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Parental gender preferences in Central and Eastern Europe and differential early life disadvantages

Michał Myck[1,2,3] | **Monika Oczkowska**[1,4] | **Izabela Wowczko**[1]

[1]Centre for Economic Analysis, CenEA, Szczecin, Poland

[2]University of Greifswald, Greifswald, Germany

[3]IZA - Institute of Labor Economics, Bonn, Germany

[4]SGH Warsaw School of Economics, Warsaw, Poland

Correspondence
Michał Myck, Centre for Economic Analysis, CenEA, Cyfrowa 2, Szczecin 71-441, Poland.
Email: mmyck@cenea.org.pl

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Abstract

Parental gender preferences may affect partnership decisions and as a result lead to early life disadvantages. We study these preferences in five post-communist countries of Central and Eastern Europe, a region with strong traditional gender norms and persisting inequalities between women and men in labour market outcomes. Using subsamples of census from Belarus, Hungary, Poland, Romania and Russia around 2000 and 2010, we follow Dahl and Moretti (2008), The demand for sons, to examine the effect of the gender of the first-born child(ren) on fertility decisions and relationship stability of their parents. We only find strong evidence of 'boy preferences' in fertility decisions in the cases of Romania and Russia. However, unlike Dahl and Moretti (2008), The demand for sons, for the US, we cannot confirm a relationship between the children's gender and parental partnership decisions. This is the case for all examined Central and Eastern European countries, as well as for a number of countries from Western Europe. The cases of Romania and Russia raise questions about other potential consequences of the documented gender preferences. We argue that our approach can be applied more broadly to identify other countries characterised by parental gender preferences, and to motivate further examination of different forms of gender driven early life disadvantages.

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KEYWORDS
early life discrimination, family structure, fertility decisions, parental gender preferences, transition countries

JEL CLASSIFICATION
J13, J16

1 | INTRODUCTION

While the most often discussed forms of gender discrimination are different expressions of bias on the labour market, gender inequalities reach far deeper than unequal pay or disparities in the likelihood of employment, and labour market outcomes may themselves be consequences of unequal treatment of girls and boys in childhood and adolescence. Discrimination may result in unequal access to health care, schooling, nutrition, and other forms of resources, before reaching adulthood (Chen et al., 1981; Gao & Yao, 2006; Hafeez & Quintana-Domeque, 2017; Hazarika, 2000; Hill & Upchurch, 1995). Such early-life discrimination, exacerbated by further unequal treatment later in life, results in substantial discrepancies in broad welfare outcomes, including those related to labour market activity and material resources. Developing conditions for equality of outcomes among men and women in countries where significant gender gaps exist among adults requires the careful identification of specific stages in the life course where these disadvantages take shape. Our focus in this paper is on five post-communist countries of Central and Eastern Europe: Belarus, Hungary, Poland, Romania and Russia, and we develop the analysis against the background of increasing concerns related to gender equality and to the contribution of men and women to further socio-economic development of the region. Over the past years these concerns have come to the fore in light of a slower pace of development, shifts towards more conservative social policies, and political turmoil culminating in the full scale Russian invasion of Ukraine in February 2022 (EBRD, 2016; OECD, 2017, 2021b).

Equality in labour market outcomes in the region of Central and Eastern Europe still lags behind the West European leaders such as Denmark, France or Sweden (see Figure 1). At the time when the latest micro-level data used in our analysis was collected (approximately 2010), the female-male labour force participation ratio in Sweden was 95%, while the corresponding numbers for Belarus, Hungary, Poland, Romania and Russia were, respectively: 92%, 82%, 81%, 75% and 86%. While wage ratios among the working population in Hungary, Poland and Romania matched closely those in Sweden (in all these countries women earned on average slightly over 90% of the average men's wage), the values in Belarus and Russia were as low as 77% and 73% (OECD, 2021a; Pastore & Verashchagina, 2011). These statistics are accompanied by traditional views on gender roles in society, which are still persistent in most of the countries in the region (see Figures 2a and 2b). For example, while the percentage of women and men who agreed with the statement that '*A job is alright but what most women really want is a home and children*' did not exceed 40% in Sweden, it was as high as 80% in Romania and Russia and over 60% in Hungary and Poland. Similarly, a high proportion of citizens of Central and Eastern European countries believe that men should be given priority when jobs are scarce (Figure 2b). In the short run, labour market reforms are needed to address the prevailing labour market inequalities. However, the ubiquity of traditional gender norms points towards the importance of examining disparities and disadvantages at different stages of the life course to identify if there is a need for interventions at earlier stages.

Recent literature has brought to light evidence on some of the most severe forms of gender bias in the form of deviations from the natural sex ratio at birth. Since the introduction of pre-natal ultrasound

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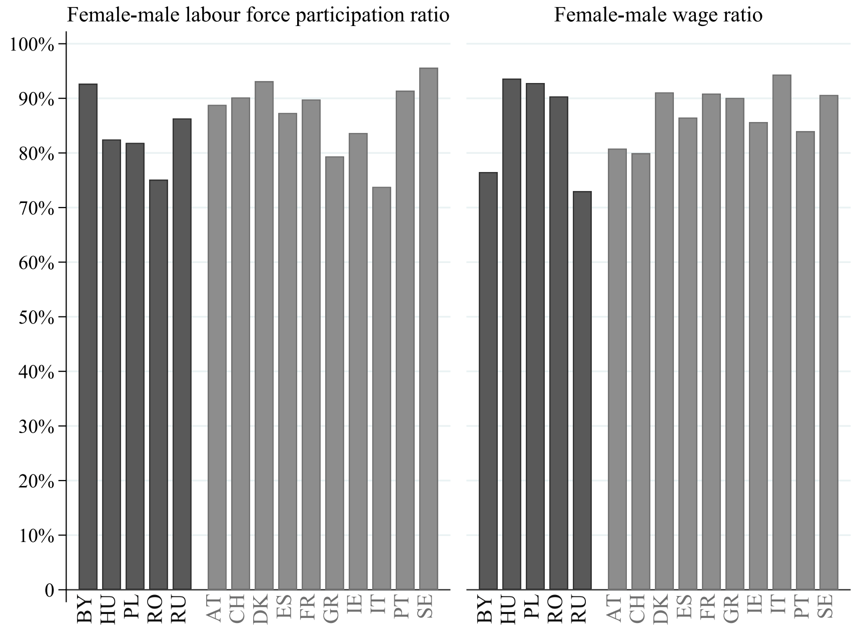

FIGURE 1 Female-male labour force participation ratio in 2016 and wage ratio in 2010, selected countries. Labour force participation rates among population aged 15–64. Country codes: AT—Austria, BY—Belarus, CH—Switzerland, DK—Denmark, ES—Spain, FR—France, GR—Greece, HU—Hungary, IE—Ireland, IT—Italy, PL—Poland, PT—Portugal, RO—Romania, RU—Russia, SE—Sweden. *Source*: Labour force participation ratios: ILOSTAT; Wage ratios: for all countries but Belarus and Russia: OECD (2021a) for Belarus: Fig. 3 in Akulava (2020), for Russia: Fig. 1 in Atencio and Posadas (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

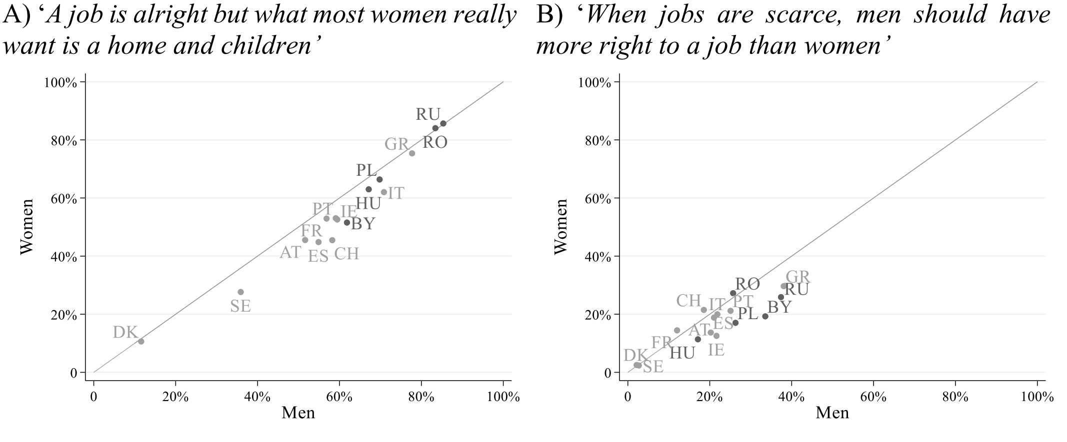

FIGURE 2 Female and male views on gender roles in the society in 2008 (percentage of those agreeing with the respective statement). (a) 'A job is alright but what most women really want is a home and children'. (b) 'When jobs are scarce, men should have more right to a job than women'. Country codes: AT—Austria, BY—Belarus, CH—Switzerland, DK—Denmark, ES—Spain, FR—France, GR—Greece, HU—Hungary, IE—Ireland, IT—Italy, PL—Poland, PT—Portugal, RO—Romania, RU—Russia, SE—Sweden. *Source*: European Values Study 2008: Integrated Dataset (EVS, 2008). [Colour figure can be viewed at wileyonlinelibrary.com]

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technology, this extreme type of expression for gender preferences has been confirmed in countries such as Albania, Armenia, Azerbaijan, China, Georgia, Hong Kong, India, Montenegro, South Korea, Taiwan, Tunisia, and Vietnam (Chao et al., 2019; Gupta et al., 2003). Sex-selective abortions, which are the primary cause of these outcomes, are rare enough in most other countries that the gender ratio at birth does not deviate significantly from the natural rate of about 105 boys to 100 girls (World Health Organization, 2019), as is the case in all five countries we use in our analysis.[1] However, a number of papers have shown that other, less extreme expressions of gender preferences can be discerned from socio-demographic data on partnership stability and fertility decisions (Dahl & Moretti, 2008; Guo et al., 2021; Lundberg & Rose, 2003; Morgan et al., 1988). We build upon this literature to examine if there is evidence of a specific form of childhood disadvantage against girls in Central and Eastern Europe. Following Dahl and Moretti (2008), the disadvantage we examine is the risk of living without a father, an outcome significantly related to lower material resources and a higher risk of poverty (Case & Paxson, 2001; Haveman & Wolfe, 1995; Hetherington et al., 1998; Lundberg, 2005; McLanahan & Sandefur, 1997). We focus on a well-defined and observable outcome which can be linked to parental gender preferences to identify if the gender imbalances observed in adulthood in the five countries we examine can be traced to potential disadvantages in the early years of life. Questions concerning the stage in life in which gender disadvantages begin to differentially affect the outcomes of men and women are of particular concern for policies aimed at effectively addressing their underlying causes. Given the above mentioned persistence of traditional social norms, these questions may be of special relevance in Central and Eastern Europe (OECD, 2021a; Pastore & Verashchagina, 2011; see also Figures 1 and 2).

