Firstborn Girls and Family Structure: Evidence from sub-Saharan Africa

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This paper examines the impact of son preference on family structure in sub-Saharan Africa using Demographic and Health Surveys data. We investigate how having a firstborn daughter, as opposed to a son, affects women's likelihood of ever being married, being in a polygamous relationship, and remaining married. Our findings reveal distinct family outcomes for women with a firstborn daughter. They experience higher long-term marriage rates, a reduced likelihood of marrying the father in out-of-wedlock births, increased divorce rates, and more frequent entry into polygamous unions. Additionally, they tend to have more children. Using regression discontinuity analysis along matrilineal-patrilineal ethnic borders, we identify patrilineal tradition as a significant explanatory factor for these outcomes.

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1 Introduction

A majority of societies exhibit some degree of son preference (Williamson 1976). Much has been written on the roots and consequences of son preference in South and East Asia. Recent studies in India highlight the profound impact of a child's gender on various aspects, including future fertility (Jayachandran and Kuziemko 2011), sex-selective abortion (Anukriti, Bhalotra, and Tam 2016), and disparities in parental time investment, access to healthcare, and nutrition (Rose 1999,Jayachandran and Kuziemko 2011, Jayachandran and Pande 2017). High-income countries also experience gender-related effects on family dynamics, such as changes in marital formation, divorce rates, and custody arrangements (Lundberg and Rose 2003, Lundberg, McLanahan, and Rose 2007, Dahl and Moretti 2008, Ichino, Lindstrom, and Viviano 2014, Blau et al. 2017, Kabatek and Ribar 2020).

Emerging evidence suggests that son preference is also present in sub-Saharan Africa, particularly in North, West, and Central African nations with significantly skewed desired sex ratios (Bongaarts 2013). Although there is little evidence of missing girls at birth, Anderson and Ray (2017) reveal notable excess women mortality across the continent, except in Southern Africa. Studies on birth spacing, such as Rossi and Rouanet (2015) confirm strong son preference in North Africa and its absence in South Africa, while Norling (2018), examining fertility patterns, underscores the diversity of gender preferences. Cassan, Baland, and Woitrin (2023) find fertility patterns in some sub-Saharan countries to be consistent with the "stopping rule" whereby parents continue child bearing until they reach a specific number of children of a given gender.

However, much less is known about the effects of son preference on family structure in sub-Saharan Africa. Dahl and Moretti (2004) looking at Kenya in their working paper, and Milazzo (2014) in research on Nigeria , found that women with a female firstborn have more children, are more likely to be separated, and more likely to end up in a polygamous union. In Senegal, Lambert, de Walle, and Villar

(2017) describes how female divorcees with a son from a previous union have a lower remarriage rate.

This paper examines how a child's gender influences family structure in sub-Saharan Africa, specifically its impact on their mother's marital status. We analyze data from over 90 DHS surveys conducted in more than 30 countries.

When gender preferences affect fertility choices, families with girls may differ significantly from those with boys (Sheps 1963; Yamaguchi 1989; Cassan, Baland, and Woitrin 2023). To address this, we focus on the sex of the firstborn child, given that concerns related to sex-selective abortion are generally not applicable in sub-Saharan Africa (Anderson and Ray 2017; Chao et al. 2019). Our identification strategy treats the sex of the firstborn child as an exogenous event, especially among young women, where concerns about differential mortality based on children's gender composition do not apply (Milazzo 2014).

First, we analyze the likelihood of subsequent marriages among a subset of women whose initial childbirth occurred prior to any formal marital commitment. While women with a firstborn daughter exhibit similar short-term marriage rates to those with sons, there is a notable increase in the probability of marriage for these women over the long term, ranging from 0.7 to 1 percentage point (equating to a 1-2% difference). Interestingly, these women were found to be more likely to be currently married, and this trend could not be primarily attributed to a higher incidence of shotgun marriages. In fact, mothers of an out-of-wedlock female firstborn appeared to be less inclined to marry the father of the firstborn child.

Next, we explored the marriage patterns, divorce rates, polygamy, and fertility among women whose initial child was born after entering a marital union. Those with a firstborn daughter exhibited a 0.2 percentage point increase in the likelihood of current divorce, representing a 5-7% higher likelihood. Additionally, they were 0.5 percentage points more likely to have experienced divorce at some point, reflecting a 4% higher likelihood. Women with a female firstborn were also 0.4 percentage points more likely to be in a polygamous marriage. Lastly, they also tended to have a higher number of children.

Behind these average effects on marriage patterns, divorce rates, polygamy, and fertility hides substantial heterogeneity across countries, an heterogeneity that can shed light on the underlying reasons behind these average affects. To study this heterogeneity, we combine the DHS data with information on ancestral anthropological and cultural practices of ethnic groups to relate the effect of the gender of the first child to traditional practices. In recent years, a growing body of literature has examined the impact of traditional practices, such as patrilineality, patrilocality, and dowry customs, often associated with cultivating cultural preferences for sons and perpetuating gender discrimination against daughters (Gupta et al. 2003, Sundaram and Vanneman 2008, Rossi and Rouanet 2015, Jayachandran 2015, Rammohan and Vu 2018). Practices that elevate the relative value of sons are consistent with most observed female first-born effects but not the higher likelihood of marriage for women with a daughter in the long run. In contrast, the patrilineal, as opposed to matrilineal, nature of a society is likely to exert a pronounced influence on family structure and result in female firstborn effects aligned with our findings. This is because women in patrilineal societies face more significant setbacks in the event of separation, typically forfeiting land or custody of their children, in contrast to their matrilineal counterparts (Clignet 1970, Poewe 1978, Holden, Sear, and Mace 2003).

For these reasons, we hypothesized that patrilineality would be an important driver of the female firstborn effects that we uncovered. One issue in order to test this hypothesis is that traditional practices are not exogenous and are closely associated with geographic and agricultural factors (Tene 2023, Alesina, Giuliano, and Nunn 2013, Alesina, Brioschi, and Ferrara forthcoming, Becker, Enke, and Falk 2020, Alsan 2015). Therefore, we complement the OLS estimates with a geographic regression discontinuity design to explore the heterogeneity of the female firstborn effects along patrilineal versus matrilineal ethnic boundaries.

Our findings indeed reveal substantial heterogeneity. The impact of a firstborn daughter on family structure, as described earlier, is particularly strong in patrilineal areas, especially concerning marriages for women who have a child prior to their first union and fertility. Along ethnic borders, we observe a 3.7 percentage point decrease in the likelihood of initially unmarried women in patrilineal areas who had a firstborn daughter in the last five years getting married, compared to those with sons. However, as the number of years since the birth increases, these women become just as likely, if not more likely, to get married. This finding contrasts sharply with women on the matrilineal side of the ethnic border, who show a 3 percentage point increase in the likelihood of marrying if they have a firstborn daughter, even in the short term. The characteristics of the husbands of these initially unmarried women who end up being married confirm that these unions are less desirable on the patrilineal side of the border than on the patrilineal side. While a daughter first born is associated with younger and richer husbands and lower experience of domestic violence on the matrilineal side, these effects are if anything reverse on the patrilineal side. Furthermore, despite the marital and separation effects, the increase in fertility following the birth of a firstborn daughter is entirely coming from the patrilineal side of the ethnic border.

These findings have implications both in terms of methodology and welfare considerations. In terms of methodology, a body of research has been dedicated to examining birth order effects and heterogeneous effects based on the gender composition of offspring (Jakiela et al. 2020,Washington 2008, Glynn and Sen 2015, Cronqvist and Yu 2017, Shafer and Malhotra 2011). Our results underscore the necessity of considering sample selection due to family structure when attempting to establish causal links between the gender of older siblings and the outcomes of younger children.

For instance, researchers finding a positive correlation between having a female eldest sister and the educational attainment of younger siblings might be tempted to attribute a causal interpretation to this effect, assuming the exogeneity of the firstborn's gender. However, if having a female firstborn child increases the likelihood of divorce or polygamy, resulting in more children living with mothers, and if the survey of interest primarily registers sons and daughters living with the head of the household (who are typically male), then any ordinary least squares (OLS) model would yield biased estimates if parental characteristics associated with divorce or polygamy are also correlated with the educational outcomes of younger siblings (e.g., parental time allocation, gender attitudes, etc.).

Similar concerns may arise in studies exploring the impact of children's gender on parental outcomes. Attention must be paid if the study focuses on a subsample of the population that could itself be affected by family structure, such as gender attitudes among judges or politicians.

