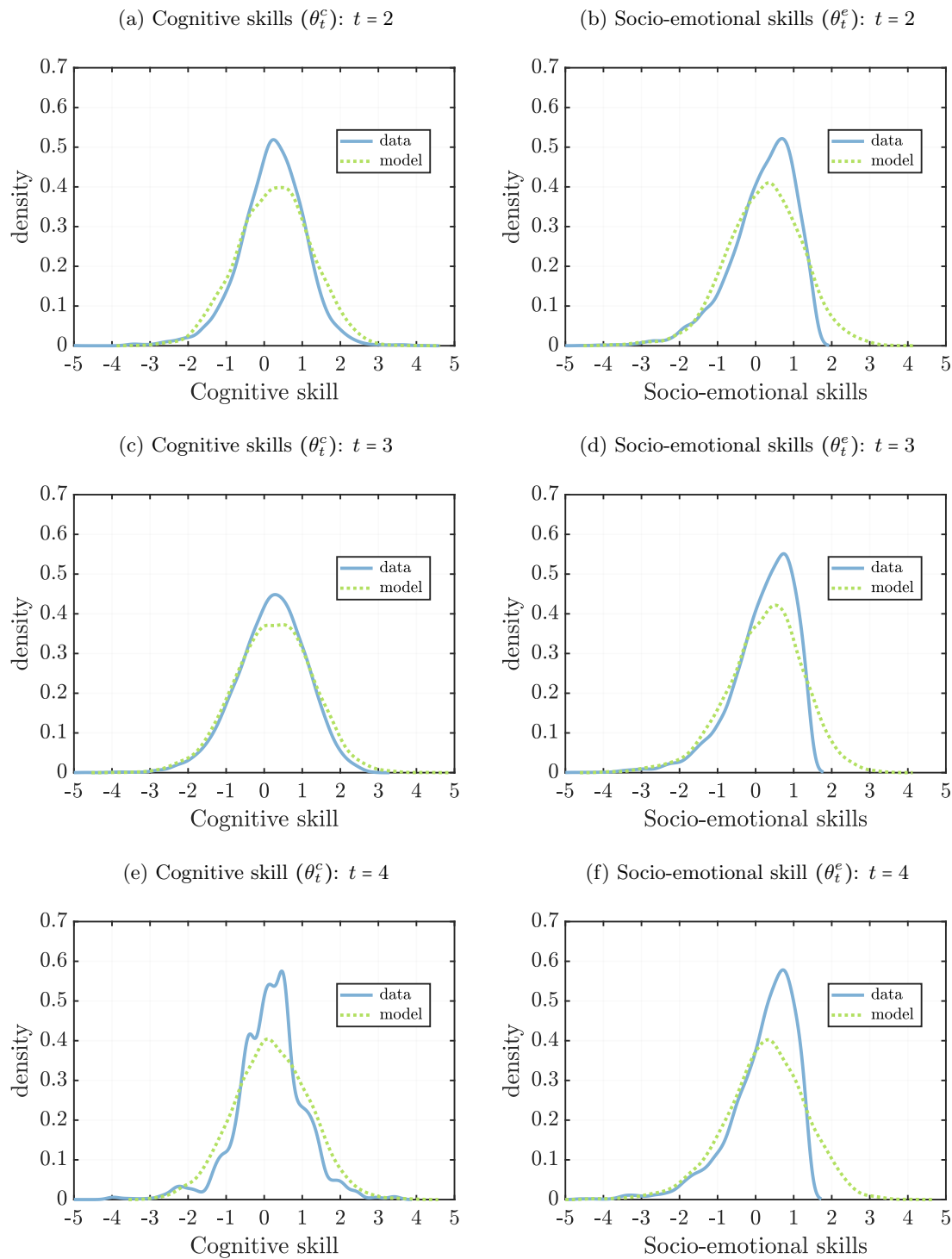
Figure A.3: Model fit - densities of cognitive and socio-emotional skills among children whose parents are divorced



Source: UK Millennium Cohort Study.

Notes: This figure shows kernel density plots for cognitive skills (sub-figures a, c, e), and socio-emotional skills (sub-figures b, d, f) in the data (solid blue line) and predicted by the empirical model (dashed green line) among children whose parents are divorced, $D_i = 1$. Sub-figures a and b correspond to child skills at age 5, while sub-figures c and d correspond to skills at age 7. Sub-figures e and f correspond to skills at age 11.

Figure A.4: Model fit - densities of cognitive and socio-emotional skills among children whose parents are not divorced

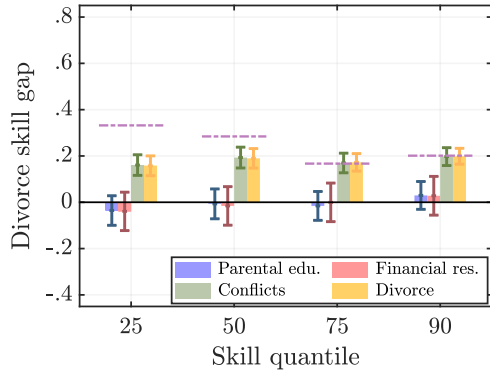


Source: UK Millennium Cohort Study.

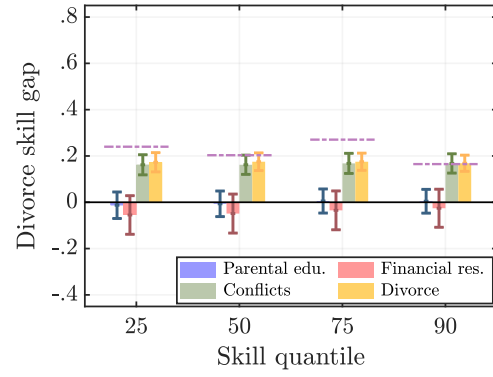
Notes: This figure shows kernel density plots for cognitive skills (sub-figures a, c, e), and socio-emotional skills (sub-figures b, d, f) in the data (solid blue line) and predicted by the empirical model (dashed green line), among children whose parents are not divorced, $D_i = 0$. Sub-figures a and b correspond to child skills at age 5, while sub-figures c and d correspond to skills at age 7. Sub-figures e and f correspond to skills at age 11.