Our analysis is based on the data repository from IPUMS-International (Integrated Public Use Microdata Series-International) which contains large representative samples drawn from national censuses conducted around 2000 and 2010. We use all the datasets available in this repository for countries of Central and Eastern Europe for which we can derive all the necessary information. The high numbers of observations make this data the most suitable resource to address the questions examined. In the Appendix A we additionally present results for Hungary, Poland, and Romania based on censuses from earlier decades, as well as comparable estimates for a number of Western European countries. We closely follow the approach of Dahl and Moretti (2008) to study partnership and fertility patterns in these countries, first, to identify parental preferences for the gender of their children, and second, to check if these preferences can be linked to patterns of childhood disadvantages. Looking first at fertility progression, we show that only in Romania can we convincingly argue in favour of consistent parental 'boy preferences'. Romanian parents show such preferences in the case of progression to the second and to the third child, as well as in the spacing between the first two children. In the latter two dimensions gender preferences for boys can also be identified in Russia, but there we find evidence for 'girl preferences' when looking at progression to the second child. This form of 'girl preferences' are also found in Poland and Belarus. Our key results—as in Dahl and Moretti (2008)—relate to how these preferences translate into differential disadvantages in childhood. Unlike the findings of Dahl and Moretti (2008) in the US, we find that parental decisions to partner or divorce in the five examined post-communist countries are not affected by the gender of their children. We show

[1]Orzack et al. (2015) show in a study on the trajectory of the gender ratio between conception and birth that while the ratio at the initial stage is equal, female morality throughout pregnancy is slightly higher than male, which results in a higher probability of males being born. Some external factors may cause both higher and lower bias in the biological gender birth ratio. For example, stressful events (such as 9/11 attacks) may cause slightly lower sex ratio at birth (more girls were born to New York residents in late 2001 than it would have been naturally expected; Catalano et al., 2006), and wars can elicit the opposite effect (Graffelman & Hoekstra, 2000; MacMahon & Pugh, 1954).

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that while children are slightly more likely to live without a father when the first-born child is a girl in Romania and Russia, this effect is driven by differential decisions concerning custody and not by parental choices over partnership formation or dissolution. For countries for which comparable data exists we find consistent results for earlier decades, and we show that the findings are also similar across a number of countries in Western Europe.

In Russia and Romania the heavily skewed social gender norms (see Figure 2) correspond to a number of expressions of 'boy preferences' as reflected in parental fertility decisions. These preferences, however, do not translate into a discernible effect on childhood disadvantages in the form of living without a father.[2] Lack of such specific disadvantages in the countries examined here does not imply that girls and boys have equal access to resources which are essential from the point of view of human capital development. In fact, we believe that the method proposed by Dahl and Moretti (2008) and applied here can be used as a preliminary approach to identify countries where parental gender preferences go beyond their declarations. In these countries more in-depth research should be conducted to examine the availability of different resources by gender at various stages of life (see e.g., Baker & Milligan, 2016; Duflo, 2003; Karbownik & Myck, 2017; Thomas, 1994).

To our knowledge this paper is the first to apply the common methodology to identify gender preferences and their potential consequences to an international set of census data available in the IPUMS repository with a focus on Central and Eastern Europe, though similar studies based on IPUMS are already available for other regions (for the US, China, Colombia, Kenya, Mexico and Vietnam: Dahl & Moretti, 2004; for the US on older: Angrist & Evans, 1998; Dahl & Moretti, 2008, and on more recent data: Blau et al., 2020; for Armenia and the Kyrgyz Republic: Brainerd, 2013; Grogan, 2013 uses IPUMS data for Armenia, Kyrgyz Republic and Belarus as sensitivity analysis). The large size of the data facilitates the analysis of gender preferences in Central and Eastern European countries, which has so far been scarce.[3]

We begin this paper with a brief description of the methodological approach for the identification of the role of the gender of the first child (or children) on the examined outcomes (Section 2). This is followed by a presentation of the data we use and the sample restrictions we apply in Section 3 and the results of our analysis in Section 4. Discussion of the findings in Section 5 concludes the paper.

2 | GENDER PREFERENCES AND IDENTIFICATION OF DIFFERENTIATED EARLY LIFE DISADVANTAGES

As stressed by Dahl and Moretti (2008), early life disadvantages resulting from being brought up in a household without a father can have significant long-term consequences (Case & Paxson, 2001;

[2]These findings contrast with the survey-based evidence from several post-Soviet countries from the Caucasus and Central Asia where fertility, family structure and women's labour market behaviour have been shown to depend strongly on the gender of their first child (Grogan, 2013).

[3]Karsten Hank and Kohler (2000) include several CEE countries in an analysis based on the Fertility and Family Survey. Most of their results are inconclusive, though it is unclear if this is because of lack of gender preferences or due to lack of power of the small samples. Looking at partnership status of mothers, Karbownik and Myck (2017) find evidence for boy preferences in an analysis based on 9 years of the Polish Household Budgets Survey, but show that a first-born girl has a negative effect on the decision to have a second child, suggesting 'girl preference'. Grogan (2013) uses international survey data and focuses on family structure and fertility in Central Asian, Caucasus and several East European countries, most of which were Soviet republics before the collapse of the Soviet Union. The author shows strong preferences for boys in countries with strong patrilocal traditions such as Albania, Armenia, Azerbaijan, Tajikistan. Grogan's sensitivity analysis includes also IPUMS 2000s samples from Armenia, Kyrgyzstan and Belarus. The last one is also used in this paper.

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Haveman & Wolfe, 1995; Hetherington et al., 1998; Lundberg, 2005; McLanahan & Sandefur, 1997). If this disadvantage is differentiated as a reflection of parental 'boy preferences', it could mean an increased likelihood of girls growing up in a lone-parent family, with consequences such as a higher risk of poverty, lower self-esteem, or adverse physical and psychological health outcomes (Dahl & Moretti, 2008; Guilmoto, 2015).[4]

In this paper we follow Dahl and Moretti (2008) in their identification of parental gender preferences by looking first, at fertility decisions, and second, at the probability of living without a father conditional on the gender of the first-born child. Dahl and Moretti (2008), having identified a higher probability of girls living without a father in US data, developed testable hypotheses for different interpretations of their findings. These include parental gender biased preferences over the gender of their children and a number of other alternative (non-exclusive) explanations:

- the 'gender role' channel whereby fathers are more likely to live with their male children, given the (real or perceived) asymmetric impact of father's presence on boys and girls;
- the 'technological' channel with comparative advantage of fathers in raising boys, whereby fathers are more efficient in raising sons compared to raising daughters;
- the 'differential cost' hypothesis which poses that the cost of raising girls (for exogenous reasons) may be higher than boys, in which case fathers would more likely choose to be in families with boys rather than in those with girls;
- and finally, the 'compensatory behaviour' hypothesis suggesting that fathers could be more likely to remain in families with boys if these are harder to look after, and fathers are altruistic in the sense that they decide to stay if they realise that an intact family is more important for boys.

Dahl and Moretti (2008) follow this classification with arguments based on parental fertility decisions which allow to distinguish biased preferences from other hypotheses. In particular, they argue that we can identify the 'boy preference' interpretation of partnership decisions by looking at parental decisions to have another child conditional on the gender of their existing child(ren). This is because such decisions should not be affected by the 'role model' arguments, while parents of a girl (or girls) should be less likely to have another child if girls are more costly or if the 'technology' hypothesis is true and it is cheaper for a family to raise boys compared to girls. This means that if the probability of having another child is higher in 'all girl' families compared to 'all boy' families, then parents show a bias towards boys.

Empirical evidence concerning gender preferences as expressed in fertility and partnership status is mixed, and there are examples in the literature of both 'boy and girl preferences' in the same countries or groups of countries (Grogan, 2013; Guilmoto, 2015; Hank & Kohler, 2000, 2003; Ichino et al., 2014; Mills & Begall, 2010). One consistent result present in numerous studies on gender preferences is that in developed countries parents express a preference for at least one child of each sex (Andersson et al., 2007; Angrist & Evans, 1998; Hank & Kohler, 2000; Mills & Begall, 2010; Sobotka & Beaujouan, 2014; Westoff & Potter, 1964; Williamson, 1976). The common point for all studies is that when it comes to making fertility decisions, parity matters (Guilmoto, 2015; Hank, 2007), and sex composition of previously born children is very important (Hank & Kohler, 2003; Mills & Begall, 2010).

[4]It is worth noting that the extent of the disadvantage of living without a father—for legal and other reasons—may differ between children of parents who never married and those of parents who divorced or separated (see, for example, Martin, 2006; McKeever & Wolfinger, 2011, for descriptive analysis). However, it is difficult to causally identify the difference in the consequences resulting from these two types of channels.