Secondly, our findings may have welfare implications. Studies conducted in developed countries consistently demonstrate advantages in terms of educational and economic outcomes for children raised in households with two married biological parents compared to those raised in single-parent homes (Kearney and Levine 2017 for example). In contrast, in Africa, child fostering is a common practice and is often considered beneficial. There is suggestive evidence that fostering responds to demands for child labor (Ainsworth 1992 in Côte d'Ivoire, Milazzo 2014 in Nigeria). Additionally, fostering can serve as an investment in a child's education or as a response to economic shocks (Akresh 2009 in Burkina Faso, Zimmerman 2003 in South Africa). Penglase (2020) found little evidence of intra-household consumption inequality between foster and non-foster children in Malawi. Consequently, the overall impact of fostering on education and living standards appears to be ambiguous and context-specific.

Nonetheless, there is substantial evidence that family structure significantly affects the well-being of both adults and children. Brown and van de Walle (2019) discovered higher poverty rates among female-headed households, especially when the female head is unmarried (Brown and van de Walle 2019). For women, the cost of being unmarried is notably steep, as evidenced by significant excess female mortality in unmarried individuals in Africa, as found by Anderson and Ray (2015). Furthermore, Van De Walle and Djuikom (2018) uncovered lower nutritional status among widowed and divorced women in Africa compared to married women in their first union.

The paper is organized as follows. Section 2 describes the data and main identification strategy. The effect of a female firstborn on family structure are shown in Section 3. Section 4 presents the heterogeneity results by traditional ethnic practice, including the regression discontinuity results. Finally, Section 5 concludes.

2 Data

To study women's outcomes, we utilize data from the Demographic and Health Surveys (DHS) conducted by USAID in sub-Saharan Africa post-1994. These nationally-representative household surveys provide data for a wide range of household- and individual-level outcomes.[1] We specifically use surveys for which geo-located cluster data is available, totaling 94 DHS surveys from 32 countries. The list of DHS waves used in the analysis in Table A1.

The main analytical sample comes from the DHS Woman's Questionnaire, which is administered to women aged 15-49, collecting data on a large variety of outcomes, including the woman's birth history. This information is used to list all children (alive or dead) that the respondent has given birth to, with information on the child's sex, date of birth, survival status, and mother's coresidence.

The DHS surveys provide geographic coordinates for each DHS sampling unit (DHS cluster), with random displacements of 0 to 2 km for urban clusters and 0 to 5 km for rural clusters. To match households' locations to specific geographic areas, we

[1] The data and detailed information on the sampling procedure and variable definitions can be found at http://dhsprogram.com/data/Data-Variables-and-Definitions.cfm.

utilize the Stata function *geoinpoly*[2]. We perform this matching process for both historic ethnic group areas (Murdock 1959) and current administrative boundaries. The information on subnational administrative areas come from the DHS geographic data and GIS data available at DIVA-GIS.

The data about traditional practices by ethnic groups and countries come from University of Zurich's Atlas of Pre-colonial Societies data. This is an update of Murdock's *Ethnographic Atlas* with ethnographic information for 1,267 ethnic groups and contains over one hundred ethnographic variables taken from societies prior to industrialization. Where available, we have also used women's ethnicity information in the DHS and merged it with the Ethnographic Atlas. We are grateful to Alessandra Voena for sharing with us a merge file between the ethnic groups in the DHS and the University of Zurich's Atlas of Pre-Colonial Societies.

3 Firstborn Girls and Family Structure

The intricate interplay between family structure and the number and gender composition of children is evident in the challenges of directly testing how a child's sex influences family dynamics. The inherent link between sex preferences for children and family size and composition makes it difficult to isolate the impact of a child's gender on family structure. When gender preferences affect fertility choices, families with girls may differ significantly from those with boys (Sheps 1963; Yamaguchi 1989; Cassan, Baland, and Woitrin 2023). However, when conditioning on a pregnancy, the sex of the firstborn may be treated as a quasi-random event, allowing an examination of the impact of the child's gender on the family dynamic.

[2]Robert Picard, 2015. "GEOINPOLY: Stata module to match geographic locations to shapefile polygons," Statistical Software Components S458016, Boston College Department of Economics, revised 16 Aug 2015.

3.1 Identification Strategy and Descriptive Statistics

Our analytical sample includes all women who have ever given birth. Our primary identification strategy treats the sex of the firstborn child as a random event, assuming that in the absence of selective mortality of the fetus or the mother, natural male-to-female birth ratios should average between 1.03 and 1.06 (Anderson and Ray 2010).

Consistent with prior research in Sub-Saharan Africa (Anderson and Ray 2017, Chao et al. 2019), we find no abnormal birth sex ratios among firstborn children in our sample, with an average sex ratio of 1.04 and minimal evidence of geographic or cohort heterogeneity. We considered the possibility of geographic heterogeneity due to genetic factors (Anderson and Ray 2010) and cohort heterogeneity arising from extreme events such as famines or natural disasters (Tan et al. 2009, Song 2012, Nandi, Mazumdar, and Behrman 2018). However, in our sample, geographic-cohort effects explain very little, accounting for up to 3% of the observed variation, even when controlling for current administrative areas and historic ethnic boundaries (Table B1).

While we observe no significant birth ratio distortions on average, we must consider the possibility of non-random heterogeneity in women's characteristics that could be correlated with family structure outcomes. One potential concern for identification is the idea that having a female firstborn child, as opposed to a male, might influence the selection of women into our sample due to selective mortality. For instance, if having a girl leads to negative health outcomes for women, it could result in higher mortality rates among women with a female firstborn.

In line with findings from Nigeria (Milazzo 2014) using 2008 DHS survey data, we see that after age 40, the male-to-female birth ratio begins to decline, indicating that selective mortality may be a concern in our sample (Table B1). However, once we control for year of the firstborn's birth fixed effects, the difference by women's age disappears.

Table 1 presents summary statistics for all women in our sample who are aged 40 and below. On average, women are 29 years old and have 4.27 years of education. 21% of the women had their first child before their first marriage or cohabitation, if any. In terms of geographic location, 68% of the women live in rural areas and in ancestral patrilineal ethnic areas, while 85% live in patrilocal ethnic areas and 77% in areas where bride price was traditionally practiced. Finally, in some surveys, we can observe how long the woman has lived in her current residence. We see that 43% of the women have always lived in the residence reported at the time of the survey.

The sex of the firstborn child is largely uncorrelated with women's observable characteristics. In Table 1, columns (3)-(5) present regression coefficients with the outcome variable indicating whether the firstborn child is female as opposed to male. These models control for geographic and cohort fixed effects, and we also report joint tests for the significance of all covariates simultaneously. Column (6) repeats the exercise excluding women aged 40 and above for which selective mortality could be a concern.

There are two variables that have some, but very small, predictive power over the sex of the firstborn child: living in a rural area and years of education. Note that both of these associations become statistically insignificant when we control for women's migration status, suggesting that women with a firstborn daughter are more likely to migrate out of rural areas, possibly for marriage purposes. This may also explain the negative, albeit tiny, effect on years of education. We will also report robustness checks by women's migration status. Additionally, we observe that girls are more likely to be alive, consistent with infant mortality being higher among boys than girls due to genetic and biological factors (Pongou 2013).

Finally, a potential concern could be recall bias, if unobserved characteristics of women that affect the probability of misremembering the sex of their firstborn are correlated with women's family structure outcomes. Generally, we believe it is fairly