Figure A.5: Counterfactual analysis - offsetting differences in observable characteristics between groups $j = 0$ and $j = 1$, skill gaps among boys

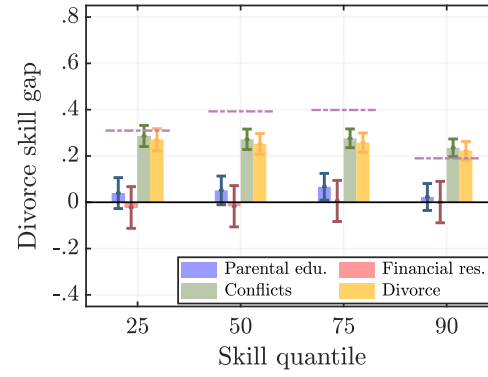
(a) Cognitive skills age 3



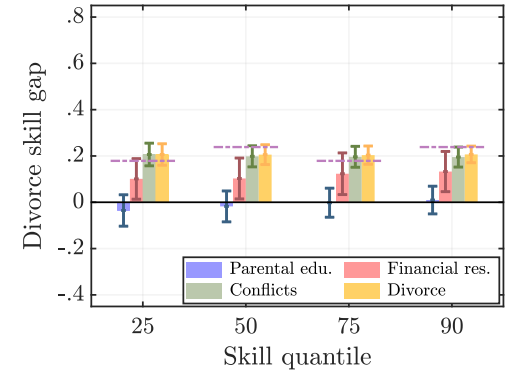
(b) Cognitive skills age 5



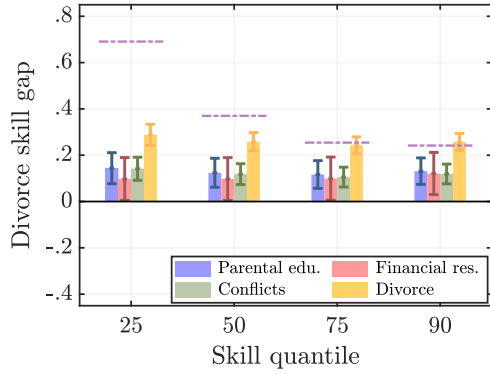
(c) Cognitive skills age 7



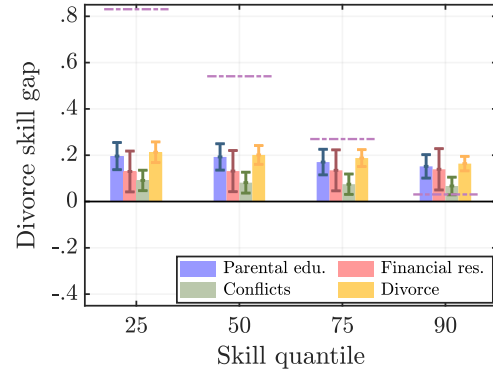
(d) Cognitive skills age 11



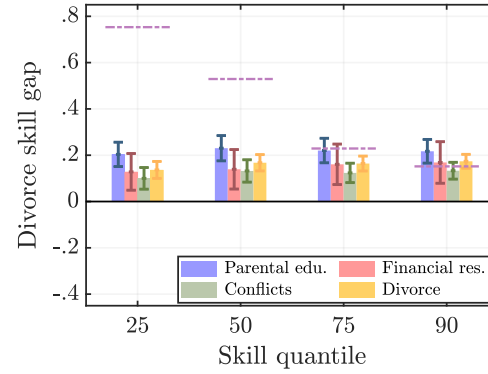
(e) Socio-emotional skills age 3



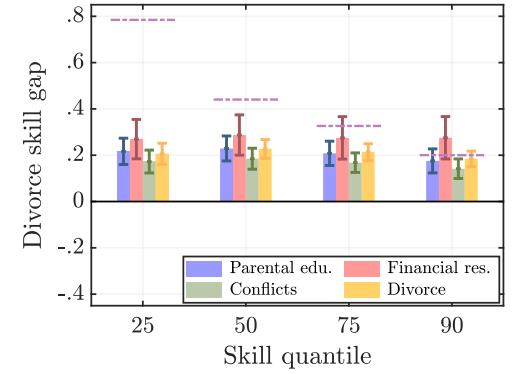
(f) Socio-emotional skills age 5



(g) Socio-emotional skills age 7



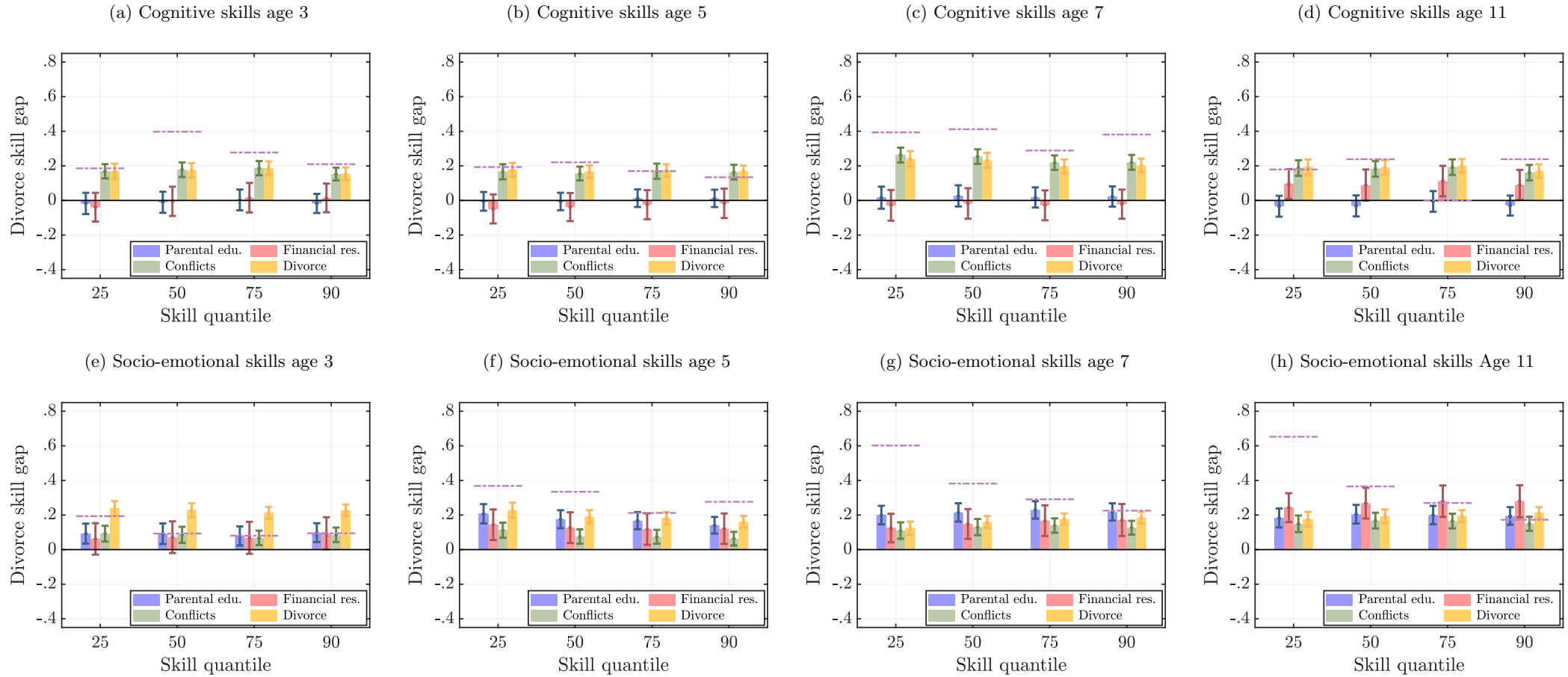
(h) Socio-emotional skills Age 11



Source: UK Millennium Cohort Study.