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To identify gender preferences for boys we first investigate whether there is a difference in the impact of the gender of the first child (or first children) on the progression to the second and third child and the spacing between subsequent children. We follow this by examining if these preferences translate into a decreased likelihood of living with a father as an expression of early life disadvantages. Formally, the estimated model takes the following form:

$$y_i = \beta_1' X_i + \beta_2' Z_i + \varepsilon_i, \tag{1}$$

where y_i is one of the outcomes measured at the family level, such as progression to the second/third child, spacing between children or presence of the father in the family, and X_i is either a dummy variable for the gender of the first child or a vector of dummies reflecting the gender composition of the first two children. Z_i is a vector of controls—maternal age (paternal in single father families) and a dummy for the year of data extraction (in the case of countries with two periods of data available—see Section 3.1 for more details). ε_i is the family-specific residual. We estimate the equation using OLS regression with robust standard errors.[5]

The identification strategy requires the assumption that the first child's gender at birth is random (Ananat & Michaels, 2008; Bedard & Deschênes, 2005), the validity of which has sometimes been questioned (Gupta, 2005; Hesketh et al., 2005). While we cannot confirm the sex ratio at birth for first-born children in the official statistics of the analysed countries, available data on the overall sex ratio at birth show relatively stable patterns in the range between 105 and 107 in the last decades, with most countries converging on around 106 in recent years. The data presented in Figure A1 in the Appendix A suggests that in the five countries examined sex selective abortions and other factors which could have influenced the natural sex ratio at birth—if present—were not significant enough to substantially affect it (Catalano, 2003; Catalano et al., 2006; Graffelman & Hoekstra, 2000; Grant, 2009; MacMahon & Pugh, 1954; Nandi et al., 2018). For comparison, Figure A1 also includes statistics on the sex ratio at birth in Armenia, a country which, like Russia and Belarus, was a Soviet Republic until 1991, and for which census-based data is also available in the IPUMS repository. As we can see, the sex ratio at birth in Armenia skyrocketed in the early 1990s to reach a level of 117.5 in 2000, clear evidence of an extreme gender bias against girls which can be explained only through sex-selective abortions.[6] For this reason, since we cannot be confident that the birth of the first child in Armenia can be treated as random, we exclude it from our analysis (the same argument applies to another former Soviet country with data available in IPUMS - the Kyrgyz Republic). Another reason why the gender of the first child may not be random is related to the possible choice of the child's gender in the process of invitro fertilisation. However, although availability of invitro fertilization and other reproductive treatments increased substantially in recent years, over the period of our analysis its use in the five considered countries was very limited due to high costs (Prag & Mills, 2017). Throughout the analysis we thus assume that the gender of the first child(ren) at birth in the countries analysed can be considered as random.

[5]For robustness checks we extended the controls by including the level of education (education of the mother in single mother families; of the father—in single father families; and the highest level of education in the couple) which largely yields the same results (available from the authors on request).

[6]For detailed analysis of the Armenian sex ratio at birth see for example, Duthé et al. (2012), while Brainerd (2013) and Grogan (2013) show evidence for biased fertility behaviour of Armenian parents based on IPUMS data.

3 | SOCIO-DEMOGRAPHIC DATA FROM THE IPUMS-INTERNATIONAL REPOSITORY

3.1 | Samples and sample selection

Since the magnitude of the effects of gender preferences on analysed outcomes is usually small, implications of gender bias are not easily identified in small-scale survey data. From this point of view the subsamples of census data from the IPUMS-International repository, provided by the Institute for Social Research and Data Innovation at the University of Minnesota (Minnesota Population Center, 2022), offer a unique opportunity to examine the considered relationships. The repository provides data on five countries from the region of Central and Eastern Europe: Belarus, Hungary, Poland, Romania, and Russia. Census subsamples available for Belarus, Poland, and Romania cover 10% of the population, whereas in the case of Hungary and Russia the IPUMS samples represent 5% of the population. Since for Belarus and Russia the IPUMS data is not available for the period before the collapse of the Soviet Union, our main results are reported for more recent waves—around the years 2000 and 2010. In the Appendix A we supplement these results with analysis of the data from Hungary, Poland and Romania for several pre-transition waves of the IPUMS data going back to the 1970s and with comparable results for censuses collected around 2000 and 2010 in eight West European countries. In Table 1 we provide basic information on the overall sample sizes of the data for the five countries as well as the numbers of observations included in our final analysis. The census data used in the paper was collected in different countries between 1999–2001 and 2009–2011. We treat these three-year windows as two distinct periods and include a binary indication of the period as control in the analysis ('2000s' and '2010s', respectively).

The IPUMS data contains the basic demographic information on all individuals, as well as details on the relationship between members of the household which are necessary to match mothers,

TABLE 1 IPUMS samples and sample sizes for analysis.

Country	Year	Sample size	Couples aged 18–40 with children	Single mothers aged 18–40	Single fathers aged 18–40	Children (aged 5–17)	Average no. of children per family	Parental education—university completed (%)[a]	Living in rural area (%)
Belarus	1999	990,706	51,056	9804	736	97,110	1.58	19.98	22.53
	2009	940,594	29,229	8753	403	51,430	1.34	26.66	22.10
Hungary	2001	510,502	15,475	2948	256	30,846	1.65	14.05	-
	2011	496,762	9981	3070	225	20,983	1.58	18.17	-
Poland	2002	3,824,056	118,758	13,850	779	240,445	1.80	12.81	37.47
Romania	2002	2,137,967	84,783	7428	1010	144,144	1.55	5.91	40.33
	2011	1,991,024	59,615	3466	901	94,160	1.47	15.91	49.57
Russia	2002	7,080,849	256,279	71,634	5222	468,832	1.41	21.75	25.05
	2010	7,047,151	170,298	61,808	4264	308,130	1.30	33.30	24.01
Total	-	17,938 762	795,474	182,761	13,796	1,456,080	-	-	-

Note: Sizes of the census samples: 10% in Belarus, Poland, Romania; 5% in Hungary and Russia.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

[a]In case of couples with different levels of education, higher level reported.

Source: IPUMS-International, version 7.3.

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fathers and their children. Since we want to consider the fertility cycle of a family as closed and to ensure that all children of a parent still live in a specific household, we limit the age range of the mother (or the father in single father families) to between 18 and 40 years. We consider families with all children in the age-range between 5 and 17 years,[7] which implies that we include only a small number of parents below the age of 24. Parents are identified based on the link with the first and the oldest child in a family. The minimum age difference between parents and children is assumed at 18 years. We exclude families with multiple births identified on the basis of same-aged children and remove families with foster, step (both on the mother's or on the father's side) or adopted children, as their sex is more likely to be endogenous with respect to parental preferences. In order to have a clean identification of single parents, we exclude households with the second parent missing, but the first reporting to be married/in union. We also exclude all widowed individuals and those with unknown or missing information about their marital status.[8] After applying these sample selection criteria we end up with a total of about one million families (couples and single parent families) with over 1.4 million children (Table 1). The samples range between 13.3 thousand families in Hungary (2011) and 333.1 thousand families in Russia (2002). In both of these cases the total IPUMS samples (respectively 0.51 and 7.08 m observations) represent 5% of the total population of these countries.

The average number of children per family in the 2000s varies between 1.41 in Russia and 1.80 in Poland, and for all five countries for which we have data in the 2010s we see a drop in these values. Over these 10 years we also observe a substantial change in the level of parental education. The shares of parents with a university education in our samples grow from 5.9% to 15.9% in Romania and from 21.8% to 33.3% in Russia. In selected datasets we can also identify if people lived in urban or rural areas. For the 2000s the shares of rural residents varied between 22.5% in Belarus to 40.3% in Romania. Somewhat surprisingly, the proportion of families living in rural areas in Romania increased to nearly 50% by 2011. However, it needs to be noted that educational and residential classifications can be significantly determined by the application of different categories and definitions at different points in time.

[7]The bottom child age criterion of 5 years is in line with a finding in Dahl and Moretti (2008), that in the US the spacing between the first and the second child was 5 years or less in case of 96% of mothers. This way we can plausibly assume that we observe all children that most of the families were planning to have. Dahl and Moretti (2008) do not apply a bottom criterion to the sample of families in their analysis. On a further note, Dahl and Moretti (2008) apply an upper child age criterion at 12 years to make sure they do not miss any children who might have already moved out of the household (they assume that children leave the soonest at age 17, hence, if the age gap between children is 5 years or less, families with the oldest child of 12 most likely had no other older children). Since we consider it rather unlikely for the oldest parents in our countries of interest to have older children not captured in the census because they have already moved out, in our basic specification we apply the upper child age criterion of 17 years. However, we run a number of sensitivity checks using different upper child age criteria, including the criterion of 12 years chosen by Dahl and Moretti (2008). They all produce largely similar results and do not change our conclusions (available from the authors on request).

[8]According to the IPUMS-International methodology, the quality of the provided intra-household links depends on underlying data (Sobek & Kennedy, 2009). Only in case of Belarus and Romania these links were available already in the source data, in other instances child-parent links were established in IPUMS based on demographic, childbearing and other characteristics using a common algorithm. We excluded from the analysis all samples for which IPUMS does not supply information on intra-family relations, that is 2011 sample for Poland, and other post-communist countries with samples available in IPUMS—Ukraine and Slovakia (in the latter case the samples are not even organised into households). On top of that, Slovenia was excluded because of an exceptionally small sample size.

TABLE 2 Reproductive and family patterns over time (in %).