Table 1: Women's Descriptive Statistics and Balance Test

	(1) Mean/st.dev.	(2) Obs.	(3)	(4)	(5) Female firstborn = 1	(6)	(7)
15–20	0.09	818,700					
	[0.29]						
21–30	0.40	818,700	0.001	0.002	0.001	0.002	0.003
	[0.49]		(0.689)	(0.517)	(0.700)	(0.389)	
31–40	0.32	818,700	–0.005	–0.004	–0.007	–0.003	–0.003
	[0.47]		(0.230)	(0.316)	(0.177)	(0.446)	
+40	0.18	818,700	–0.009	–0.008	–0.011	–0.009	
	[0.39]		(0.105)	(0.157)	(0.176)	(0.154)	
First child born before union	0.20	818,699	0.001	–0.000	–0.001	–0.001	–0.000
	[0.40]		(0.642)	(0.866)	(0.793)	(0.709)	
Firstborn alive	0.85	818,700	0.048***	0.048***	0.046***	0.049***	0.053***
	[0.36]		(0.000)	(0.000)	(0.000)	(0.000)	
Years of education	4.27	818,394	–0.000	–0.000*	–0.000	–0.000	–0.000*
	[4.49]		(0.109)	(0.086)	(0.272)	(0.214)	
Christian	0.60	762,409		0.003	0.002	0.003	0.005
	[0.49]			(0.250)	(0.564)	(0.274)	
Muslim	0.33	762,409		–0.001	0.000	0.000	0.002
	[0.47]			(0.670)	(0.916)	(0.967)	
Other religion	0.06	762,409					
	[0.24]						
Rural	0.68	818,700	–0.002*	–0.002*	–0.001		
	[0.47]		(0.096)	(0.086)	(0.707)		
Patrilineal area	0.68	818,700					
	[0.47]						
Matrilineal area	0.14	818,700					
	[0.34]						
Patrilocal area	0.85	812,972					
	[0.35]						
Matrilocal area	0.04	812,972					
	[0.19]						
Bride price area	0.77	818,700					
	[0.42]						
Always in current residence	0.43	528,483			–0.000		
	[0.50]				(0.751)		
Outcome mean			0.489	0.488	0.490	0.488	0.489
Country FE			Yes	Yes			
Woman's year of birth FE			Yes	Yes	Yes	Yes	Yes
Survey year FE			Yes	Yes	Yes	Yes	Yes
Ethnic area FE			Yes	Yes			
DHS sampling unit FE						Yes	Yes
Exclude 40+							Yes
Observations			812,665	756,430	475,802	756,118	619,197

Notes: This Table presents summary statistics of all women included in this paper's analytical sample. Column (1) present sample mean and standard deviation. Column (2) presents number of observations with non-missing values. Columns (3) to (7) present the coefficient and correspondent p-value, respectively, of an OLS regression of an indicator variable equal to one of the woman's firstborn child was female regressed on women's observable characteristics. Standard errors are clustered at the DHS sampling unit.

unreasonable that a large enough proportion of women would misreport the sex of their firstborn child to the extent that it would impact the conclusions drawn from the empirical analysis. Additionally, we will check throughout the robustness of our results to excluding women aged 40 and above which should alleviate concerns about this potential source of sample selection bias.

3.2 Empirical Strategy

This section tests whether the sex of the firstborn child has effects on the mother's family structure. The main regression model is specified as follows:

$$y_{iec} = \beta \mathit{Female\ firstborn}_i + X_i'\Gamma + \alpha_c + \lambda_e + \delta_t + \epsilon_{iec}, \tag{1}$$

where y_{iec} is the outcome of interest for woman i residing in ethnic area e and country c. $\mathit{Female\ firstborn}_i$ is an indicator variable equal to one if her firstborn's sex is female, and zero otherwise. X_i is a vector of covariates of woman i including age, age squared, education, and year of birth and religion fixed effects and of woman's i's firstborn including age, age squared, and an indicator variable equal to one if the child is no longer alive. We also include country α_c, ethnic area λ_e, and survey year δ_t fixed effects. We will also report results including DHS sampling unit fixed effects. The regressions including religion fixed effects have a fewer number of observations because not all DHS surveys collect this information.[3] We cluster standard errors at the DHS sampling unit.

In addition to presenting the estimated coefficient of interest, $\hat{\beta}$, we will also adopt the approach of Dahl and Moretti (2008) to report the male firstborn baseline. This baseline is calculated as the average predicted outcome variable for women with a male firstborn child using the estimated coefficients on the control variables. We will

[3]The surveys for which religion affiliation of the respondents is not available are the following: Lesotho 2004, Senegal 1997, Tanzania 2010, and Tanzania 2015-2016.

also report the 'percent effect,' represented by the ratio of $\hat{\beta}$ to the male firstborn baseline, which is equivalent to the odds ratio minus 1.

We typically partition the regression sample into two subsamples: 1. Women whose first child was born before their first union, if applicable. 2. Women whose firstborn child was born after their first union.

3.3 Results: Effect of Female Firstborn on Family Structure

3.3.1 Women with a first daughter more likely to end up married

We first examine the subsample of women, which accounts for 21% of the sample, whose firstborn child was born before the date of their first marriage or cohabitation. We estimate that the proportion of women who got pregnant of their firstborn child before union is higher at 37% of the sample. Of these, 44% entered a union during the pregnancy. However, we do not observe any differential impact of the sex of the firstborn child on the probability of entering a union during pregnancy (Table B2). Therefore, to assess the impact of the firstborn's sex on the probability of a union, we focus on the subsample of women whose first child was born before their first union took place.

Table 2 presents the results of estimating equation (1) with an outcome variable equal to one if the respondent ever entered a marriage or cohabitation. The results indicate that the probability of subsequent marriage increases by 0.9-1% when comparing a woman whose first child was female to a woman whose first child was male.

These results however mix the probability of what is often called a "shotgun marriage", defined as marrying the father of the child shortly after the birth, and future marital decisions of the mother. To try to distinguish "shotgun" from "subsequent" marriages, columns (3) to (4) show the effect on shotgun marriage by restricting the

Table 2: Effect of Female Firstborn on Subsequent Marriage

			Years since Firstborn's Birth			
			< 5		≥ 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.005**	0.006***	-0.001	-0.000	0.006***	0.008***
	(0.014)	(0.003)	(0.809)	(0.991)	(0.002)	(0.001)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓
Country FE	✓		✓		✓	
Ethnic area FE	✓		✓		✓	
DHS sampling unit FE		✓		✓		✓
Male firstborn baseline	0.68	0.68	0.30	0.27	0.82	0.81
Percent effect	0.66	0.92	-0.32	-0.02	0.76	0.97
Observations	165,333	144,924	42,838	29,144	122,450	104,115

Notes: OLS regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (3)-(6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

sample to women whose first child was born no more than five years ago from the time of the survey, while columns (5)-(6) show the effect of a female firstborn on the likelihood of becoming ever married among women whose first born was born more than five years ago. We see that having a daughter only increases the probability of subsequent marriage in the long-term.

In addition, note that 50% of the women who marry after the birth do so within 30 months after the birth of the first born child, and 75% do so within 5 years. It seems unlikely that this pattern reflects a similar likelihood of ultimately marrying the father of the firstborn, just delayed. To provide further evidence of the unlikeliness of the shotgun mechanism, we build an indicator variable equal to one if the woman's husband in the household is the father of the firstborn child. This sample is restricted to married women in their first union whose firstborn child still lives in the household, whose partner is part of the household and is listed in the household roster and for which we have information on the firstborn's father.[4] We see that the probability of the woman's husband not being the firstborn's father is 1.3-2 percentage points higher if the child is a girl than if it is a boy (Table 3).

Table 3: Subsequent Marriage: Probability of Firstborn's Child Living with Father

			Years since birth ≤ 12	
	(1)	(2)	(3)	(4)
Female firstborn	-0.013***	-0.015**	-0.016***	-0.020**
	(0.002)	(0.043)	(0.002)	(0.030)
Mother and firstborn controls	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Religion FE		✓		✓
Country FE	✓		✓	
Ethnic area FE	✓		✓	
DHS sampling unit FE		✓		✓
Male firstborn baseline	0.82	0.83	0.84	0.86
Percent effect	-1.64	-1.77	-1.87	-2.38
Observations	25,338	12,807	18,112	7,508

Notes: OLS regressions where the dependent variable is an indicator variable = 1 if the firstborn's father identifier coincides with the mother's current husband identifier. The sample is limited to women whose firstborn child was born before ever been in a union, who are currently in a union, and whose firstborn child lives with her. Columns (3)-(4) further restrict the sample to women whose firstborn child was born twelve or less years ago. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

3.3.2 Firstborn Girls Lead to More Polygamy and Marital Dissolution

We then examine the subsample of women whose firstborn child was born after the date of their first marriage or cohabitation (80% of the sample). Table 4 presents the results on postmarital family structure outcomes: polygamous marriage and marital dissolution.

The results indicate that the probability of being in a polygamous marriage increases by 1.1-1.4% when comparing a woman whose first child was female to a woman whose

[4] This last restriction applies to 4,772 observations and correspond to children for which the information on whether the father is alive or not, and therefore whether is part of the household, is missing at the child level.

first child was male. In columns (1) to (4), the dependent variable is an indicator variable equal to one if the respondent is currently in a polygamous marriage, with columns (3) and (4) restricting the sample to women currently in a union. These polygamy results mask heterogeneity by religious affiliation since the effect is larger among women who self-report as muslim (Table B5).