Notes: This figure plots the divorce skill gap that remains between boys in group $j = 0$ and group $j = 1$, in each counterfactual scenario, at different quantiles of the skill distribution. The purple dashed line corresponds to the divorce skill gap in the raw data at the respective quantile of the skill distribution. The blue bars correspond to the scenario where we offset differences in parental education, the red bars are the scenario where we offset differences in family financial resources, and the green bars are the skill gaps that remain in the counterfactual where we offset differences in inter-parental conflicts. The yellow bars are the corresponding gaps when we change only the divorce decision. The top panel of sub-figures a, b, c, and d show counterfactual divorce skill gaps for cognitive skills at ages 3, 5, 7, and 11 respectively. The bottom panel, sub-figures e, f, g, and h, show corresponding divorce skill gaps for socio-emotional skills. 95% confidence intervals from 250 bootstrap replications are indicated by the error bars.

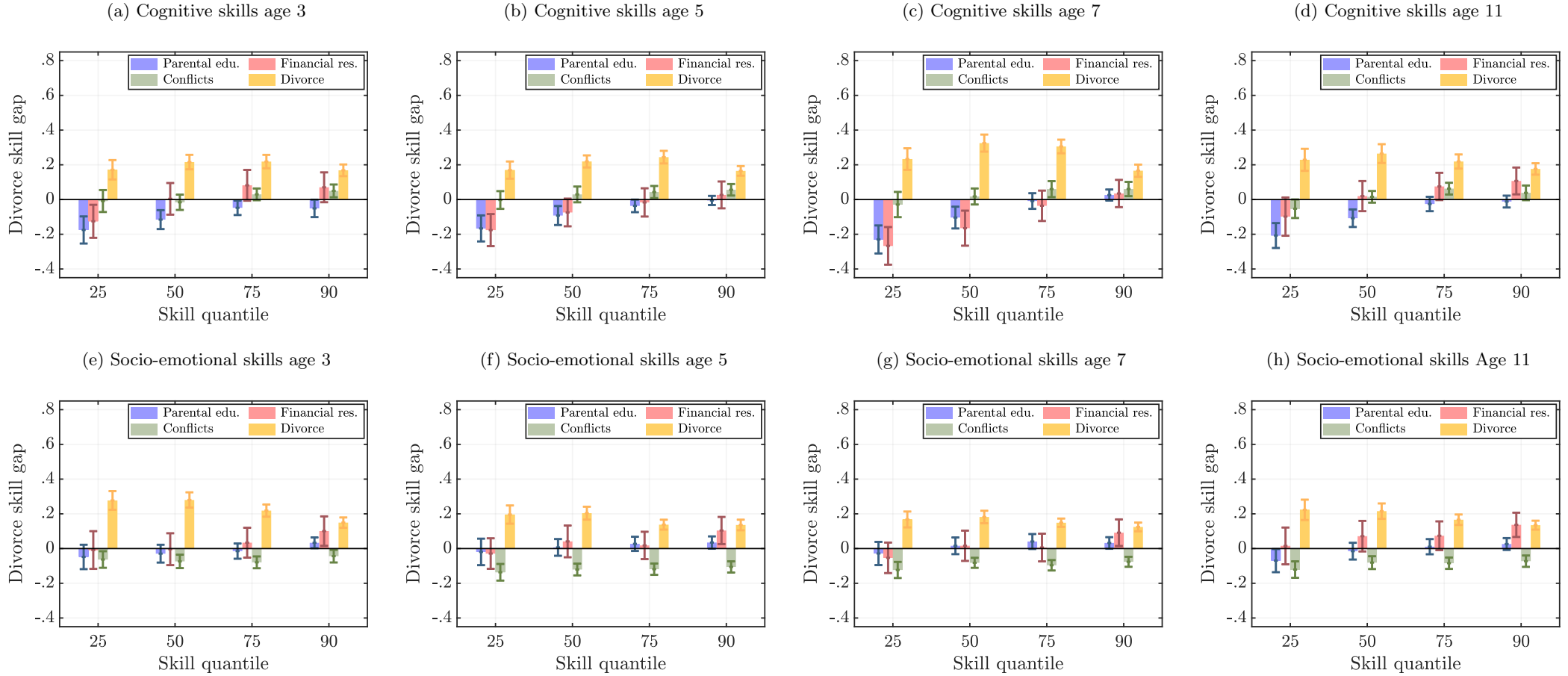
Figure A.6: Counterfactual analysis - offsetting differences in observable characteristics between groups $j = 0$ and $j = 1$, skill gaps among girls



Source: UK Millennium Cohort Study.

Notes: This figure plots the divorce skill gap that remains between girls in group $j = 0$ and group $j = 1$, in each counterfactual scenario, at different quantiles of the skill distribution. The purple dashed line corresponds to the divorce skill gap in the raw data at the respective quantile of the skill distribution. The blue bars correspond to the scenario where we offset differences in parental education, the red bars are the scenario where we offset differences in family financial resources, and the green bars are the skill gaps that remain in the counterfactual where we offset differences in inter-parental conflicts. The yellow bars are the corresponding gaps when we change only the divorce decision. The top panel of sub-figures a, b, c, and d show counterfactual divorce skill gaps for cognitive skills at ages 3, 5, 7, and 11 respectively. The bottom panel, sub-figures e, f, g, and h, show corresponding divorce skill gaps for socio-emotional skills. 95% confidence intervals from 250 bootstrap replications are indicated by the error bars.