Variable	Belarus 1999	Belarus 2009	Hungary 2001	Hungary 2011	Poland 2002	Romania 2002	Romania 2011	Russia 2002	Russia 2010
Families by no of children									
1	47.6	68.5	44.3	52.8	38.3	54.6	59.5	63.6	72.5
2	47.8	29.4	47.3	37.8	46.7	38.1	35.4	32.7	25.0
3+	4.6	2.1	8.4	9.4	15.0	7.3	5.1	3.7	2.5
Single mothers:									
Never married	1.5	4.5	2.8	7.8	2.9	1.6	1.7	3.8	6.2
Divorced	14.4	18.3	13.0	15.3	7.5	6.4	3.8	17.7	20.0
Single fathers:									
Never married	0	0.1	0.2	0.6	0.1	0.1	0.6	0.1	0.1
Divorced	1.2	1.0	1.2	1.1	0.5	1.0	0.8	1.5	1.7
First born girl in all families	49.1	48.7	48.5	48.7	48.6	48.3	48.3	48.8	48.6
First born girl in 1-child families	49.7	49.2	49.0	48.9	49.2	47.4	48.0	49.1	48.9
Second born girl in 2-child families	49.1	48.5	48.4	48.5	48.8	48.6	47.9	48.3	48.9
Third born girl in families with 3+ children	48.1	49.2	49.5	48.1	49.6	48.1	48.2	48.9	48.5
Gender of the first two children in families with 3+ children[a]									
BG	22.7	26.2	21.2	23.5	23.5	23.5	24.3	22.4	23.1
BB	28.7	25.6	29.9	28.0	27.8	26.7	27.0	28.4	27.9
GB	20.8	23.5	22.8	23.4	23.3	21.6	22.0	21.7	21.1
GG	27.8	24.7	26.1	25.1	25.4	28.2	26.7	27.5	27.9

Note: Samples of families selected on the basis of certain criteria described in main text.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

[a]Gender composition: BG—boy-girl, BB—boy-boy, GB—girl-boy, GG—girl-girl.

Source: Own calculations based on IPUMS-International, version 7.3.

3.2 | Family structure and fertility patterns in the Central and Eastern European region over time

In Table 2 we provide a comparison of descriptive statistics concerning family composition derived from the samples in each country for the 2000s and 2010s. In all countries but Hungary the shares of families with two and three children decreased over time. These trends, together with an increase in the proportion of families without children (not reported here) are the most obvious reflections of the falling levels of fertility in the region that have been observed in other studies (Amialchuk et al., 2014; Sobotka & Beaujouan, 2014). As we can see, Belarus experienced a dramatic drop of almost 20.0 percentage points (pp) in the share of two-child families, with a corresponding increase in the share of one-child families. On the other hand, in Romania a 4.9pp increase in the share of single-child families occurred in conjunction with a 2.7pp decline in the share of two-child families, and a drop in the share of three-child families that was almost just as high. An outlier in these statistics is Hungary, where an almost 10pp drop in the share of two-child families was accompanied by a rise in the share of one-child families and a slight increase (1.0pp) in the share of three-child families.

Additionally, with the exception of Romania, in the analysed span of only 10 years, the shares of families with unmarried or divorced mothers increased dramatically. In the 2010s in Russia 20% of

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mothers were divorced, while in Hungary almost 8% were unmarried. On the other hand, Romanian families had the lowest rates of mothers who never married or got divorced. Romania is also the only country where these shares diminished over the analysed decade. In all analysed countries the shares of single father families were at very low levels, with the highest proportions of less than 2% observed in Russia.

In Table 2 we also present the changes in shares of daughters at different parities, which can be indicative of raw gender preferences. Across all countries and families in the sample, independent of the number of children, the rate of first born girls oscillated around the expected gender birth ratio (biological birth ratio of 105 boys per 100 girls means that girls should comprise circa 48.8% of children). However, when we look at the shares of daughters in one-child families we can see that these are slightly higher in all countries except for Romania, and that the pattern is much less consistent at higher parities. Since it has been argued that parental gender preferences ought to be analysed considering higher parities (Hank, 2007), in Table 2 we complement the above analysis by looking at the gender composition of the first two children in families with three children and more. In these descriptive statistics we already find some indication of the preference for mixed-gender offspring, since families with same-sex children were more likely to have the third child than the ones that already had both a boy and a girl, irrespective whether a boy or a girl came first. This trend seems to be getting weaker over time as the distribution of different combinations of gender pairs was more even in the samples from the 2010s.

4 | RESULTS

In Tables 3–5 we present the regression results from the model specified in Equation (1), where the coefficient (β_1) indicates the effect of the gender of the first child or the first two children (X_i) on one of the respective outcomes (y_i): progression to the second/third child (Table 3); spacing between the first two children (in years, Table 4) and living without a father (Table 5). We estimate this regression for each country sample separately aggregating 2 years of available data in the cases of Belarus, Hungary, Romania and Russia. In the Tables we report the β_1 coefficients together with robust standard errors (in brackets) and percentage effects (in square brackets).

4.1 | Gender of first children and subsequent fertility

We first examine if—in accordance with the classification by Dahl and Moretti (2008)—we can identify 'boy preferences' in the decisions of parents to have another child. We thus focus on the effect of the gender of the first child or the first two children on the subsequent fertility of couples, respectively in couples with one or more and in couples with two or more children. In the first case, 'boy preferences' would be expressed if parents were more likely to have a second child conditional on the first one being a girl. In the second case preferences may, on the one hand, relate to having a child of the opposite gender following the first two births of boys or first two births of girls. On the other hand, however, if parents on average have a preference for boys, then they would be more likely to have the third child following two births of girls, compared to two boys. In this case the likelihood of the decision to have a third child would be higher among those with two girls than among those with two boys.

Our results are presented in Table 3. Column (1) shows the effect of a first-born girl as compared to a first-born boy on the decision to have a second child. These results suggest that 'boy preferences' can only be confirmed in Romania where the probability of having a second child is higher by as much as 3.2% conditional on the first child being a girl. In all other countries the coefficients are negative,

TABLE 3 Effects of the gender of first child(ren) on the probability of having more children among couples.

	Two or more children among couples with 1+ children	Three or more children among couples with 2+ children			
		Model 1	Model 2		
	First child a girl	First two children of same sex versus mix	First two boys versus mix	First two girls versus mix	Sign. (4–3)
Country	(1)	(2)	(3)	(4)	(5)
Belarus	−0.014**	0.018**	0.016**	0.022**	
	(0.003)	(0.003)	(0.003)	(0.004)	
	[−2.7]	[25.3]	[21.4]	[29.8]	
	80,285	39,898			
Hungary	−0.009	0.035**	0.036**	0.035**	
	(0.006)	(0.006)	(0.008)	(0.008)	
	[−1.6]	[23.4]	[23.5]	[23.2]	
	25,333	14,520			
Poland	−0.009**	0.035**	0.031**	0.039**	
	(0.003)	(0.003)	(0.004)	(0.004)	
	[−1.3]	[15.1]	[13.4]	[17.0]	
	118,731	77,618			
Romania	0.014**	0.032**	0.023**	0.041**	**
	(0.003)	(0.003)	(0.003)	(0.004)	
	[3.2]	[24.1]	[17.5]	[31.2]	
	143,943	65,239			
Russia	−0.012**	0.027**	0.021**	0.035**	**
	(0.001)	(0.001)	(0.002)	(0.002)	
	[−3.1]	[31.3]	[23.8]	[40.1]	
	426,568	163,840			

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. For all countries except Poland (2002) data is pooled from two surveys (1999 and 2009 in Belarus, 2001 and 2011 in Hungary, 2002 and 2011 in Romania, 2002 and 2010 in Russia). All regressions (except for Poland) include a period dummy, and mother's age polynomial of power 3. In columns (1)–(5) the basic sample includes all households with couples and the mother between the ages 18 and 40 living with children aged 5–17. In column (1) the dependent variable indicates that the couple has two or more children. In columns (2)–(5) the sample is limited to couples with two or more children, and the dependent variable indicates that the couple has three or more children.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

#$p < 0.05$, *$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

suggesting that either some of the alternative hypotheses presented in Dahl and Moretti (2008) hold or that parents actually have 'girl preferences'. For example, the probability of having the second child is lower following a first-born girl by 2.7% in Belarus, 1.6% in Hungary, 1.3% in Poland and 3.1% in Russia.

To examine the differences in the propensity to have a third child for different gender pairs of the first two children for families with two and more children, in column (2) we first show the estimates of the impact of the same-sex gender pairs as compared to different-sex pairs on the probability to have a third child (Model 1). Subsequently (Model 2), we divide the effects of the same-sex child

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TABLE 4 Effects of the first child's gender on spacing between first two children among couples with 2+ children (in years).

Country	First child a girl
Belarus	−0.011
	(0.019)
	39,898
Hungary	0.024
	(0.030)
	14,520
Poland	0.003
	(0.013)
	77,618
Romania	−0.074**
	(0.014)
	65,239
Russia	−0.040**
	(0.011)
	163,840

Note: Standard errors in parentheses, number of observations in the last row per country. For all countries except Poland (2002) data is pooled from two surveys (1999 and 2009 in Belarus, 2001 and 2011 in Hungary, 2002 and 2011 in Romania, 2002 and 2010 in Russia). All regressions (except for Poland) include a period dummy, and mother's age polynomial of power 3. The basic sample includes all households with couples and the mother between the ages 18 and 40 living with two or more children aged 5–17. The dependent variable indicates the difference in age between first two children, in years.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

$^{\#}p < 0.05$, $^{*}p < 0.01$, $^{**}p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

compositions for the probability to have a third child into separate effects of having two boys (column 3) or two girls (column 4) relative to mixed offspring. This approach first tests if parents have a preference for mixed-gender offspring, and second, by comparing the values of coefficients on two boys and two girls in Model 2, we identify if parents behave differently depending on the gender of the first two kids. The statistical significance of this difference is reported in column (5).

As we can see in column (2) there is generally a strong preference for a gender mix of children, and we identify these effects in all five countries. It is worth pointing out that the magnitude of the implication of these preferences is very high. For example, parents are over 30% more likely to have the third child if their first two children are of the same gender in Russia, and only slightly less likely in Belarus (25.3%), Hungary (23.4%) and Romania (24.1%). In Poland the probability is higher by 15.1%.

Finally, comparing the implications of having two boys versus two girls for the likelihood of having a third child we find strong evidence of 'boy preferences' in Romania and Russia. Russian parents of two girls were 40.1% more likely to have a third child than parents of a girl and a boy, while those of two boys were only 23.8% more likely to have a third child. The numbers for Romania were respectively 31.2% and 17.5%. In Belarus and Poland, while the probability of having the third child is higher in the case of parents with two first born girls versus those with two boys, the differences are not statistically significant. In Hungary the probability is minimally higher, though statistically non-distinguishable - for those with first born boys.