Table 4: Effect of Female Firstborn on Polygamy and Divorce

	Polygamous marriage				Divorced			
			Currently in union		Currently		Ever	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female firstborn	0.003***	0.003**	0.004***	0.004***	0.002***	0.001***	0.006***	0.005**
	(0.002)	(0.014)	(0.000)	(0.004)	(0.000)	(0.002)	(0.003)	(0.018)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓		✓
Country FE	✓		✓		✓		✓	
Ethnic area FE	✓		✓		✓		✓	
DHS sampling unit FE		✓		✓		✓		✓
Male firstborn baseline	0.24	0.25	0.27	0.29	0.03	0.03	0.14	0.15
Percent effect	1.27	1.10	1.40	1.25	5.26	5.52	4.21	3.57
Observations	655,816	495,149	580,781	441,372	655,816	495,149	119,465	103,923

Notes: OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(4)), currently divorced (columns (5)-(6)), and ever divorced (columns (7)-(8)). The sample is limited to women whose firstborn child was born after been in a union. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

The probability of marital dissolution is also higher among women with a firstborn daughter. The the probability of being currently divorced increases by 5.2-5.5% (columns (5)-(6)). If we limit to those surveys that also provide past marital history, we find consistent results when the outcome variable is instead "ever divorced" (columns (7)-(8)).

None of these female firstborn impacts on postmarital outcomes seem to be immediate to the firstborn's birth, as they are not present when we limit to women whose firstborn's child was born within the last five years (Tables B13, B14).

3.3.3 Women with a female firstborn end up having more children

Finally, Table 5 presents the results of estimating equation (1) with the number of children the woman has given birth to at the time of the survey. We see that women who have a firstborn daughter have 0.02-0.03 more births on average compared to women with a firstborn son. This difference amounts to about a three to four percent increase in fertility compared to the male firstborn baseline. We also see that the results hold up consistently, regardless of whether we narrow our focus to women whose first child was born before or after their first union.

Even in the presence of son preference, we might still have expected to find no significant effects of the sex of the firstborn child on total fertility for three reasons.

First, our results regarding the effect of a firstborn daughter on women's marital status suggest that the potential fertility effect may be mitigated by the increased likelihood of women lacking a partner or being in a polygamous union.

Second, our analysis includes women of various ages, some of whom may not have completed their fertility cycle yet. This censoring could introduce a downward bias in the estimation. As anticipated, when we restrict the sample to women above 40 years old, where most women are expected to have finished their reproductive life, the fertility effect is larger (see Table B3).

Third, the majority of couples desire to have more than one child. In our sample, 90% and 80% of women report their ideal total number of children, regardless of their actual childbearing, to be greater than two and three, respectively. Therefore, we might expect the impact of the sex of the first child on fertility to be small for the second and third child fertility decisions (Dahl and Moretti 2008). However, as shown in Table B4, having a firstborn daughter increases the probability of having k or more children, starting at $k = 2$, suggesting that part of the fertility effect is likely operating through reduced birth intervals (Rossi and Rouanet 2015).

Table 5: Effect of Female Firstborn on Fertility

	All		Firstborn born before union		Firstborn born after union	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.025***	0.023***	0.021***	0.011	0.028***	0.024***
	(0.000)	(0.000)	(0.006)	(0.273)	(0.000)	(0.000)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓
Country FE	✓		✓		✓	
Ethnic area FE	✓		✓		✓	
DHS sampling unit FE		✓		✓		✓
Male firstborn baseline	3.92	4.09	3.32	3.46	4.07	4.21
Percent effect	0.65	0.56	0.62	0.31	0.68	0.58
Observations	821,156	612,176	165,334	111,572	655,816	495,149

Notes: OLS regressions where the dependent variable is the number of children the female respondent ever gave birth to. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

3.3.4 Magnitude of the Effects

In order to interpret the magnitude of the impacts on family structure, we conducted an analysis to determine the number of additional offspring attributed to the birth of firstborn girls. Within the period spanning from 1980 to 2020, an average of approximately 3,257,076 initial daughters were born in sub-Saharan Africa each year.[5] Our results imply that the presence of firstborn daughters led to an annual increase of roughly 65,140 births, resulting in an overall surplus of about 2,600,000 births over the course of the last four decades.

Beyond birth statistics, we can predict the annual number of additional subsequent marriages and divorces in the continent due to the births of firstborn girls as opposed to boys. Out of about $223,540,630$ women who had children in 2020,[6] around

[5]We estimate the total number of firstborn girls born each year by multiplying the number of new births by 24% (the average of firstborn children from the DHS surveys) and by the annual sex birth ratio. Both the number of new births and sex birth ratio come from: United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition.

[6]Multiplying the female population in 2020 by the fraction of women that are between the ages of 15 to 64 years old in the DHS sample (55%) and by the fraction that have children (73%) gives

$44,708,126$ (20%) had a child prior to their first union. Given our estimates (0.01), a first born daughter results in $447,081$ additional marriages per year. The rest of these women, around $178,832,500$, had their first born after their first union. Our estimates predict that firstborn daughters will result in an additional $894,162$ of these women to be ever divorced.

3.4 Robustness Checks

3.4.1 Sample Restrictions

The sample includes all women interviewed in the DHS surveys, which means women between the ages of 15 and 49. However, as discussed in section 3.1, there are concerns about selective mortality due to differential health shocks or exposure to violence by children's sex. The results are robust even when excluding women above the age of 40 (Table B6).

The main analytical sample also includes all women who have ever given birth, irrespective of whether their firstborn child is still alive or not. Due to biological and environmental factors, boys are more likely than girls to die during the first years of life (Pongou 2013). On the other hand, there is evidence of excess girl mortality in sub-Saharan Africa, with estimates of 425,000 excess female deaths each year in the age category zero to 14 years old (Anderson and Ray 2017). The main results already control for an indicator variable equal to one if the firstborn is no longer alive, but we may still worry that the death of the first child mediates the results differently depending on the firstborn child. We find that the results on family structure are not driven by differential child's death splitting the sample by firstborn alive status (Tables B7,B8).

We also document the robustness of the results by women's migration status, split-

us $223,540,630$ women.

ting the sample into women who have always lived in the same residence as at the time of the survey and those who have not (Tables B9, B10). This analysis suggests that the potential role of migration response as a mediating factor is limited. In addition, as shown in the main Tables, the results are robust to the restrictive inclusion of DHS sampling unit fixed effects, suggesting that the results are not driven by local factors correlated with women's choice of residence based on the sex of their first child.

By dropping one by one each country and checking the robustness of the estimates, we can exclude the possibility that the results are influenced by an outlier. We re-estimated equation (1) for each outcome of interest excluding one country at a time and find that the results remain consistent across different country exclusions (Table B11).

3.4.2 Persistence

In our main results, we are pooling surveys from the 90s to the latest available data from 2022, this implies that we have substantial heterogeneity on the calendar year when the firstborn children were born. Given the malleability of social norms and other socioeconomic factors to the passage of time, we may not necessarily expect ex-ante effects to be homogeneous across firstborn's cohorts. To assess this possibility, we run separate regressions for each outcome of interest in which we fully interact equation (1) with dummies indicating the decade when the firstborn was born (see Table B12). Overall, we find a remarkable persistence of the results over the firstborn's decade of birth. The female firstborn impacts on subsequent marriage, polygamy, and divorce do not seem present, at least yet, among the firstborns born after 2010. But this is expected since, as we saw, the impacts on these family structure outcomes do not occur immediately after the firstborn's birth. We also see the effects on fertility weakening over the decades but this is too be expected as the fertility history of the most recent cohorts may not be complete yet.

3.5 Other outcomes: Partner and Relationship Quality

The reported findings on women's marital status may also be translated into differential impacts on partner characteristics and relationship quality. Overall, we do not find any impacts of a female firstborn on married women's partner characteristics (age, education, coresidence, income earner), neither when splitting the sample based on the firstborn child born before or after the union (Table B15).

However, we do find that women with a firstborn girl are more likely to justify intimate partner violence (IPV) for a variety of reasons (Table B16). The DHS surveys also include the incidence of IPV for a subset of the surveys, and a further random subset of eligible married women. The administration of this module has changed over the years, and for comparability reasons, we restrict the analysis to surveys after 2012. Overall, there is no evidence that having a firstborn daughter increases the probability of women reporting having ever experienced IPV (Table B17). If anything, we find suggestive evidence of the opposite effect, although as we will see in section 4, there is relevant heterogeneity based on traditional practices.