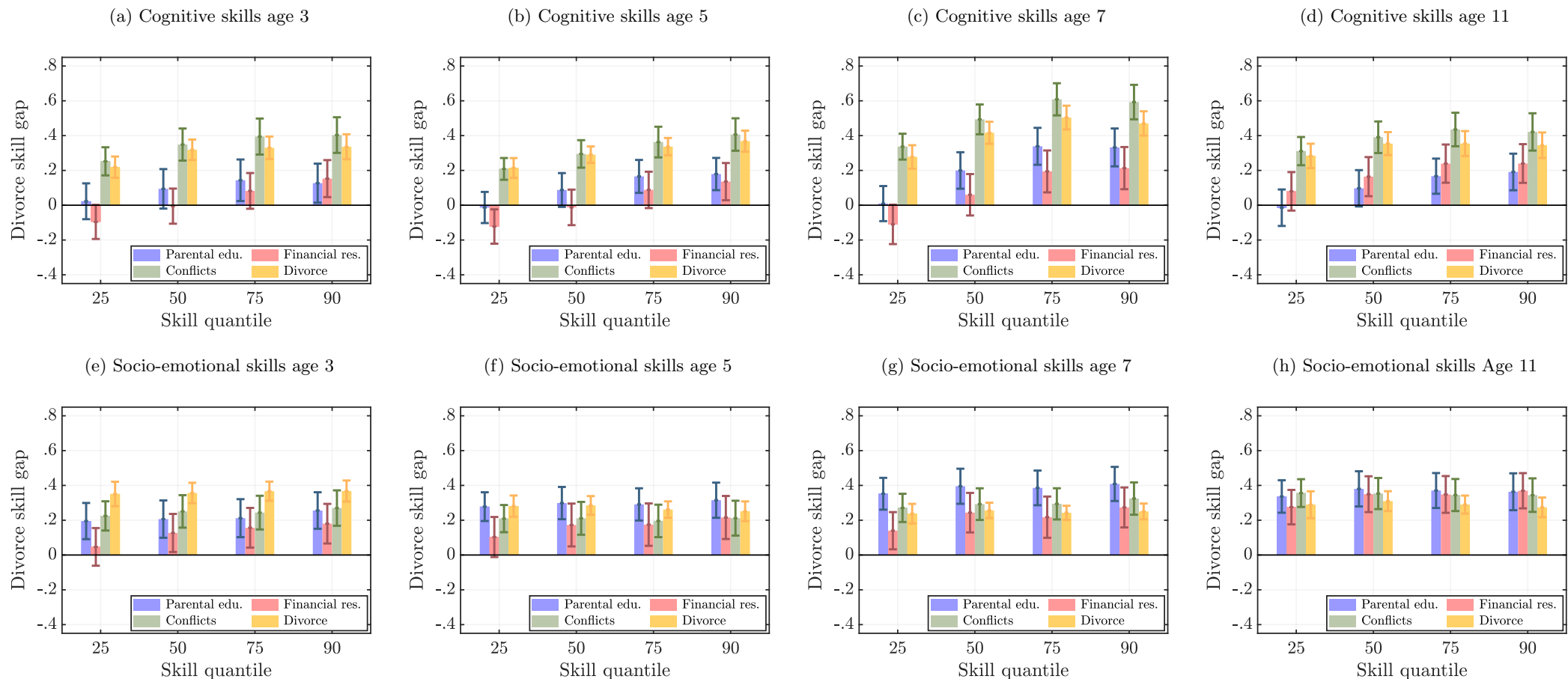
Figure A.7: Counterfactual analysis: endogenous skill gap between children in group $j = 0$ and group $j = 1$



Source: UK Millennium Cohort Study.

Notes: This figure plots the divorce skill gap that remains between children in group $j = 0$ and group $j = 1$, in each counterfactual scenario, at different quantiles of the skill distribution. The blue bars correspond to the scenario where we offset differences in parental education, the red bars are the scenario where we offset differences in family financial resources, and the green bars are the skill gaps that remain in the counterfactual where we offset differences in inter-parental conflicts. The yellow bars are the corresponding gaps when we change only the divorce decision. The top panel, sub-figures a, b, c, and d show counterfactual divorce skill gaps for cognitive skills at ages 3, 5, 7, and 11 respectively. The bottom panel, sub-figures e, f, g, and h, show corresponding divorce skill gaps for socio-emotional skills. 95% confidence intervals from 250 bootstrap replications are indicated by the error bars.

Figure A.8: Counterfactual analysis: endogenous skill gap between children in group $j = 0$ and group $j = 1'$



Source: UK Millennium Cohort Study.

Notes: This figure plots the divorce skill gap that remains between children in group $j = 0$ and group $j = 1'$, in each counterfactual scenario, at different quantiles of the skill distribution. The blue bars correspond to the scenario where we offset differences in parental education, the red bars are the scenario where we offset differences in family financial resources, and the green bars are the skill gaps that remain in the counterfactual where we offset differences in inter-parental conflicts. The yellow bars are the corresponding gaps when we change only the divorce decision. The top panel, sub-figures a, b, c, and d show counterfactual divorce skill gaps for cognitive skills at ages 3, 5, 7, and 11 respectively. The bottom panel, sub-figures e, f, g, and h, show corresponding divorce skill gaps for socio-emotional skills. 95% confidence intervals from 250 bootstrap replications are indicated by the error bars.

Table A.1: Assessment, by child age

Assessment	Age 3	Age 5	Age 7	Age 11
Cognitive skills				
Bracken School Readiness Test	X			
BAS Naming Vocabulary	X	X		
BAS Picture Similarity		X		
BAS Pattern Construction		X	X	
BAS Word Reading			X	
BAS Verbal Similarities				X
NFER Number Skills			X	
Socio-emotional skills				
SDQ (Strenght and Difficulties Questionnaire)	X	X	X	X

Sources: UK Millennium Cohort Study

Notes: The table shows the tests available by child's age. The Bracken School Readiness test evaluates their understanding of educational concepts in sub-tests or categories such as colours, letters, numbers, sizes, comparisons and shapes. The Picture Similarity Test measures child's problem solving abilities by asking the child to choose two similar pictures from a row of 4 pictures. The Pattern Construction Test instead asks the child to build a pattern by combining coloured flat squares or solid cubes. This test provides information about child accuracy, speed and spatial awareness as well as dexterity and coordination. The BAS Word Reading Test assesses child's reading ability by asking the child to read aloud a list of 90 words shown on a card. The NFER test instead is a maths assessment which initially tests all children equally and then, based on their score, they are asked easier, medium or harder questions. For the NFER Test we use an adjusted test score which adopts an item response scaling method (Rasch) to adjust the results of the easy, medium and hard subtest scores to the correspondent raw scores. The BAS Verbal Similarities Test informs about verbal reasoning and verbal knowledge by asking the child to recognise similarities among three words read out by the interviewer. The Strength and Difficulties questionnaire consists of five sub-scales measuring: (i) Emotional Problems; (ii) Conduct Problems; (iii) Hyperactivity; (iv) Peer Relationship Problems and (v) Pro-social Behavior.

Table A.2: Cognitive skills - Factor loadings

	(1) Factor Loadings	(2) Signal
Age 3		
BAS Naming vocabulary	0.874	0.764
Braken School Readiness Test	0.874	0.764
Age 5		
BAS Naming vocabulary	0.711	0.506
BAS Pattern construction	0.727	0.528
BAS Picture Similarity	0.735	0.540
Age 7		
BAS Word Reading	0.768	0.590
BAS Pattern construction	0.731	0.534
BAS Mathematical Skills	0.843	0.710

Sources: UK Millennium Cohort Study

Notes: Column (1) shows the factor loading and Column (2) shows the signal that is the proportion of the variance of each measure explained by the latent factor.