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TABLE 5 Effects of the first child's gender on the probability of living without a father among all families (first child a girl).

		Channels for living without a father		
	Living without a father	Mother never married	Current divorce or separation	Maternal custody after divorce
Country	(1)	(2)	(3)	(4)
Belarus	0.004	−0.001	0.004	0.003
	(0.002)	(0.001)	(0.002)	(0.004)
	[2.1]	[−2.2]	[2.4]	[0.4]
	99,981	99,981	97,316	17,031
Hungary	0.003	0.001	−0.003	0.023*
	(0.004)	(0.002)	(0.004)	(0.008)
	[1.8]	[3.1]	[−1.9]	[2.5]
	31,955	31,955	28,366	4820
Poland	0.002	−0.000	0.001	0.015*
	(0.002)	(0.001)	(0.002)	(0.005)
	[1.9]	[−1.1]	[1.2]	[1.6]
	133,387	133,387	128,459	10,650
Romania	0.005**	−0.001	0.002	0.052**
	(0.001)	(0.001)	(0.001)	(0.007)
	[7.0]	[−3.4]	[3.8]	[6.2]
	157,203	157,203	151,213	9821
Russia	0.004*	−0.000	0.001	0.014**
	(0.001)	(0.001)	(0.001)	(0.002)
	[1.6]	[−0.5]	[0.6]	[1.5]
	569,505	569,505	541,810	115,254

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. For all countries except Poland (2002) data is pooled from two surveys (1999 and 2009 in Belarus, 2001 and 2011 in Hungary, 2002 and 2011 in Romania, 2002 and 2010 in Russia). All regressions (except for Poland) include a period dummy, and mother's (father's in case of single father households) age polynomial of power 3. In columns (1) and (2) the basic sample includes all households with the mother (the father in single father households) between the ages 18 and 40 living with children aged 5–17 (excluding widowed individuals and lone parents reporting being married). In column (1) the dependent variable indicates that children live without the father—with a single mother who is divorced or never married. In column (2) the dependent variable indicates that the mother has never married. In column (3) the sample is limited to ever married parents, and the dependent variable indicates that the parent is divorced or separated. In column (4) the sample is further limited to divorced or separated parents, and the dependent variable indicates that the child lives with the mother.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

#$p < 0.05$, *$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

4.2 | Gender of the first child and spacing between subsequent children

Another potential measure for identifying a gender preference for boys is the examination of the spacing between first-born and second-born children. We thus analyse if having a first-born girl or a first-born boy affects the time span until parents decide to have the second child. Two important notes of caution here are: first, that the sample is narrowed down to families with two or more children, and

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second, that for most samples the spacing is calculated based on the years of age of children due to a lack of birth month information in the data.

With these limitations in mind, our results—presented in Table 4—show once again evidence of 'boy preferences' in Romania and Russia. In these two countries parents waited shorter to have the second child conditional on having a first-born girl, although the magnitude of the effects is not very large. For example, in Romania, where the effects are largest, parents waited on average only about a month longer to have the second child if the first one was a boy. While reasons other than gender preferences might be behind these decisions, the fact that the effects are largest for Romania seems consistent with other findings for this country presented in Table 3.[9]

4.3 | Gender preferences and early life disadvantage: Presence of a father in the family

The above analysis aimed at examining if we can identify parental preferences in favour of boys in the Dahl and Moretti (2008) classification is followed here with analysis of whether these preferences translate into a specific form of differentiated disadvantage in childhood. In Table 5 we show the estimates of the effect of the first-born girl relative to the first-born boy on the probability of living without a father. We find that, except for Romania and Russia, having a first-born girl does not translate into a statistically significant higher (or lower) probability of living without the father (column [1]). Importantly from the perspective of the role of parental preferences, and unlike in the results found for the US in Dahl and Moretti (2008), the statistically significant effects identified in Romania and Russia seem not to result from parental partnership decisions: a first-born girl does not increase either the probability of the mother never being married (column [2]) or the probability of divorce or separation (column [3]). The only statistically significant 'driver' of the probability of living without the father among girls is the fact that maternal/paternal custody decisions among divorced parents depend on the gender of the first-born child, with mothers being more likely to be given custody when the child is a girl. Maternal custody for first-born girls is more likely in all countries (it is not statistically significant in Belarus), but only in Romania and Russia the implications of these decisions are substantial enough to determine the overall probability of living without a father.[10] Looking at parental partnership decisions (column [2] and [3] in Table 5) it seems that parents in none of the countries we examine consider the gender of their children in the decisions to marry or to separate. In this respect, parents in the five Central and Eastern European countries behave similarly to those in the analysed Western European countries where there is also little evidence of the influence of children's gender on partnership decisions (see Tables A1–A3 in the Appendix A).[11] It is notable though, that the implications of the much higher probability of maternal custody in Romania in families with first-born girls (by 6.2%) are such that the overall probability that a child is living without a father is 7.0% higher. While this does not appear to be driven by parental preferences, such a large effect—more than twice as high as the overall effect found for the US (3.1%) by Dahl and Moretti (2008)—may still raise significant concerns with regard to equality of opportunities among Romanian boys and girls.

[9]Note that a similar exercise could be conducted for spacing between the second and third child in families with three children. However, as we showed in Table 3, the sample of families with three children is heavily biased with respect to the gender of the first two children. Thus, it would be difficult to give these results a straightforward interpretation.

[10]The effect on maternal custody is particularly high in Romania, where a first-born girl increases the probability by 6.2 percent—this is four times higher than in Russia (the effect in the US, as reported in Dahl and Moretti (2008), is 2.9 percent).

[11]France seems to be the only exception, where the first-born girl increases the probability that the mother has never been married by 1.8 percent. The estimated coefficient, however, is only significant at 5% level, and we find no indication pointing towards this being a reflection of parental 'boy preferences' in the other results (see Tables A1–A2).

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Finally, for three of the analysed Central and Eastern European countries where data on earlier periods of time (before the transition) was available in the IPUMS repository (Hungary, Poland and Romania), we largely confirm the results from the most recent data (Tables A4–A6 in the Appendix A), with the Romanian parents once again revealing some 'boy preferences' when looking at fertility decisions, but without substantial implications for partnership outcomes.[12]

Putting all the above evidence together—based both on Central and East, as well as West European data—it needs to be noted, that Romania and Russia clearly stand out with respect to the consistency of 'boy preferences' among parents. The fact that, unlike in the US, these preferences do not translate into partnership decisions (and are thus not responsible for a higher probability of living without a father through this channel), while a comforting finding, raises important questions concerning other potential consequences of such preferences in these countries, which we discuss in the concluding section.

5 | CONCLUSION

Girls in the United States suffer a particular form of disadvantage in childhood, in that they are less likely to live together with their fathers, which has been found to correlate strongly with reduced available material resources and an increased risk of poverty (Dahl & Moretti, 2008). The authors propose several alternative explanations for this finding and show evidence supporting an important role of parental gender preferences. It is parental discrimination in favour of boys that leads to the increased risk of early life disadvantage for girls.

The Central and Eastern European setting constitutes an important context to examine the role of such preferences for the well-being of women. First, despite the decades of Communist rule in the 20th century, many countries in the region are still characterized by strong traditional gender norms (Figures 2a and 2b). Moreover, in comparison to countries leading in gender equality, they continue to underperform in terms of either female labour force participation or gender wage equality, or both. To examine the degree of the specific form of early life disadvantage and the role played by parental gender preferences, in this paper we use subsamples of census data from Belarus, Hungary, Poland, Romania and Russia provided by the IPUMS-International data repository.

Our key findings are as follows. We find no consistent evidence across the region of a significant preference in favour of boys in parental fertility decisions. Preferences in favour of boys seem strongest among parents in Romania and Russia, but there is no evidence of parental 'boy preferences' in Belarus, Hungary, or Poland. Moreover, we find that in none of the examined countries do parental decisions on entering a marriage or on dissolving a partnership relate to the gender of the first child. Thus, the identified 'boy preferences' among Romanian and Russian parents do not translate into the type of disadvantage for girls which has been found in the US. The key driver which determines an overall higher likelihood of living without a father among girls in Romania and Russia are strong effects of the gender of the first child on maternal custody decisions after divorce.

When applied to data from eight West European countries, our approach produces similar results—in most of these countries parental partnership decisions are not related to their child's gender. The only exception is France, where the likelihood of the mother never marrying increases if her first-born child is a girl. However, this result is not very highly statistically significant, and in any case the French data do not support consistent parental 'boy preferences' in other dimensions. It thus seems

[12]The probability of living without a father for girls in Romania was lower, but the estimates were significant only at the 5% level, and the effect was once again driven by a higher likelihood of maternal custody after divorce.

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that with regard to the relationship between parental gender preferences and partnership decisions the United States is an important exception.

Several points are important to note with regard to the interpretation of our findings and their implications for the wellbeing of women in Central and Eastern European countries and beyond, as well as from the point of view of further research. First of all, it is possible that the identified 'boy preferences' in Romania and Russia translate into other forms of discrimination. It would seem particularly relevant for these two countries to examine girls' and boys' access to material resources and within household inequality more broadly (see e.g. results of Karbownik & Myck, 2017, for Poland). Second, in the case of progression to the second child, in Belarus, Poland and Russia, as well as in France and Portugal, parents seem to show a preference for girls: the likelihood of having the second child is lower if the first one is a girl (Tables 3 and A1). A number of hypotheses could be formulated here, including the expectations among parents with respect to the receipt of old age care in the future (Grigoryeva, 2017; Henretta et al., 1997; Lee et al., 1993). As demographic changes progress in Europe, and as many governments—especially in Central and Eastern European countries—seem unwilling to establish strong foundations for institutional support in old age, these results might also deserve further detailed attention.