4 Heterogeneity Analysis: The Role of Kinship

We have just seen that a female firstborn child influences marriage patterns, divorce rates, polygamy, and fertility. Naturally, these average effects hide substantial heterogeneity across countries. Identifying the determinants of these effects may help us better understand these differences.

Some of these effects, such as higher rates of separation and polygamy following the birth of a daughter as opposed to a son, clearly suggest a form of son preference. However some other effects, such as a higher ultimate rate of marriage for women with a girl as opposed to a boy firstborn may be harder to explain purely based on a taste-based son preference. These results could reflect hardship for women without husband nor son.

In recent years, a substantial body of literature has emerged, delving into the impact of traditional practices, including patrilineality, patrilocality, dowry customs, and more. These practices have often been associated with fostering cultural preferences for sons and perpetuating discrimination against daughters (Gupta et al. 2003, Sundaram and Vanneman 2008, Rossi and Rouanet 2015, Jayachandran 2015, Rammohan and Vu 2018).

Patrilineal societies, where kinship and inheritance are traced through men, stand in contrast to matrilineal societies, where the same is traced through women, resulting in the heightened value attributed to boys (Rossi and Rouanet 2015). Highly correlated with patrilineality is patrilocality which dictates the residence of newlywed couples close to the husband's family. This residence determine the potential support available for parents based on the gender of their offspring (Bau 2021). Furthermore, the exchange of dowries or significant bride prices during marriage influences the relative parental value assigned to girls versus boys (Ashraf et al. 2020, Khalifa 2023).

These traditional practices are likely to significantly impact son preferences and, by extension, the dynamic interplay between the gender of the firstborn and the structure of families. Among these, it is reasonable to expect that the patrilineal or matrilineal nature of a society may have a particularly pronounced effect on family structure. This is because women in matrilineal societies experience fewer losses in the event of divorce, as they do not forfeit land or custody of their children, in contrast to patrilineal societies (Clignet 1970, Poewe 1978, Holden, Sear, and Mace 2003). In patrilineal societies, women without a husband or a son often have limited claims to land. Researchers have found that in matrilineal societies (15% in SSA) children are healthier, the gender gap in education and political participation is lower, the incidence of domestic violence are reduced is reduced (Lowes 2021, Lowes 2022, Robinson and Gottlieb 2019) though there is less cooperation between husband and wives and higher rates of aids (Lowes 2022, Loper 2022).

It is important to acknowledge that traditional practices themselves are not exogenous. Recent research links the prevalence of matrilineality to regions conducive to hoe agriculture, where conditions are less favorable for the domestication of large animals (Tene 2023). Conversely, patrilineality tends to be more prevalent in areas where plowing techniques dominate (Alesina, Giuliano, and Nunn 2013; Alesina, Brioschi, and Ferrara forthcoming), and where large animals have been successfully domesticated (Becker, Enke, and Falk 2020, Alsan 2015).

This endogeneity is the reason why, following the lead of Lowes (2022), we will use a geographic regression discontinuity design along the so-called 'matrilineal belt' of sub-Saharan Africa to investigate heterogeneity in the impact of a female firstborn within matrilineal and patrilineal societies.[7] Additionally, we will undertake a similar analysis to explore the influence of patrilocality and the presence of substantial bride prices.

4.1 OLS Estimates

To explore the heterogeneity by ancestral kinship structure on the effect of having a female versus a male firstborn, we first estimate equation (1) adding the interaction $Female\ firstborn_i * Patrilineal_e$, where $Patrilineal_e$ is an indicator variable equal to one if the woman lives in a DHS cluster located inside an ancestral patrilineal ethnic area, and zero if they are in a matrilineal ethnic area. We limit to ethnic areas that are of either patrilineal (69.37% of the overall sample) or matrilineal descent (13.40% of the sample).[8]

[7]The "matrilineal belt" of sub-Saharan Africa intersects Angola, the Republic of Congo, DRC, Gabon, Malawi, Mozambique, Namibia, Tanzania, and Zambia.

[8]The remaining 17.23% of the sample live in ethnic areas classified by Murdock (1967) as of duolateral (6.98%), quasi-lineages(0.26%), ambilineal (2.33%), bilateral (1.47%), mixed (5.63%), or unknown descent (0.56%).

Table 6: Female Firstborn, Kinship, and Family Structure: OLS Estimates

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn × Patrilineal	-0.001	-0.001	-0.000	0.002	-0.001	0.033***
	(0.787)	(0.907)	(0.936)	(0.601)	(0.533)	(0.004)
Female firstborn	0.005	-0.003	0.007	0.002	0.003	0.001
	(0.230)	(0.774)	(0.153)	(0.444)	(0.100)	(0.944)
Patrilineal pair	0.035***	0.035***	0.035***	0.051***	-0.014***	0.029*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.058)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.004*	-0.004	0.007***	0.004***	0.002***	0.034***
	(0.082)	(0.457)	(0.007)	(0.003)	(0.000)	(0.000)
Observations	138,620	36,225	102,391	480,492	541,068	541,068

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

The OLS estimates suggest that in patrilineal societies, we observe a higher degree of subsequent marriages, polygamous unions and number of children across the board and less divorce (Table 6). In addition, within patrilineal societies, we observe the female firstborn differential impact across all family structure outcomes. Within matrilineal societies, there is also evidence of a female firstborn impact on subsequent marriage and divorce. Given our interest on the female firstborn coefficients, as opposed to the impact of patrilineality itself, and that it might be correlated with other ethnic characteristics, we show that the results are robust to the inclusion of ethnic area fixed effects (Table C1), and DHS cluster and religion fixed effects (Table C2).

4.2 Geographic Regression-Discontinuity Design

The OLS estimates allow us to compare the causal effect of a female firstborn in matrilineal versus patrilineal areas. However, the differential effect cannot solely be attributed to the difference in lineage practice. As discussed above, other area characteristics associated with patrilineal practices, such as suitability for plough agriculture, could underlie this heterogeneity.

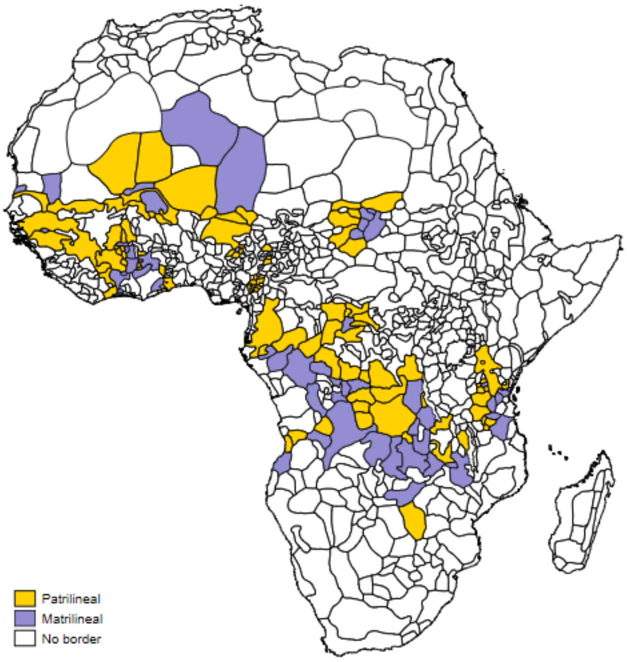

Figure 1: RD Setting: Patrilineal-Matrilineal Ethnic Borders

Notes: This Figure maps those ethnic areas where at least in one of their boundaries there is a discontinuity between patrilineal and matrilineal kinship according to Murdock (1959), and for which there are women in our sample located in DHS clusters within 200 km of those boundaries.