Table A.3: Socio-emotional skills - Factor loadings

	(1) Factor Loadings	(2) Signal
Age 3		
Emotional Symtoms	0.521	0.272
Peer Problems	0.616	0.379
Conduct Problems	0.744	0.554
Hyperactivity Problems	0.699	0.488
Prosocial Behaviour	0.594	0.353
Age 5		
Emotional Symtoms	0.554	0.307
Peer Problems	0.605	0.366
Conduct Problems	0.598	0.358
Hyperactivity Problems	0.707	0.500
Prosocial Behaviour	0.598	0.358
Age 7		
Emotional Symtoms	0.575	0.331
Peer Problems	0.625	0.391
Conduct Problems	0.767	0.588
Hyperactivity Problems	0.725	0.526
Prosocial Behaviour	0.612	0.375
Age 11		
Emotional Symtoms	0.646	0.417
Peer Problems	0.661	0.436
Conduct Problems	0.765	0.586
Hyperactivity Problems	0.742	0.551
Prosocial Behaviour	0.593	0.351

Sources: UK Millennium Cohort Study

Notes: Column (1) shows the factor loading and Column (2) shows the signal that is the proportion of the variance of each measure explained by the latent factor.

Table A.4: Interparental Conflicts - Factor loadings

	(1) Factor Loadings	(2) Signal
Interparental conflicts (age 9 months)		
Partner sensitive and aware of needs	0.728	0.530
Partner doesnt listen	0.721	0.520
Sometime lonely when with partner	0.725	0.526
Relationship full of joy and excitement	0.695	0.483
Wishes was more warmth and affection	0.731	0.535
Suspects on brink of separation	0.561	0.315
Can make up quickly after argument	0.434	0.189
Frequency go out as a couple	0.233	0.054
Happy/Unhappy with relationship	0.608	0.369

Sources: UK Millennium Cohort Study

Notes: Column (1) shows the factor loading and Column (2) shows the signal that is the proportion of the variance of each measure explained by the latent factor.

Table A.5: Mean divorce skills gaps, by child age - Boys

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.256*** (0.090)	0.257*** (0.078)	0.362*** (0.084)	0.275*** (0.083)
Decomposition				
Explained	0.211*** (0.043)	0.241*** (0.037)	0.328*** (0.047)	0.223*** (0.040)
Unexplained	0.046 (0.088)	0.016 (0.078)	0.034 (0.085)	0.051 (0.089)
Panel B: Socio-emotional skills				
Mean Gap	0.497*** (0.099)	0.535*** (0.099)	0.534*** (0.094)	0.585*** (0.098)
Decomposition				
Explained	0.365*** (0.048)	0.335*** (0.048)	0.327*** (0.047)	0.383*** (0.047)
Unexplained	0.132 (0.101)	0.200* (0.104)	0.207** (0.097)	0.202** (0.102)
Observations	2432	2432	2432	2432

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are: (i) *child characteristics* that are child sex and birth weight; (ii) *demographic characteristics* which are number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parents age, parents ethnicity; (iii) *parental education*; (iv) *health characteristics* that are parents general health; and (v) *family financial resources* which are family income, housing tenure, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi) *interparental conflicts*. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.6: Mean divorce skills gaps, by child age - Girls

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.243*** (0.068)	0.183*** (0.064)	0.347*** (0.068)	0.258*** (0.067)
Decomposition				
Explained	0.244*** (0.048)	0.185*** (0.033)	0.235*** (0.040)	0.246*** (0.038)
Unexplained	-0.001 (0.077)	-0.002 (0.070)	0.112 (0.073)	0.012 (0.075)
Panel B: Socio-emotional skills				
Mean Gap	0.181** (2.27)	0.352*** (4.25)	0.471*** (5.10)	0.490*** (5.54)
Decomposition				
Explained	0.336*** (8.54)	0.336*** (8.80)	0.300*** (7.95)	0.341*** (8.37)
Unexplained	-0.154* (-1.88)	0.0158 (0.18)	0.171* (1.75)	0.149 (1.61)
Observations	2571	2571	2571	2571

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are: (i) *child characteristics* that are child sex and birth weight; (ii) *demographic characteristics* which are number of siblings, whether parents were cohabiting or married at birth, duration of relationship between the parents at birth, whether the pregnancy was planned, mother's religiosity, parents age, parents ethnicity; (iii) *parental education*; (iv) *health characteristics* that are parents general health; and (v) *family financial resources* which are family income, housing tenure, parents' social class based on NS-SEC (National Statistics Socio-Economic Classification); (vi) *interparental conflicts*. Statistical significance at the 1, 5 and 10 percent indicated by ***, ** and *.

Table A.7: Detailed decomposition of the mean divorce skills gaps, by child age - unexplained component when significant

	(1) Age 7	(2) Age 11
Socio-emotional skills		
Unexplained		
Child Characteristics	0.309 (0.374)	-0.182 (0.413)
Demographic Characteristics	-0.103 (0.629)	-0.411 (0.572)
Parent's Education	-0.032 (0.047)	0.016 (0.049)
Parent's Health	-0.131 (0.190)	-0.217 (0.190)
Financial Resources	0.035 (0.188)	-0.167 (0.207)
Interparental Conflicts	-0.059* (0.033)	-0.015 (0.035)
Constant	0.168 (0.707)	1.151 (0.751)
Observations	5003	5003

Source: UK Millennium Cohort Study.

Notes: Socio-emotional skills are in standard deviations. The variables used to explain the gap are the same as Table 3. The table shows the detailed decomposition of the unexplained component when significant (see Table 3). Column (1) corresponds to the detailed decomposition of the unexplained component of the divorce skills gap of socio-emotional skills at age 7 as reported in Table 3, Panel B Column (3). Column (2) corresponds to the detailed decomposition of the unexplained component of the divorce skills gap of socio-emotional skills at age 11 as reported in Table 3, Panel B Column (4). Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.8: Mean divorce skills gaps, by child age - divorce between age 3 and 5 of the child

	(1) Age 5	(2) Age 7	(3) Age 11
Panel A: Cognitive skills			
Mean Gap	0.198*** (0.056)	0.324*** (0.061)	0.302*** (0.050)
Explained			
Child characteristics	0.011* (0.006)	0.013** (0.006)	0.005 (0.004)
Demographic characteristics	0.014 (0.013)	-0.008 (0.013)	0.018 (0.014)
Parent's Education	0.055*** (0.012)	0.068*** (0.013)	0.067*** (0.013)
Parent's Health	0.006 (0.004)	0.008 (0.005)	0.003 (0.005)
Financial Resources	0.075*** (0.017)	0.120*** (0.019)	0.054*** (0.015)
Interparental Conflicts	0.015 (0.016)	0.007 (0.017)	0.024 (0.017)
Total	0.176*** (0.029)	0.209*** (0.032)	0.170*** (0.027)
Panel B: Socio-emotional skills			
Mean Gap	0.368*** (0.065)	0.425*** (0.070)	0.361*** (0.064)
Explained			
Child characteristics	0.002 (0.008)	-0.001 (0.009)	0.002 (0.008)
Demographic characteristics	0.026** (0.012)	0.021* (0.012)	0.033** (0.013)
Parent's Education	0.012 (0.009)	0.007 (0.009)	0.021** (0.009)
Parent's Health	0.013** (0.007)	0.017** (0.007)	0.019** (0.008)
Financial Resources	0.061*** (0.017)	0.081*** (0.017)	0.075*** (0.016)
Interparental Conflicts	0.203*** (0.024)	0.156*** (0.022)	0.158*** (0.020)
Total	0.317*** (0.031)	0.281*** (0.030)	0.308*** (0.030)
Observations	4696	4696	4696