More broadly, the method proposed by Dahl and Moretti (2008) and applied here could serve as a systematic and easily applicable test of parental revealed preference reflecting a bias towards boys (or girls). Thus, facilitated identification of countries with a risk of gender differentiated treatment of children should be followed by in depth analysis of potential consequences, including, but not limited to, the likelihood of living without a father.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data used in this manuscript come from the IPUMS-International data repository housed by the Minnesota Population Center. Data is provided free of charge for scientific purposes.

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The analysis presented in this manuscript was prepared using Stata 15 software. Files with syntax enabling replication of the results are available at: https://doi.org/10.5281/zenodo.7846011.

ORCID

Michał Myck https://orcid.org/0000-0002-9894-838X
Monika Oczkowska https://orcid.org/0000-0001-7252-838X
Izabela Wowczko https://orcid.org/0000-0002-1200-9091

REFERENCES

Akulava, M. (2020). *Women on the labor market: Belarus*. FROGEE Policy Brief 2.

Amialchuk, A., Lisenkova, K., Salnykov, M., & Yemelyanau, M. (2014). Economic determinants of fertility in Belarus. *Economics of Transition and Institutional Change*, *22*(3), 577–604. https://doi.org/10.1111/ecot.12043

Ananat, E. O., & Michaels, G. (2008). The effect of marital breakup on the income distribution of women with children. *Journal of Human Resources*, *43*(3), 611–629. https://doi.org/10.3368/jhr.43.3.611

Andersson, G., Hank, K., & Vikat, A. (2007). Understanding parental gender preferences in advanced societies: Lessons from Sweden and Finland. *Demographic Research*, *17*(6), 135–156. https://doi.org/10.4054/demres.2007.17.6

Angrist, J. D., & Evans, W. N. (1998). Children and their parents' labor supply: Evidence from exogenous variation in family size. *The American Economic Review*, *88*(3), 450–477.

Atencio, A., & Posadas, J. (2015). *Gender gap in pay in the Russian federation: Twenty years later, still a concern*, policy research working papers. The World Bank. URL (consultedAugust 2022): http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-7407

Baker, M., & Milligan, K. (2016). Boy-girl differences in parental time investments: Evidence from three countries. *Journal of Human Capital*, *10*(4), 399–441. https://doi.org/10.1086/688899

Bedard, K., & Deschênes, O. (2005). Sex preferences, marital dissolution, and the economic status of women. *Journal of Human Resources*, *40*(2), 411–434. https://doi.org/10.3368/jhr.xl.2.411

Blau, F. D., Kahn, L. M., Brummund, P., Cook, J., & Larson-Koester, M. (2020). Is there still son preference in the United States? *Journal of Population Economics*, *33*(3), 709–750. https://doi.org/10.1007/s00148-019-00760-7

Brainerd, E. (2013). Missing women in the former Soviet union ? Son preference and children's health in the transition from communism.

Case, A., & Paxson, C. (2001). Mothers and others: Who invests in children's health? *Journal of Health Economics*, *20*(3), 301–328. https://doi.org/10.1016/s0167-6296(00)00088-6

Catalano, R., Bruckner, T., Marks, A. R., & Eskenazi, B. (2006). Exogenous shocks to the human sex ratio: The case of september 11, 2001 in New York city. *Human Reproduction*, *21*(12), 3127–3131. https://doi.org/10.1093/humrep/del283

Catalano, R. A. (2003). Sex ratios in the two germanies: A test of the economic stress hypothesis. *Human Reproduction*, *18*(9), 1972–1975. https://doi.org/10.1093/humrep/deg370

Chao, F., Gerland, P., Cook, A. R., & Alkema, L. (2019). Systematic assessment of the sex ratio at birth for all countries and estimation of national imbalances and regional reference levels. *Proceedings of the National Academy of Sciences*, *116*(19), 9303–9311. https://doi.org/10.1073/pnas.1812593116

Chen, L. C., Huq, E., & D'Souza, S. (1981). Sex bias in the family allocation of food and health care in rural Bangladesh. *Population and Development Review*, *7*(1), 55–70. https://doi.org/10.2307/1972764

Dahl, G., & Moretti, E. (2008). The demand for sons. *The Review of Economic Studies*, *75*(4), 1085–1120. https://doi.org/10.1111/j.1467-937x.2008.00514.x

Dahl, G. B., & Moretti, E. (2004). *The demand for sons: Evidence from divorce, fertility, and shotgun marriage* (NBER working paper No. 10281). *NBER Working Paper Series*.

Duflo, E. (2003). Grandmothers and granddaughters: Old-age pensions and intrahousehold allocation in South Africa. *The World Bank Economic Review*, *17*(1), 1–25. https://doi.org/10.1093/wber/lhg013

Duthé, G., Meslé, F., Vallin, J., Badurashvili, I., & Kuyumjyan, K. (2012). High sex ratios at birth in the caucasus: Modern technology to satisfy old desires. *Population and Development Review*, *38*(3), 487–501. https://doi.org/10.1111/j.1728-4457.2012.00513.x

EBRD. (2016). Life in transition. A decade of measuring transition.

25776983, 2024, 1, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/ecot.12381 by Cochrane Germany, Wiley Online Library on [02/03/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

EVS. (2008). European values study 2008: Integrated dataset. [Dataset]. ZA4800 (v. 5.0.0.). URL(consultedJuly2022): https://search.gesis.org/research_data/ZA4800?doi=10.4232/1.13841

Gao, M., & Yao, Y. (2006). Gender gaps in access to health care in rural China. *Economic Development and Cultural Change*, *55*(1), 87–107. https://doi.org/10.1086/505720

Graffelman, J., & Hoekstra, R. F. (2000). A statistical analysis of the effect of warfare on the human secondary sex ratio. *Human Biology*, *72*(3), 433–445.

Grant, V. (2009). Wartime sex ratios: Stress, male vulnerability and the interpretation of atypical sex ratio data. *Journal of Evolutionary Psychology*, *7*(4), 251–262. https://doi.org/10.1556/jep.7.2009.4.5

Grigoryeva, A. (2017). Own gender, sibling's gender, parent's gender: The division of elderly parent care among adult children. *American Sociological Review*, *82*(1), 116–146. https://doi.org/10.1177/0003122416686521

Grogan, L. (2013). Household Formation rules, fertility and female labour supply: Evidence from post-communist countries. *Journal of Comparative Economics*, *41*(4), 1167–1183. https://doi.org/10.1016/j.jce.2012.11.001

Guilmoto, C. Z. (2015). The masculinization of births overview and current knowledge. *Population*, *70*(2), 185–243.

Guo, R., Wang, Q., Yi, J., & Zhang, J. (2021). Housing prices and son preference: Evidence from China's housing reform. *Economics of Transition and Institutional Change*, *30*(3), 421–446. https://doi.org/10.1111/ecot.12306

Gupta, M. D. (2005). Explaining Asia's "missing women": A New look at the data. *Population and Development Review*, *31*(3), 529–535. https://doi.org/10.1111/j.1728-4457.2005.00082.x

Gupta, M. D., Zhenghua, J., Bohua, L., Zhenming, X., Chung, W., & Hwa-Ok, B. (2003). Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the republic of Korea. *Journal of Development Studies*, *40*(2), 153–187. https://doi.org/10.1080/00220380412331293807

Hafeez, N., & Quintana-Domeque, C. (2017). Son preference and gender-biased breastfeeding in Pakistan. *Economic Development and Cultural Change*, *66*(2), 179–215. https://doi.org/10.1086/695137

Hank, K. (2007). Parental gender preferences and reproductive behaviour: A review of the recent literature. *Journal of Biosocial Science*, *39*(5), 759–767. https://doi.org/10.1017/s0021932006001787

Hank, K., & Kohler, H.-P. (2000). Gender preferences for children in Europe: Empirical results from 17 FFS countries. *Demographic Research*, *2*(1). https://doi.org/10.4054/demres.2000.2.1

Hank, K., & Kohler, H.-P. (2003). Sex preferences for children revisited: New evidence from Germany. *Population*, *58*(1), 133–143. https://doi.org/10.2307/3246647

Haveman, R., & Wolfe, B. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature*, *33*(4), 1829–1878.

Hazarika, G. (2000). Gender differences in children's nutrition and access to health care in Pakistan. *Journal of Development Studies*, *37*(1), 73–92. https://doi.org/10.1080/713600059

Henretta, J. C., Hill, M. S., Li, W., Soldo, B. J., & Wolf, D. A. (1997). Selection of children to provide care: The effect of earlier parental transfers. *The Journals of Gerontology: Serie Bibliographique*, *52B*(Special_Issue), 110–119. https://doi.org/10.1093/geronb/52b.special_issue.110

Hesketh, T., Lu, L., & Xing, Z. W. (2005). The effect of China's one-child family policy after 25 years. *New England Journal of Medicine*, *353*(11), 1171–1176. https://doi.org/10.1056/nejmhpr051833

Hetherington, E. M., Bridges, M., & Insabella, G. M. (1998). What matters? What does not? Five perspectives on the association between marital transitions and children's adjustment. *American Psychologist*, *53*(2), 167–184. https://doi.org/10.1037/0003-066x.53.2.167

Hill, K., & Upchurch, D. M. (1995). Gender differences in child health: Evidence from the demographic and health surveys. *Population and Development Review*, *21*(1), 127–151. https://doi.org/10.2307/2137416

Ichino, A., Lindström, E.-A., & Viviano, E. (2014). Hidden consequences of a first-born boy for mothers. *Economics Letters*, *123*(3), 274–278. https://doi.org/10.1016/j.econlet.2014.03.001

Karbownik, K., & Myck, M. (2017). Who gets to look nice and who gets to play? Effects of child gender on household expenditures. *Review of Economics of the Household*, *15*(3), 925–944. https://doi.org/10.1007/s11150-016-9328-y

Lee, G. R., Dwyer, J. W., & Coward, R. T. (1993). Gender differences in parent care: Demographic factors and same-gender preferences. *Journal of Gerontology*, *48*(1), S9–S16. https://doi.org/10.1093/geronj/48.1.s9

Lundberg, S. (2005). Sons, daughters, and parental behavior. *Oxford Review of Economic Policy*, *21*(3), 340–356. https://doi.org/10.1093/oxrep/gri020

Lundberg, S., & Rose, E. (2003). Child gender and the transition to marriage. *Demography*, *40*(2), 333–349. https://doi.org/10.1353/dem.2003.0015

25776983, 2024, 1, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/ecot.12381 by Cochrane Germany, Wiley Online Library on [02/03/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

MacMahon, B., & Pugh, T. F. (1954). Sex ratio of white births in the United States during the Second World War. *The American Journal of Human Genetics*, *6*(2), 284–292.