To address the threats of endogeneity, we also use a geographic regression discontinuity design. This estimation relies on ethnic groups that share a border but have different practices of matrilineal or patrilineal kinship. We follow a similar methodology to Lowes (2022) and Moscona, Nunn, and Robinson (2020). Specifically, we identify pairs of ethnic groups, where a patrilineal community shares a border with a matrilineal community, as shown in Figure 1. The rationale behind this geographic RD specification is rooted in the idea that the demarcation of matrilineal belt boundaries coincides with the borders of multiple matrilineal and patrilineal ethnic groups. These boundaries are inherently arbitrary in nature, with the regions adjacent to these borders sharing are similar in terms of geography, historical background, and cultural attributes. The strategy allows to account for unobservable factors as well, as long as they vary smoothly across space. Our estimation equation is as follows:

$$y_{idep} = \theta_p + \beta Female\ firstborn_i + \gamma Female\ firstborn_i * Patrilineal_e + f(location_{idep}) + X_i'\Gamma + Z_d'\Sigma + \delta_t + \lambda_e + \epsilon_{idep}, \tag{2}$$

where y_{idep} is the outcome of interest for woman i in DHS cluster d from ethnic area e and ethnic pair p. θ_p is an ethnicity pair fixed effect; ethnic pairs are adjacent ethnic groups in which one group practices matrilineal kinship and the other group practices patrilineal kinship. f($location_{idep}$) is the RD polynomial, which controls for a smooth function of the geographic location of DHS cluster for ethnic pair p, in the baseline specification we use a local linear specification using latitude and longitude of the DHS cluster as the running variables (Dell and Querubin 2018; Lowes 2022), we will also report estimates with alternative running variables. The vector Z_d is a vector of covariates at the DHS cluster level that include a rural dummy, the log of population, log of the average purchasing power parity, and travel time to the nearest city. Standard errors are clustered at the DHS cluster (sampling unit) level. The sample consists of households residing in DHS clusters located in pairs of ethnic groups that share a border where one is of patrilineal kinship and the other one is matrilineal. The sample is further restricted to DHS clusters that are within 200km of the ethnic pair border. We will also report estimates using alternative sample restrictions based on distance to the border.

The validity of the design hinges on assuming that the ethnic divisions outlined by Murdock (1959) align with current ethnic affiliations. We check this by analyzing how women's self-reported ethnic affiliation changes at the ethnic boundaries using data from those DHS surveys that collect ethnicity information. Figure 2 shows there is a discontinuity in the fraction of women in the sample that report being members of patrilineal or matrilineal kinship groups at the border. The fraction of individuals do not add up to one hundred, given the small presence of other kinship structures.

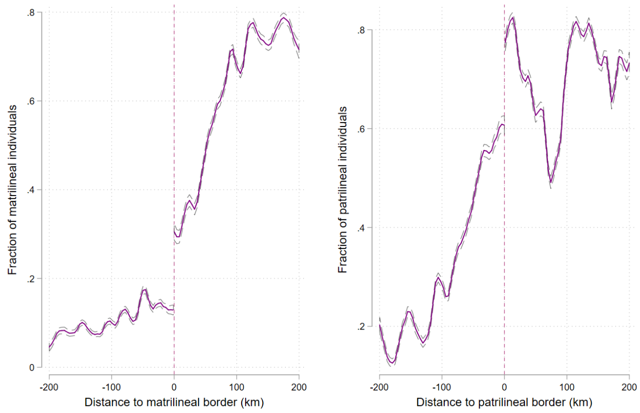

Figure 2: Self-Reported Ethnicity and Geographic Location

Notes: This Figure plots a local polynomial smooth, with a 95% level CI, of the relationship between women's kinship descent according to self-reported ethnicity and the one assigned based on their geographic location. The x-axis reports geographic distance to the matrilineal or patrilineal border. The y-axis reports the fraction of the sample at each distance that identifies as being a member of the patrilineal or matrilineal kinship group.

4.2.1 Heterogeneous Effects on Family Structure

We now turn to the RD estimates. We begin by revisiting the specific subgroup of women who gave birth to their first child before entering into their initial marriage or cohabitation. The RD estimates in Table 7 show a significant 3.7 percentage point decline in the likelihood of marriage within the first five years for women who had a firstborn daughter compared to a son in patrilineal areas. Remarkably, women who had their first child more than five years prior are, if anything, more likely to have ever been married if that first child was a girl. In sharp contrast, within matrilineal regions, the presence of a firstborn child increases the likelihood of being married by 3 percentage points.

Next, we consider the remaining women, who had their first child after their first union. Table 8 shows that the increased likelihood in polygamy following a firstborn daughter compared to a firstborn son tends to be more pronounced in patrilineal areas, although the difference is not statistically significant. In contrast, the effect on divorce rates is present in both matrilineal and patrilineal areas, and if anything

Table 7: Female Firstborn, Kinship, and Subsequent Marriage: RD Estimates

			Years since birth			
			< 5		≥ 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	-0.036***	-0.036***	-0.075**	-0.070**	-0.020	-0.023*
	(0.005)	(0.005)	(0.012)	(0.019)	(0.143)	(0.089)
Female firstborn	0.026***	0.027***	0.033*	0.033	0.027***	0.029***
	(0.006)	(0.005)	(0.095)	(0.102)	(0.009)	(0.005)
Patrilineal pair	0.052***		0.033		0.057***	
	(0.000)		(0.185)		(0.000)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	-0.010	-0.009	-0.042*	-0.037*	0.008	0.006
	(0.241)	(0.258)	(0.057)	(0.092)	(0.382)	(0.466)
Observations	23,405	23,404	6,326	6,317	16,067	17,071

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (3) to (6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table 8: Female Firstborn, Kinship, and Postmarital Outcomes: RD Estimates

	Polygamous union		Currently Divorced		Fertility	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	0.007	0.007	-0.003	-0.003	0.060**	0.060**
	(0.331)	(0.326)	(0.290)	(0.247)	(0.022)	(0.023)
Female firstborn	-0.004	-0.004	0.007***	0.007***	-0.031	-0.029
	(0.490)	(0.510)	(0.004)	(0.003)	(0.153)	(0.173)
Patrilineal pair	0.021**		0.000		0.002	
	(0.041)		(0.934)		(0.953)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	0.003	0.003	0.004***	0.004***	0.030*	0.030**
	(0.484)	(0.449)	(0.006)	(0.008)	(0.050)	(0.044)
Observations	108,749	108,749	119,976	119,976	119,976	119,976

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(2)), currently divorced (columns (3)-(4)), and the number of children the woman ever gave birth to (colimns (5)-(6)). The sample is limited to women whose firstborn child was born after been in a union. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table 9: Female Firstborn, Kinship, and Partner Characteristics: RD

	Firstborn before union				Firstborn after union			
	Age (1)	Education (2)	At home (3)	No money (4)	Age (5)	Education (6)	At home (7)	No money (8)
Female firstborn × Patrilineal	0.663*	0.012	0.005	0.034***	0.079	-0.011	0.003	0.005
	(0.084)	(0.856)	(0.822)	(0.007)	(0.535)	(0.598)	(0.688)	(0.214)
Female firstborn	-0.622**	0.016	0.015	-0.024***	-0.138	0.014	0.000	-0.002
	(0.019)	(0.740)	(0.432)	(0.007)	(0.174)	(0.412)	(0.956)	(0.499)
Patrilineal pair	-0.137	-0.048	-0.033	-0.010	-0.027	0.004	0.006	0.001
	(0.698)	(0.386)	(0.123)	(0.366)	(0.858)	(0.838)	(0.390)	(0.647)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.041	0.027	0.020	0.010	-0.059	0.003	0.003	0.003
	(0.882)	(0.521)	(0.145)	(0.241)	(0.440)	(0.785)	(0.409)	(0.202)
Observations	13,975	15,855	14,575	5,263	104,688	116,159	108,506	32,213

Notes: This Table presents geographic RD regressions where the dependent variables are partner characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

is larger on the former where marriages tend to be less stables (Loper 2022, Lowes 2022). Finally looking at heterogeneous on fertility, the RD estimates confirm that the effect of a firstborn daughter as opposed to a son is concentrated in patrilineal areas.

4.2.2 Heterogeneous Effects on Partner and Relationship Quality

Compared to the baseline estimates, we find evidence of a female firstborn impact on women's partner and relationship characteristics when considering kinship heterogeneity. In matrilineal areas, among women who had their first child out-of-wedlock and married later, we observe that those with a firstborn girl have younger husbands and their partners are less likely to have no income. This is not observed in patrilineal areas (Table 9).