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.9: Mean divorce skills gaps, by child age - divorce between age 5 and 7 of the child

	(1) Age 7	(2) Age 11
Panel A: Cognitive skills		
Mean Gap	0.138** (0.060)	0.088 (0.058)
Explained		
Child characteristics	0.008 (0.006)	0.002 (0.004)
Demographic characteristics	0.011 (0.011)	0.029** (0.012)
Parents' Education	0.051*** (0.013)	0.049*** (0.012)
Parents' Health	0.003 (0.003)	0.003 (0.003)
Financial Resources	0.082*** (0.015)	0.045*** (0.013)
Interparental Conflicts	0.055*** (0.019)	0.031* (0.016)
Total	0.210*** (0.029)	0.158*** (0.026)
Panel B: Socio-emotional skills		
Mean Gap	0.281*** (0.062)	0.322*** (0.060)
Explained		
Child characteristics	0.003 (0.008)	0.004 (0.007)
Demographic characteristics	0.012 (0.009)	0.021** (0.010)
Parents' Education	0.002 (0.008)	0.013 (0.008)
Parents' Health	0.009 (0.006)	0.009 (0.007)
Financial Resources	0.054*** (0.013)	0.053*** (0.012)
Interparental Conflicts	0.191*** (0.023)	0.190*** (0.022)
Total	0.271*** (0.029)	0.290*** (0.029)
Observations	5497	5497

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.10: Detailed decomposition of the mean divorce skills gaps, by child age - additionally controlling for mother's mental distress (Explained part)

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Differential				
Mean Gap	0.259*** (0.057)	0.215*** (0.049)	0.357*** (0.049)	0.268*** (0.056)
Explained				
Child Characteristics	0.012 (0.008)	0.010* (0.006)	0.012** (0.005)	0.005 (0.004)
Demographic Characteristics	-0.032 (0.021)	-0.001 (0.018)	-0.016 (0.018)	0.023 (0.020)
Parent's Education	0.085*** (0.013)	0.070*** (0.012)	0.101*** (0.015)	0.094*** (0.014)
Parent's Health	0.005 (0.005)	0.003 (0.004)	0.007 (0.005)	-0.006 (0.004)
Financial Resources	0.141*** (0.021)	0.117*** (0.020)	0.162*** (0.023)	0.109*** (0.022)
Interparental Conflicts	0.015 (0.011)	0.012 (0.012)	0.020 (0.012)	0.019 (0.012)
Mother's distress	0.002 (0.005)	0.000 (0.006)	-0.004 (0.006)	-0.001 (0.006)
Total	0.229*** (0.028)	0.212*** (0.024)	0.281*** (0.029)	0.242*** (0.026)
Panel B: Noncognitive skills				
Differential				
Mean Gap	0.336*** (0.065)	0.440*** (0.064)	0.505*** (0.064)	0.537*** (0.069)
Explained				
Child Characteristics	0.005 (0.006)	0.003 (0.006)	0.003 (0.007)	0.005 (0.007)
Demographic Characteristics	0.034* (0.018)	0.030* (0.018)	0.032* (0.018)	0.056*** (0.018)
Parent's Education	0.053*** (0.013)	0.025** (0.012)	0.016 (0.011)	0.045*** (0.012)
Parent's Health	0.013** (0.006)	0.009* (0.005)	0.014** (0.006)	0.022*** (0.007)
Financial Resources	0.111*** (0.021)	0.116*** (0.021)	0.124*** (0.020)	0.101*** (0.021)
Interparental Conflicts	0.102*** (0.015)	0.104*** (0.014)	0.086*** (0.013)	0.086*** (0.013)
Mother's distress	0.044*** (0.012)	0.054*** (0.013)	0.043*** (0.011)	0.045*** (0.011)
Total	0.360*** (0.032)	0.342*** (0.031)	0.317*** (0.031)	0.361*** (0.034)
Observations	4990	4990	4990	4990

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3 and also include mother's mental distress as additional variable. Mother's mental distress is assessed using a modified version of the Malaise Inventory as included in the MCS when the child is 9 months. Example questions asked include whether the mother feels (i) tired most of the time, (ii) often miserable or depressed (iii) often worried about things, etc. (Rutter et al., 1970). Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.11: TFP parameter estimates for the production of cognitive skills, $A_t^c(\cdot)$

	(1)	(2)	(3)	(4)
	Age 3	Age 5	Age 7	Age 11
divorce	-0.02	0.00	-0.07	-0.01
female	0.20***	0.06***	-0.00	-0.11***
birth weight (Kg)	0.09***	0.06***	0.06***	0.01
Number of siblings	-0.19***	-0.05***	-0.00	-0.08***
Cohabitation	0.07*	-0.05*	0.03	0.00
Duration of relationship	-0.01	0.00	-0.00	0.00
Planned pregnancy	-0.04	-0.03	0.03	-0.05*
Mother's religion	-0.02	0.01	-0.02	0.09***
Mother's age	0.00	-0.00	-0.01*	-0.00
Father's age	0.00	0.00	0.00	0.01**
Mother white	0.21**	0.14**	-0.22***	-0.03
Father white	0.30***	0.01	-0.07	0.03
Mother GCSE	-0.03	-0.00	0.09	0.05
Mother A-level	0.02	0.01	0.16**	0.16**
Mother University degree	0.13*	0.05	0.19***	0.19**
Father GCSE	-0.01	0.03	0.05	0.08
Father A-level	0.06	0.06	0.15***	0.13**
Father University degree	0.13**	0.15***	0.17***	0.19***
Mother good health	0.01	-0.01	0.07**	-0.05
Father good health	-0.04	0.02	-0.06*	-0.04
OECD equiv. income	-0.01	-0.01	0.06***	-0.01
Own house	-0.12***	-0.02	-0.05	-0.11**
Rent house	-0.18**	-0.04	-0.04	-0.17**
Mother managerial occ.	-0.07**	-0.09***	-0.05	-0.07**
Mother intermediate occ.	-0.19***	-0.16***	-0.11***	-0.05
Mother routine occ.	-0.44***	-0.25***	-0.03	-0.13
Father managerial occ.	-0.08**	-0.03	-0.15***	0.02
Father intermediate occ.	-0.18***	-0.09***	-0.19***	-0.10***
Father routine occ.	-0.17	0.05	-0.29**	0.12
constant	-0.77***	-0.30***	-0.39***	-0.18*

Source: UK Millennium Cohort Study.