Martin, M. A. (2006). Family structure and income inequality in families with children, 1976 to 2000. *Demography*, *43*(3), 421–445. https://doi.org/10.1353/dem.2006.0025

McKeever, M., & Wolfinger, N. H. (2011). Thanks for nothing: Income and labor force participation for never-married mothers since 1982. *Social Science Research*, *40*(1), 63–76. https://doi.org/10.1016/j.ssresearch.2010.06.008

McLanahan, S., & Sandefur, G. (1997). *Growing up with a single parent: What hurts, what helps*. Harvard University Press.

Mills, M., & Begall, K. (2010). Preferences for the sex-composition of children in Europe: A multilevel examination of its effect on progression to a third child. *Population Studies*, *64*(1), 77–95. https://doi.org/10.1080/00324720903497081

Minnesota Population Center. (2022). Ipums international: Version 7.3. [Dataset]. University of Minnesota. (consulted-July 2022). https://doi.org/10.18128/D020.V7.3

Morgan, S. P., Lye, D. N., & Condran, G. A. (1988). Sons, daughters, and the risk of marital disruption. *American Journal of Sociology*, *94*(1), 110–129. https://doi.org/10.1086/228953

Nandi, A., Mazumdar, S., & Behrman, J. R. (2018). The effect of natural disaster on fertility, birth spacing, and child sex ratio: Evidence from a major earthquake in India. *Journal of Population Economics*, *31*(1), 267–293. https://doi.org/10.1007/s00148-017-0659-7

OECD. (2017). *The pursuit of gender equality: An uphill battle*. OECD. URL (consultedDecember 2022): https://www.oecd-ilibrary.org/social-issues-migration-health/the-pursuit-of-gender-equality_9789264281318-en

OECD. (2021a). Earnings and wages - gender wage gap - OECD data. http://data.oecd.org/earnwage/gender-wage-gap.htm. Accessed: 18 March 2021.

OECD. (2021b). Gender gaps in Eurasia: The daunting effects of COVID- 19.

Orzack, S. H., Stubblefield, J. W., Akmaev, V. R., Colls, P., Munne, S., Scholl, T., Steinsaltz, D., & Zuckerman, J. E. (2015). The human sex ratio from conception to birth. In *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 112, No. (16). NaN-NaN.

Pastore, F., & Verashchagina, A. (2011). When does transition increase the gender wage gap? *Economics of Transition and Institutional Change*, *19*(2), 333–369. https://doi.org/10.1111/j.1468-0351.2010.00407.x

Prag, P., & Mills, M. (2017). Assisted reproductive technologies in Europe usage and regulation in the context of cross-boarder reproductive care. In M. Kreyenfeld & D. Konietzka (Eds.), *Childlessness in Europe, patterns, causes and contexts* (pp. 289–309). Springer.

Sobek, M., & Kennedy, S. (2009). The development of family interrelationship variables for international census data. *Working Paper 2009–02*.

Sobotka, T., & Beaujouan, É. (2014). Two is best? The persistence of a two-child family ideal in Europe. *Population and Development Review*, *40*(3), 391–419. https://doi.org/10.1111/j.1728-4457.2014.00691.x

Thomas, D. (1994). Like father, like son; like mother, like daughter: Parental resources and child height. *Journal of Human Resources*, *29*(4), 950–988. https://doi.org/10.2307/146131

Westoff, C. F., & Potter, R. G. (1964). *Third child: A study in the prediction of fertility* (Third Child). Princeton University Press.

Williamson, N. E. (1976). *Sons or daughters: A cross-cultural survey of parental preferences*. Sage Publications.

World Health Organization. (2019). Sex ratio. http://www.searo.who.int/health_situation_trends/data/chi/sex-ratio/en/. Accessed: 25 November 2019.

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APPENDIX A

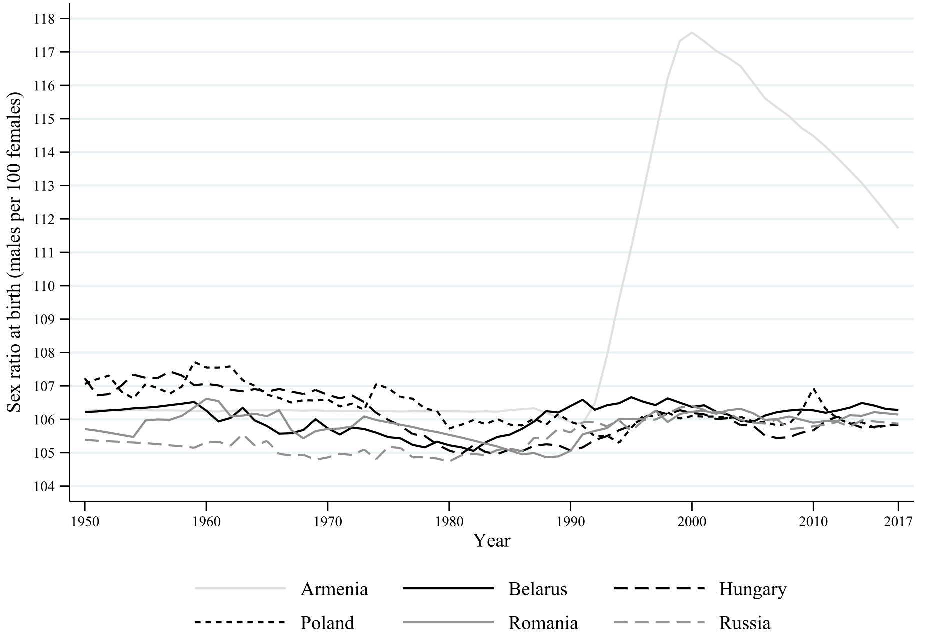

FIGURE A1 Sex ratio at birth between 1950 and 2017 in selected countries. *Source*: Own compilation based on data from (Chao et al., 2019). [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE A1 Effects of the gender of first child(ren) on the probability of having more children among couples: Western European countries.

	Two or more children among couples with 1+ children	Three or more children among couples with 2+ children			
		Model 1	Model 2		
	First child a girl	First two children of same sex versus mix	First two boys versus mix	First two girls versus mix	Sign. (4–3)
Country	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Austria	0.006	0.032**	0.019#	0.048**	*
	(0.006)	(0.006)	(0.008)	(0.008)	
	[0.9]	[19.2]	[11.3]	[28.1]	
	22,764	14,565			
France	−0.007**	0.053**	0.051**	0.055**	
	(0.001)	(0.002)	(0.002)	(0.002)	
	[−1.0]	[25.2]	[24.2]	[26.2]	
	376,415	255,661			
Greece	−0.007	0.032**	0.017*	0.049**	**
	(0.006)	(0.005)	(0.006)	(0.007)	
	[−1.0]	[25.7]	[14.0]	[39.8]	
	27,055	18,818			

(Continues)

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TABLE A1 (Continued)

Country	Two or more children among couples with 1+ children: First child a girl (1)	Three or more children among couples with 2+ children — Model 1: First two children of same sex versus mix (2)	Model 2: First two boys versus mix (3)	First two girls versus mix (4)	Sign. (4–3) (5)
Ireland	0.000	0.081**	0.083**	0.080**	
	(0.009)	(0.012)	(0.014)	(0.015)	
	[0.0]	[27.9]	[28.4]	[27.4]	
	9124	6441			
Italy	−0.001	0.012**	0.009*	0.015**	
	(0.003)	(0.002)	(0.003)	(0.003)	
	[−0.2]	[22.6]	[17.7]	[28.1]	
	86,345	40,028			
Portugal	−0.018*	0.018*	0.013	0.024**	
	(0.006)	(0.006)	(0.007)	(0.007)	
	[−4.1]	[19.2]	[13.7]	[25.4]	
	26,932	11,767			
Spain	−0.004	0.040**	0.042**	0.038**	
	(0.005)	(0.004)	(0.005)	(0.005)	
	[−0.7]	[45.4]	[47.7]	[42.8]	
	42,845	25,423			
Switzerland	0.012	0.032*	0.025	0.040*	
	(0.010)	(0.011)	(0.014)	(0.014)	
	[1.6]	[13.9]	[10.7]	[17.4]	
	7672	5812			

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. For all countries except Austria (2001), Greece (2001), Spain (2001), and Switzerland (2000) data is pooled from two surveys (1999 and 2011 in France, 2002 and 2011 in Ireland, 2001 and 2011 in Italy, 2001 and 2011 in Portugal). All regressions (except for Austria, Greece, Spain and Switzerland) include a period dummy, and mother's age polynomial of power 3. In columns (1)–(5) the basic sample includes all households with couples and the mother between the ages 18 and 40 living with children aged 5–17. In column (1) the dependent variable indicates that the couple has two or more children. In columns (2)–(5) the sample is limited to couples with two or more children, and the dependent variable indicates that the couple has three or more children. Sample selection for Western European countries available in IPUMS: We excluded the 2011 samples in Austria and Greece, since they lacked information on interfamily relations. While the 2011 sample in Spain included information on relations between family members, it didn't contain crucial variables indicating non-biological links between parents and children. 2010 sample in Finland, 2001 and 2011 sample in the Netherlands, and 2001 sample in the UK reported individuals only, without organizing them into households.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

#$p < 0.05$, *$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

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TABLE A2 Effects of the first child's gender on spacing between first two children among couples with 2+ children (in years): Western Europe countries.