Shifting the focus to IPV outcomes, we find that in patrilineal societies, women generally are more accepting of IPV, consistent with previous findings from Lowes (2022). Furthermore, among women whose first child was born before marriage, we observe that women are more likely to justify IPV if they had a firstborn daughter

Table 10: Female Firstborn, Kinship, and IPV Attitudes: RD

	Firstborn before union						Firstborn after union					
		Beating justified if						Beating justified if				
	(1) Mean	(2) Goes out	(3) Neg. child	(4) Argues	(5) Ref. sex	(6) Burns food	(7) Mean	(8) Goes out	(9) Neg. child	(10) Argues	(11) Ref. sex	(12) Burns food
Female firstborn × Patrilineal	0.013	0.000	0.003	-0.002	0.033**	0.029**	0.002	0.000	0.006	-0.006	0.001	0.007
	(0.310)	(0.998)	(0.848)	(0.904)	(0.035)	(0.039)	(0.775)	(0.998)	(0.445)	(0.453)	(0.934)	(0.273)
Female firstborn	0.008	0.010	0.008	0.022*	0.004	-0.005	0.001	-0.001	0.001	0.005	0.001	-0.004
	(0.359)	(0.427)	(0.501)	(0.064)	(0.672)	(0.575)	(0.860)	(0.933)	(0.812)	(0.357)	(0.803)	(0.423)
Patrilineal pair	0.012	0.016	0.020	0.026	0.000	-0.004	0.039***	0.051***	0.029**	0.045***	0.049***	0.019*
	(0.370)	(0.346)	(0.263)	(0.128)	(0.976)	(0.761)	(0.000)	(0.000)	(0.025)	(0.000)	(0.000)	(0.075)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.020**	0.010	0.011	0.020	0.037***	0.024**	0.002	-0.001	0.007	-0.000	0.002	0.003
	(0.024)	(0.393)	(0.346)	(0.102)	(0.001)	(0.026)	(0.503)	(0.913)	(0.109)	(0.953)	(0.639)	(0.454)
Observations	22,241	22,241	22,241	22,237	22,233	22,240	109,585	109,582	109,579	109,551	109,579	109,579

Notes: This Table presents geographic RD regressions where the dependent variables are attitudes towards IPV. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table 11: Female Firstborn, Kinship, and IPV (> 2012): RD

	Firstborn before union				Firstborn after union			
	(1) Any IPV	(2) Emotional	(3) Physical/sexual	(4) Severe physical/sexual	(5) Any IPV	(6) Emotional	(7) Physical/sexual	(8) Severe physical/sexual
Female firstborn × Patrilineal	0.087**	0.059	0.063	0.029	-0.017	-0.020	0.000	-0.007
	(0.045)	(0.149)	(0.142)	(0.360)	(0.342)	(0.238)	(0.979)	(0.586)
Female firstborn	-0.082***	-0.059**	-0.080***	-0.022	0.004	0.017	-0.011	-0.001
	(0.001)	(0.013)	(0.002)	(0.249)	(0.741)	(0.162)	(0.397)	(0.887)
Patrilineal pair	-0.030	-0.060	-0.004	-0.002	0.029	0.019	0.033*	0.025*
	(0.489)	(0.105)	(0.922)	(0.932)	(0.176)	(0.353)	(0.091)	(0.052)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.005	-0.000	-0.017	0.007	-0.013	-0.003	-0.011	-0.008
	(0.885)	(0.999)	(0.619)	(0.786)	(0.283)	(0.789)	(0.340)	(0.348)
Observations	4,172	4,172	4,172	4,169	21,254	21,252	21,254	21,240

Notes: This Table presents geographic RD regressions where the dependent variables are women's report of having ever experienced IPV. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

compared to a son. This suggests that these women entered unions with greater acceptance of IPV (Table 10). In Table 11, which includes surveys conducted after 2012, we report the RD estimates with self-reported experiences of ever having experienced IPV as the outcome variable. Interestingly, we find that in matrilineal societies, women with a female firstborn are actually less likely to report experiencing IPV, while this difference is not present in patrilineal societies. However, when we limit the sample to women below 40 years old, we do find that these women are more likely to experience IPV if their first child was a girl (Table C3), suggesting a potential role of domestic violence as a driver of selective mortality.

4.2.3 Validity and Sensitivity Checks

We assess the sensitivity of our heterogeneity analysis by kinship descent to various robustness checks (Appendix C.2). We present the RD estimates using a different restriction on the women included in the sample, based on their geographic distance to the ethnic boundary (100km or 50km from the border). Additionally, we demonstrate that the results remain robust when using alternative specifications of the running variable, such as higher degree polynomials of the latitude and longitude variables, as well as distance to the border. We also include results clustering at the ethnic area level and examine the robustness of the findings by including religion fixed effects and additional geographic controls at the DHS cluster level.

4.3 Theoretical Model

[In progress]

5 Conclusion

In conclusion, this study has explored the impact of a firstborn girl on family structure in sub-Saharan Africa, specifically on marriage patterns, divorce rates, polygamy, and fertility.

We found that women with a female firstborn child tend to have different family outcomes compared to those with sons. They are more likely to marry over the long term, less inclined to marry the father of the firstborn child in the case of out-of-wedlock births, and more likely to experience divorce and enter polygamous unions. Additionally, they tend to have a higher number of children. Using regression discontinuity analysis along matrilineal-patrilineal ethnic borders, we identify patrilineal tradition as a significant explanatory factor for these outcomes, as well as differential impacts on partner characteristics, with welfare implications.

These findings highlight the complexity of family dynamics in sub-Saharan Africa and the importance of considering gender preferences in the context of fertility and marriage choices.

From a methodological perspective, this research underscores the importance of considering sample selection due to family structure when establishing causal links between the gender composition of offspring and various outcomes.

Furthermore, our findings has welfare implications for children in sub-Saharan Africa, as family structure is likely to significantly affects the well-being of both adults and children.

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Appendix

A Data and Variables

Table A1: List of DHS Surveys

Country	DHS Years
Angola	2015, 2016
Benin	1996, 2001, 2011, 2012, 2017, 2018
Burkina Faso	1998, 1999, 2003, 2010
Burundi	2010, 2011, 2016, 2017
Cameroon	2004, 2011, 2018, 2019
Car	1994, 1995
Chad	2014, 2015
Cote D'Ivoire	1994, 1998, 1999, 2011, 2012
DCR	2007, 2013, 2014
Eswatini	2006, 2007
Ethiopia	2000, 2005, 2011, 2016
Gabon	2012
Ghana	1998, 1999, 2003, 2008, 2014
Guinea	1999, 2005, 2012, 2018
Kenya	2003, 2008, 2009, 2014, 2022
Lesotho	2004, 2005, 2009, 2010, 2014
Liberia	2006, 2007, 2013, 2019, 2020
Madagascar	1997, 2008, 2009, 2021
Malawi	2000, 2004, 2005, 2010, 2015, 2016
Mali	2001, 2006, 2012, 2013, 2018
Mozambique	2011
Namibia	2000, 2006, 2007, 2013
Niger	1998
Nigeria	2003, 2008, 2013, 2018
Rwanda	2005, 2010, 2011, 2014, 2015, 2019, 2020
Senegal	1997, 2005, 2010, 2011, 2012, 2013, 2015, 2018, 2019
Sierra Leone	2008, 2013, 2019
Tanzania	1999, 2009, 2010, 2015, 2016
Togo	1998, 2013, 2014
Uganda	2000, 2001, 2006, 2011, 2016
Zambia	2007, 2013, 2014, 2018, 2019
Zimbabwe	1999, 2005, 2006, 2010, 2011, 2015

B Female Firstborn Effects: Additional Analysis

Table B1: Women's age and Probability of Female firstborn

	(1)	(2)	(3)	(4)	(5)
21-30	0.002	0.002	0.002	0.002	0.002
	(0.273)	(0.227)	(0.283)	(0.491)	(0.364)
31-40	-0.001	0.001	0.000	-0.000	-0.000
	(0.624)	(0.743)	(0.904)	(0.899)	(0.980)
+40	-0.004*	0.001	0.001	-0.001	0.000
	(0.057)	(0.851)	(0.847)	(0.771)	(0.914)
Constant	0.489***	0.487***	0.487***	0.488***	0.488***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE	✓	✓			
Year of firstborn birth FE		✓			
Country × Year of firstborn birth FE			✓		
Ethnic area × Year of firstborn birth FE				✓	
Administrative area 1 × Year of firstborn birth FE					✓
R-squared	0.000	0.000	0.002	0.030	0.024
Observations	821,156	821,156	821,136	818,206	817,507

Table B2: Effect of Female Firstborn on Marriage During Pregnancy

	(1)	(2)
Female firstborn	0.00	0.00
	(0.77)	(0.27)
Mother and firstborn controls	✓	✓
Year FE	✓	✓
Religion FE		✓
Country FE	✓	
Ethnic area FE	✓	
DHS sampling unit FE		✓
Male firstborn baseline	0.45	0.45
Percent effect	0.11	0.45
Observations	299,206	274,517

Notes: This Table presents OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is estimated to have gotten married during pregnancy. The sample is limited to women that became pregnant before their first union. Columns (3)-(6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), and (6) also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B3: Effect of Female Firstborn on Fertility: Women Above 40 Years Old