Notes: In this table the coefficients correspond to estimates of the TFP parameters $A_t^c(\cdot)$ in the production of cognitive skills, equation 6. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors omitted for brevity and are available upon request.

Table A.12: TFP parameter estimates for the production of socio-emotional skills, $A_t^e(\cdot)$

	(1)	(2)	(3)	(4)
	Age 3	Age 5	Age 7	Age 11
divorce	0.04	-0.06	-0.12***	-0.09*
female	0.19***	0.13***	0.13***	0.10***
birth weight (Kg)	0.01	0.01	0.00	0.03*
Number of siblings	0.04**	-0.02*	0.01	0.02*
Cohabitation	-0.05	0.03	-0.02	0.01
Duration of relationship	-0.01**	0.00	0.00	-0.00
Planned pregnancy	-0.03	-0.00	0.01	0.02
Mother's religion	0.06**	0.02	0.01	0.06***
Mother's age	-0.00	-0.00	-0.00	-0.00
Father's age	0.00	0.00	-0.00	0.00
Mother white	0.15*	-0.00	0.03	-0.14**
Father white	0.04	-0.00	-0.01	0.07
Mother GCSE	0.08	0.00	0.01	0.02
Mother A-level	0.17**	-0.01	0.02	0.03
Mother University degree	0.20***	0.00	0.02	0.07
Father GCSE	-0.02	0.06	-0.00	0.05
Father A-level	0.04	0.10**	0.03	0.07
Father University degree	0.05	0.06	0.01	0.08*
Mother good health	0.10**	0.07**	0.09***	0.18***
Father good health	0.10**	-0.01	0.01	0.05
OECD equiv. income	-0.01	-0.01	-0.01	-0.03**
Own house	-0.12***	-0.09***	-0.06**	-0.12***
Rent house	-0.26***	-0.13*	-0.03	-0.18***
Mother managerial occ.	-0.04	-0.05*	-0.02	0.02
Mother intermediate occ.	-0.18***	-0.09***	-0.09***	-0.03
Mother routine occ.	-0.23**	-0.19**	-0.17**	-0.03
Father managerial occ.	0.03	0.00	-0.00	-0.04*
Father intermediate occ.	-0.10***	-0.04	-0.08***	-0.06***
Father routine occ.	0.15	0.10	-0.06	-0.06
constant	-0.72***	-0.05	0.03	-0.22**

Source: UK Millennium Cohort Study.

Notes: In this table the coefficients correspond to estimates of the TFP parameters $A_t^e(\cdot)$ in the production of socio-emotional skills, equation 6. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors omitted for brevity and are available upon request.

Table A.13: Unobserved heterogeneity (π^k) and error variance (σ_η^2) estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Cognitive skills				Socio-emotional skills			
	type share	Age 3	Age 5	Age 7	Age 11	Age 3	Age 5	Age 7	Age 11
Type 1	0.12	-0.16	-0.07	-0.07	-0.07	-0.16	-0.81	-0.81	-0.81
Type 2	0.45	0.51	0.32	0.32	0.32	0.51	0.19	0.19	0.19
Type 3	0.02	-0.50	-0.33	-0.33	-0.33	-0.50	-2.21	-2.21	-2.21
Type 4	0.12	0.87	0.51	0.51	0.51	0.87	0.29	0.29	0.29
Type 5	0.29	0	0	0	0	0	0	0	0
$\sigma_{\eta_t^k}^2$		0.42	0.39	0.30	0.13	0.27	0.08	0.44	0.10

Source: UK Millennium Cohort Study.

Notes: This table shows estimates of the unobserved heterogeneity parameters, π^k , and the error variance $\sigma_{\eta_t^k}^2$ for the skill production technologies, equation 5. Share corresponds to the probability of a given type. Standard errors omitted for brevity and are available upon request.

Table A.14: Model fit - observed and predicted skill gaps, by gender and child age

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
<i>a) Cognitive skills - Boys</i>				
Mean divorce gap (data)	0.26	0.26	0.36	0.27
Mean divorce gap (model)	0.27	0.25	0.41	0.31
Percentile divorce gap (data)	11.68	11.72	14.84	26.27
Percentile divorce gap (model)	10.36	10.11	15.42	12.33
<i>b) Cognitive skills - Girls</i>				
Mean divorce gap (data)	0.24	0.18	0.35	0.26
Mean divorce gap (model)	0.31	0.27	0.43	0.33
Percentile divorce gap (data)	11.16	10.54	15.60	13.65
Percentile divorce gap (model)	11.76	10.93	16.16	13.18
<i>c) Socio-emotional skills - Boys</i>				
Mean divorce gap (data)	0.50	0.54	0.53	0.59
Mean divorce gap (model)	0.37	0.38	0.43	0.48
Percentile divorce gap (data)	18.67	19.70	19.78	20.19
Percentile divorce gap (model)	14.52	15.11	17.03	18.68
<i>d) Socio-emotional skills - Girls</i>				
Mean divorce gap (data)	0.18	0.35	0.47	0.49
Mean divorce gap (model)	0.38	0.39	0.45	0.50
Percentile divorce gap (data)	7.97	13.77	19.76	18.98
Percentile divorce gap (model)	14.85	15.36	17.43	19.05

Source: UK Millennium Cohort Study.

Notes: In this table the mean divorce gaps for child cognitive and socio-emotional skills are in standard deviation units.