Country	First child a girl
Austria	0.078*
	(0.029)
	14,565
France	0.002
	(0.006)
	255,661
Greece	−0.023
	(0.025)
	18,818
Ireland	−0.004
	(0.041)
	6441
Italy	−0.004
	(0.014)
	40,028
Portugal	−0.008
	(0.039)
	11,767
Spain	−0.009
	(0.024)
	25,423
Switzerland	−0.063
	(0.037)
	5812

Note: Standard errors in parentheses, number of observations in the last row per country. For all countries except Austria (2001), Greece (2001), Spain (2001), and Switzerland (2000) data is pooled from two surveys (1999 and 2011 in France, 2002 and 2011 in Ireland, 2001 and 2011 in Italy, 2001 and 2011 in Portugal). All regressions (except for Austria, Greece, Spain and Switzerland) include a period dummy, and mother's age polynomial of power 3. The basic sample includes all households with couples and the mother between the ages 18 and 40 living with two or more children aged 5–17. The dependent variable indicates the difference in age between first two children, in years. Sample selection for Western European countries available in IPUMS: We excluded the 2011 samples in Austria and Greece, since they lacked information on interfamily relations. While the 2011 sample in Spain included information on relations between family members, it didn't contain crucial variables indicating non-biological links between parents and children. 2010 sample in Finland, 2001 and 2011 sample in the Netherlands, and 2001 sample in the UK reported individuals only, without organizing them into households.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

*$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

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TABLE A3 Effects of the first child's gender on the probability of living without a father among all families (first child a girl): Western European countries.

		Channels for living without a father		
	Living without a father	Mother never married	Current divorce or separation	Maternal custody after divorce
Country	(1)	(2)	(3)	(4)
Austria	0.007	0.003	0.002	0.023#
	(0.004)	(0.003)	(0.004)	(0.010)
	[4.3]	[4.7]	[1.7]	[2.5]
	27,884	27,884	24,528	2989
France	0.004**	0.002#	−0.000	0.023**
	(0.001)	(0.001)	(0.001)	(0.003)
	[2.0]	[1.8]	[−0.3]	[2.7]
	491,266	491,266	334,271	43,824
Greece	0.007#	0.000	0.003	0.052**
	(0.003)	(0.001)	(0.003)	(0.013)
	[9.9]	[1.5]	[4.2]	[6.0]
	29,463	29,463	29,299	2183
Ireland	0.007	−0.001	0.010	0.017
	(0.007)	(0.007)	(0.007)	(0.017)
	[2.3]	[−0.6]	[7.2]	[2.0]
	13,729	13,729	9506	1331
Italy	0.003	0.001	0.001	0.011#
	(0.002)	(0.001)	(0.002)	(0.005)
	[2.6]	[2.9]	[1.2]	[1.2]
	100,450	100,450	93,048	9196
Portugal	0.005	0.004	−0.001	0.022
	(0.004)	(0.002)	(0.003)	(0.011)
	[3.8]	[9.4]	[−1.2]	[2.5]
	31,722	31,722	29,038	2856
Spain	0.001	0.001	−0.002	0.020#
	(0.003)	(0.002)	(0.003)	(0.008)
	[0.6]	[3.3]	[−2.4]	[2.1]
	48,315	48,315	45,476	3826
Switzerland	0.010	−0.000	0.006	0.054*
	(0.007)	(0.003)	(0.006)	(0.019)

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TABLE A3 (Continued)

Country	Living without a father (1)	Channels for living without a father: Mother never married (2)	Current divorce or separation (3)	Maternal custody after divorce (4)
	[9.7]	[−1.2]	[7.2]	[6.1]
	8687	8687	8338	763

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. For all countries except Austria (2001), Greece (2001), Spain (2001), and Switzerland (2000) data is pooled from two surveys (1999 and 2011 in France, 2002 and 2011 in Ireland, 2001 and 2011 in Italy, 2001 and 2011 in Portugal). All regressions (except for Austria, Greece, Spain and Switzerland) include a period dummy, and mother's (father's in case of single father households) age polynomial of power 3. In columns (1) and (2) the basic sample includes all households with the mother (the father in single father households) between the ages 18 and 40 living with children aged 5–17 (excluding widowed individuals and lone parents reporting being married). In column (1) the dependent variable indicates that children live without the father—with a single mother who is divorced or never married. In column (2) the dependent variable indicates that the mother has never married. In column (3) the sample is limited to ever married parents, and the dependent variable indicates that the parent is divorced or separated. In column (4) the sample is further limited to divorced or separated parents, and the dependent variable indicates that the child lives with the mother. Sample selection for Western European countries available in IPUMS: We excluded the 2011 samples in Austria and Greece, since they lacked information on interfamily relations. While the 2011 sample in Spain included information on relations between family members, it didn't contain crucial variables indicating non-biological links between parents and children. 2010 sample in Finland, 2001 and 2011 sample in the Netherlands, and 2001 sample in the UK reported individuals only, without organizing them into households.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

#$p < 0.05$, *$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

TABLE A4 Effects of the gender of first child(ren) on the probability of having more children among couples: The pre-transition period.

Country	Two or more children among couples with 1+ children: First child a girl (1)	Three or more children among couples with 2+ children: Model 1: First two children of same sex versus mix (2)	Model 2: First two boys versus mix (3)	First two girls versus mix (4)	Sign. (4–3) (5)
Hungary	0.001	0.029**	0.028**	0.030**	
	(0.004)	(0.004)	(0.004)	(0.005)	
	[0.3]	[24.4]	[23.6]	[25.2]	
	60,174	33,418			
Poland	−0.007#	0.038**	0.038**	0.037**	
	(0.003)	(0.003)	(0.004)	(0.004)	
	[−1.1]	[17.8]	[17.9]	[17.7]	
	106,476	64,912			

(Continues)

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TABLE A4 (Continued)

	Two or more children among couples with 1+ children	Three or more children among couples with 2+ children			
		Model 1	Model 2		
	First child a girl	First two children of same sex versus mix	First two boys versus mix	First two girls versus mix	Sign. (4–3)
Country	(1)	(2)	(3)	(4)	(5)
Romania	0.010**	0.041**	0.024**	0.059**	**
	(0.002)	(0.003)	(0.003)	(0.004)	
	[1.8]	[19.2]	[11.3]	[28.0]	
	155,411	92,705			

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. In Hungary data is pooled from three surveys conducted in 1970, 1980 and 1990, in Romania—from two surveys from 1977 to 1992. In Poland data comes solely from the 1978 census, we excluded the 1988 sample, because it does not contain information on interfamily relations. In Hungary and Romania regressions include respectively a factor or a dummy variable indicating period. All regressions include mother's age polynomial of power 3. In columns (1)–(5) the basic sample includes all households with couples and the mother between the ages 18 and 40 living with children aged 5–17. In column (1) the dependent variable indicates that the couple has two or more children. In columns (2)–(5) the sample is limited to couples with two or more children, and the dependent variable indicates that the couple has three or more children.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

$^{\#}p < 0.05$, $^{*}p < 0.01$, $^{**}p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

TABLE A5 Effects of the first child's gender on spacing between first two children among couples with 2+ children (in years): The pre-transition period.

Country	First child a girl
Hungary	−0.030
	(0.020)
	33,418
Poland	−0.001
	(0.015)
	64,912
Romania	−0.071**
	(0.012)
	92,705

Note: Standard errors in parentheses, number of observations in the last row per country. In Hungary data is pooled from three surveys conducted in 1970, 1980 and 1990, in Romania—from two surveys from 1977 to 1992. In Poland data comes solely from the 1978 census, *we* excluded the 1988 sample, because it does not contain information on interfamily relations. In Hungary and Romania regressions include respectively a factor or a dummy variable indicating period. All regressions include mother's age polynomial of power 3. The basic sample includes all households with couples and the mother between the ages 18 and 40 living with two or more children aged 5–17. The dependent variable indicates the difference in age between first two children, in years.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

$^{*}p < 0.01$, $^{**}p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

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TABLE A6 Effects of the first child's gender on the probability of living without a father among all families (first child a girl): The pre-transition period.

		Channels for living without a father		
	Living without a father	Mother never married	Current divorce or separation	Maternal custody after divorce
Country	**(1)**	**(2)**	**(3)**	**(4)**
Hungary	0.006*	−0.000	0.004	0.030**
	(0.002)	(0.001)	(0.002)	(0.007)
	[7.4]	[−2.4]	[4.8]	[3.3]
	66,332	66,332	65,645	5636
Poland	−0.001	−0.001	−0.002	0.020**
	(0.001)	(0.001)	(0.001)	(0.005)
	[−1.7]	[−4.3]	[−3.2]	[2.1]
	114,802	114,802	113,168	6692
Romania	0.002#	−0.001	−0.002	0.068**
	(0.001)	(0.000)	(0.001)	(0.007)
	[3.9]	[−8.7]	[−2.4]	[8.3]
	167,334	167,334	165,298	10,290

Note: Standard errors in parentheses, percent effect in square brackets, number of observations in the last row per country. In Hungary data is pooled from three surveys conducted in 1970, 1980 and 1990, in Romania—from two surveys from 1977 to 1992. In Poland data comes solely from the 1978 census, we excluded the 1988 sample, because it does not contain information on interfamily relations. In Hungary and Romania regressions include respectively a factor or a dummy variable indicating period. All regressions include mother's (father's in case of single father households) age polynomial of power 3. In columns (1) and (2) the basic sample includes all households with the mother (the father in single father households) between the ages 18 and 40 living with children aged 5–17 (excluding widowed individuals and lone parents reporting being married). In column (1) the dependent variable indicates that children live without the father—with a single mother who is divorced or never married. In column (2) the dependent variable indicates that the mother has never married. In column (3) the sample is limited to ever married parents, and the dependent variable indicates that the parent is divorced or separated. In column (4) the sample is further limited to divorced or separated parents, and the dependent variable indicates that the child lives with the mother.

Abbreviation: IPUMS, Integrated Public Use Microdata Series.

#$p < 0.05$, *$p < 0.01$, **$p < 0.001$.

Source: Own calculations based on IPUMS-International, version 7.3.

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