Table A.15: Reweighted detailed decomposition of the divorce gap, by child age

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.058)	0.220*** (0.051)	0.354*** (0.055)	0.266*** (0.057)
Explained				
Child characteristics	0.024** (0.010)	0.014** (0.006)	0.014** (0.006)	0.004 (0.008)
Demographic characteristics	-0.051 (0.086)	-0.033 (0.040)	-0.097* (0.060)	0.023 (0.044)
Parent's education	0.177*** (0.030)	0.156*** (0.028)	0.217*** (0.033)	0.158*** (0.029)
Parent's health	0.020 (0.013)	0.015 (0.012)	0.016 (0.013)	-0.021* (0.012)
Financial Resources	0.163*** (0.047)	0.137*** (0.044)	0.205*** (0.051)	0.187*** (0.050)
Interparental conflicts	0.056 (0.039)	0.009 (0.027)	0.024 (0.029)	0.044 (0.031)
Total Explained	0.390*** (0.110)	0.298*** (0.060)	0.379*** (0.082)	0.395*** (0.070)
Specification error	-0.055 (0.107)	0.015 (0.072)	0.110 (0.087)	-0.007 (0.083)
Total Unexplained	-0.109** (0.043)	-0.095*** (0.021)	-0.124*** (0.031)	-0.126*** (0.028)
Reweighting error	0.025 (0.031)	0.002 (0.021)	-0.010 (0.024)	0.003 (0.023)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.067)	0.443*** (0.065)	0.503*** (0.066)	0.537*** (0.069)
Explained				
Child characteristics	0.014** (0.007)	0.013* (0.008)	0.014* (0.008)	0.010 (0.007)
Demographic characteristics	-0.021 (0.048)	0.069 (0.049)	0.025 (0.042)	0.032 (0.039)
Parent's education	0.097*** (0.027)	0.057** (0.025)	0.061*** (0.024)	0.078*** (0.022)
Parent's health	0.028** (0.013)	0.018** (0.009)	0.018* (0.010)	0.031*** (0.010)
Financial Resources	0.144*** (0.045)	0.132*** (0.041)	0.191*** (0.043)	0.193*** (0.045)
Interparental conflicts	0.238*** (0.033)	0.263*** (0.029)	0.201*** (0.027)	0.201*** (0.026)
Total Explained	0.500*** (0.076)	0.552*** (0.070)	0.510*** (0.062)	0.545*** (0.059)
Specification error	0.003 (0.090)	0.068 (0.086)	0.148* (0.084)	0.163** (0.083)
Total Unexplained	-0.157*** (0.028)	-0.185*** (0.026)	-0.153*** (0.023)	-0.159*** (0.022)
Reweighting error	-0.009 (0.023)	0.008 (0.022)	-0.003 (0.021)	-0.011 (0.021)

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.16: Mean divorce skills gaps, by child age - using as reference group the children of divorce

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.053)	0.220*** (0.048)	0.354*** (0.054)	0.266*** (0.051)
Decomposition				
Explained	0.214*** (0.077)	0.220*** (0.073)	0.348*** (0.066)	0.194*** (0.065)
Unexplained	0.037 (0.089)	-0.001 (0.079)	0.006 (0.076)	0.072 (0.079)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.063)	0.443*** (0.061)	0.503*** (0.058)	0.537*** (0.061)
Decomposition				
Explained	0.441*** (0.088)	0.327*** (0.086)	0.237*** (0.076)	0.353*** (0.086)
Unexplained	-0.105 (0.082)	0.116 (0.089)	0.266*** (0.094)	0.185** (0.089)
Observations	5003	5003	5003	5003

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.17: Mean divorce skills gaps, by child age - using as reference group the pooled sample of children of intact and divorced families

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.053)	0.220*** (0.048)	0.354*** (0.054)	0.266*** (0.051)
Decomposition				
Explained	0.224*** (0.030)	0.209*** (0.024)	0.284*** (0.027)	0.237*** (0.026)
Unexplained	0.027 (0.054)	0.010 (0.047)	0.070 (0.056)	0.029 (0.056)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.063)	0.443*** (0.061)	0.503*** (0.058)	0.537*** (0.061)
Decomposition				
Explained	0.368*** (0.030)	0.341*** (0.028)	0.308*** (0.025)	0.360*** (0.030)
Unexplained	-0.032 (0.060)	0.102* (0.060)	0.195*** (0.060)	0.178*** (0.061)
Observations	5003	5003	5003	5003

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.18: Mean divorce skills gaps, by child age - common support

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.325*** (0.117)	0.307*** (0.106)	0.509*** (0.117)	0.341*** (0.113)
Decomposition				
Explained	0.177*** (0.045)	0.194*** (0.039)	0.227*** (0.045)	0.194*** (0.037)
Unexplained	0.148 (0.115)	0.113 (0.102)	0.282*** (0.107)	0.147 (0.109)
Panel B: Socio-emotional skills				
Mean Gap	0.537*** (0.120)	0.600*** (0.125)	0.686*** (0.123)	0.601*** (0.129)
Decomposition				
Explained	0.156*** (0.044)	0.141*** (0.045)	0.158*** (0.042)	0.216*** (0.044)
Unexplained	0.381*** (0.120)	0.459*** (0.115)	0.529*** (0.117)	0.386*** (0.125)
Observations	4246	4246	4246	4246

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

Table A.19: Mean divorce skills gaps, by child age - re-grouping observable characteristics

	(1) Age 3	(2) Age 5	(3) Age 7	(4) Age 11
Panel A: Cognitive skills				
Mean Gap	0.250*** (0.053)	0.220*** (0.048)	0.354*** (0.054)	0.266*** (0.051)
Explained				
Child Characteristics	0.009 (0.011)	0.005 (0.008)	0.017** (0.008)	-0.003 (0.007)
Demographic Characteristics	0.012 (0.020)	-0.008 (0.015)	-0.009 (0.017)	0.029 (0.018)
Parent's Education	0.084*** (0.014)	0.070*** (0.013)	0.100*** (0.015)	0.092*** (0.015)
Parent's Health	0.006 (0.005)	0.003 (0.005)	0.007 (0.006)	-0.006 (0.005)
Financial Resources	0.143*** (0.024)	0.117*** (0.018)	0.163*** (0.024)	0.109*** (0.020)
Relationship Quality	-0.024 (0.021)	0.025 (0.018)	0.005 (0.020)	0.020 (0.020)
Total	0.229*** (0.032)	0.213*** (0.025)	0.282*** (0.029)	0.242*** (0.030)
Panel B: Socio-emotional skills				
Mean Gap	0.337*** (0.063)	0.443*** (0.061)	0.503*** (0.058)	0.537*** (0.061)
Explained				
Child Characteristics	0.001 (0.009)	0.004 (0.009)	0.008 (0.009)	0.016 (0.010)
Demographic Characteristics	0.043** (0.018)	0.034** (0.016)	0.014 (0.016)	0.045*** (0.016)
Parent's Education	0.054*** (0.012)	0.025** (0.012)	0.017 (0.012)	0.044*** (0.012)
Parent's Health	0.020*** (0.008)	0.019*** (0.007)	0.021*** (0.007)	0.031*** (0.009)
Financial Resources	0.114*** (0.022)	0.120*** (0.022)	0.127*** (0.020)	0.105*** (0.021)
Relationship Quality	0.127*** (0.023)	0.138*** (0.022)	0.128*** (0.020)	0.119*** (0.021)
Total	0.358*** (0.029)	0.340*** (0.030)	0.316*** (0.026)	0.360*** (0.031)
Observations	5003	5003	5003	5003

Source: UK Millennium Cohort Study.

Notes: Children cognitive (Panel A) and socio-emotional skills (Panel B) are in standard deviations. The variables used to explain the gap are the same as Table 3. Statistical significance from 250 bootstrap replications, at the 1, 5 and 10 percent indicated by ***, ** and *. Standard errors in parentheses.

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