	All		Firstborn born before union		Firstborn born after union	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.056***	0.043***	0.016	0.040	0.065***	0.051***
	(0.000)	(0.007)	(0.597)	(0.484)	(0.000)	(0.004)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓
Country FE	✓		✓		✓	
Ethnic area FE	✓		✓		✓	
DHS sampling unit FE		✓		✓		✓
Male firstborn baseline	6.20	6.49	5.62	5.77	6.32	6.62
Percent effect	0.90	0.66	0.28	0.69	1.02	0.76
Observations	149,697	106,580	25,479	10,720	124,157	87,026

Notes: This Table presents OLS regressions where the dependent variable is the number of children the female respondent ever gave birth to. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), and (6)also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B5: Heterogeneity by Women's Religious Affiliation: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall	< 5	≥ 5	Polyg.	Div	Fert.
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	-0.006	-0.007	-0.007	0.000	0.000	0.015
	(0.402)	(0.716)	(0.365)	(0.989)	(0.799)	(0.347)
Female firstborn × Christian	0.013	0.009	0.015*	0.003	0.001	0.018
	(0.101)	(0.640)	(0.069)	(0.546)	(0.552)	(0.284)
Female firstborn × Muslim	0.010	0.002	0.014*	0.007	0.002	0.012
	(0.226)	(0.921)	(0.095)	(0.167)	(0.246)	(0.473)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Christian	0.006***	0.002	0.008***	0.003**	0.001**	0.033***
	(0.005)	(0.648)	(0.003)	(0.026)	(0.047)	(0.000)
Female firstborn+Female firstborn*Muslim	0.004	-0.005	0.007**	0.007***	0.002***	0.027***
	(0.302)	(0.649)	(0.041)	(0.000)	(0.001)	(0.000)
Observations	151,822	39,221	112,546	544,386	613,030	613,030

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B4: Effect of Female Firstborn on Having k or More Children

	2+	3+	4+	5+	6+	7+
Female firstborn	0.002**	0.003***	0.004***	0.005***	0.003***	0.002***
	(0.010)	(0.002)	(0.000)	(0.000)	(0.001)	(0.002)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Religion FE	✓	✓	✓	✓	✓	✓
DHS sampling unit FE	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.82	0.66	0.51	0.38	0.27	0.19
Percent effect	0.23	0.40	0.75	1.25	1.09	1.29
Observations	612,176	612,176	612,176	612,176	612,176	612,176

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B6: Age ≤ 40: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall	< 5	≥ 5	Polyg.	Div	Fert.
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.006***	-0.001	0.008***	0.003***	0.001***	0.020***
	(0.006)	(0.855)	(0.001)	(0.003)	(0.004)	(0.000)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.65	0.30	0.80	0.25	0.03	3.54
Percent effect	0.87	-0.24	1.01	1.39	4.75	0.58
Observations	139,646	42,756	96,845	478,515	529,841	529,841

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B7: Firstborn alive: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn	0.005**	-0.001	0.007***	0.004***	0.002***	0.031***
	(0.018)	(0.722)	(0.003)	(0.000)	(0.000)	(0.000)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.66	0.29	0.80	0.25	0.03	3.85
Percent effect	0.73	-0.51	0.85	1.65	5.86	0.80
Observations	142,139	39,588	102,502	490,608	553,818	553,818

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B8: Firstborn not alive: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn	0.003	0.018	0.004	0.002	0.001	0.004
	(0.424)	(0.283)	(0.289)	(0.551)	(0.397)	(0.732)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.83	0.41	0.89	0.35	0.03	5.20
Percent effect	0.41	4.38	0.49	0.51	3.03	0.08
Observations	22,959	3,094	19,747	87,987	99,711	99,711

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B9: Always Same Residence: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn	0.005	0.001	0.005	0.009^{***}	0.002^{*}	0.027^{***}
	(0.144)	(0.839)	(0.170)	(0.000)	(0.062)	(0.000)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.61	0.22	0.77	0.26	0.04	4.21
Percent effect	0.81	0.59	0.70	3.33	4.52	0.63
Observations	49,216	14,658	34,487	159,065	183,503	183,503

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B10: Changed Residence: Effect of Female Firstborn on Family Structure

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn	0.005^{*}	0.001	0.007^{**}	0.002	0.001	0.026^{***}
	(0.069)	(0.886)	(0.027)	(0.150)	(0.322)	(0.000)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.76	0.41	0.86	0.24	0.03	3.96
Percent effect	0.71	0.27	0.79	1.02	2.46	0.66
Observations	59,716	13,401	46,230	209,641	236,007	236,007

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B11: Dropping one country at the time: Effect of Female Firstborn

	Subsequent marriage					
	Overall	< 5	≥ 5	Polyg.	Div	Fert.
Angola	0.004**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Benin	0.004**	−0.001	0.006***	0.004***	0.001***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Burkina Faso	0.005**	−0.001	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Burundi	0.004**	−0.001	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Cameroon	0.005***	−0.001	0.007***	0.004***	0.001***	0.030***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Car	0.004**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Chad	0.005**	−0.001	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Cote D'Ivoire	0.005**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
DCR	0.005***	−0.000	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Eswatini	0.004**	−0.002	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Ethiopia	0.005**	−0.001	0.006***	0.004***	0.001***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Gabon	0.005**	0.000	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Ghana	0.005**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Guinea	0.004**	−0.001	0.006***	0.003***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Kenya	0.003*	−0.002	0.005**	0.004***	0.002***	0.025***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Lesotho	0.005***	0.000	0.007***	0.004***	0.001***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Liberia	0.005**	−0.000	0.006***	0.004***	0.001***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Madagascar	0.005***	0.000	0.007***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Malawi	0.004**	−0.002	0.006***	0.004***	0.001***	0.029***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Mali	0.004**	−0.001	0.006***	0.003***	0.002***	0.025***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Mozambique	0.005**	0.000	0.006***	0.004***	0.001***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Namibia	0.005***	0.000	0.007***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Niger	0.005**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Nigeria	0.005**	0.000	0.006***	0.004***	0.002***	0.026***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Rwanda	0.005**	−0.000	0.006***	0.004***	0.001***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Senegal	0.005***	0.000	0.007***	0.004***	0.001***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Sierra Leone	0.005***	−0.001	0.007***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Tanzania	0.005**	−0.001	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Togo	0.005**	−0.001	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Uganda	0.004**	−0.001	0.006***	0.004***	0.002***	0.027***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Zambia	0.004**	−0.002	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)
Zimbabwe	0.004**	−0.002	0.006***	0.004***	0.002***	0.028***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.000)	(0.004)

Table B12: Effect of Female Firstborn on Family Structure: Heterogeneity by Firstborn's Decade of Birth

	Subsequent marriage					
	Overall	< 5	≥ 5	Polyg.	Div	Fert.
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	-0.000	0.025	0.001	0.005**	0.002**	0.046***
	(0.914)	(0.861)	(0.736)	(0.030)	(0.027)	(0.000)
1990-1999 × Female firstborn	0.006	-0.008	0.002	0.001	-0.000	-0.012
	(0.215)	(0.954)	(0.627)	(0.782)	(0.779)	(0.358)
2000-2009 × Female firstborn	0.008*	-0.028	0.011**	-0.004	-0.001	-0.030**
	(0.085)	(0.845)	(0.034)	(0.195)	(0.481)	(0.016)
2010+ × Female firstborn	0.002	-0.028	0.011	-0.003	-0.001	-0.037***
	(0.682)	(0.846)	(0.273)	(0.337)	(0.355)	(0.003)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*1990-1999	0.005*	0.017	0.003	0.006***	0.002**	0.034***
	(0.092)	(0.197)	(0.304)	(0.002)	(0.023)	(0.000)
Female firstborn+Female firstborn*2000-2009	0.008**	-0.003	0.012***	0.001	0.001*	0.016***
	(0.021)	(0.680)	(0.002)	(0.446)	(0.077)	(0.000)
Female firstborn+Female firstborn*2010+	0.002	-0.003	0.012	0.002	0.001	0.009*
	(0.669)	(0.606)	(0.204)	(0.390)	(0.387)	(0.055)
Observations	165,155	42,802	122,308	578,610	653,539	653,539

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B13: Effect of Female Firstborn on Polygamy and Divorce, Years since Birth < 5

	Polygamous marriage				Divorced			
			Currently in union		Currently		Ever	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female firstborn	0.001	0.001	0.002	0.002	0.001	0.001	-0.001	-0.002
	(0.513)	(0.709)	(0.336)	(0.483)	(0.425)	(0.341)	(0.673)	(0.579)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓		✓
Country FE	✓		✓		✓		✓	
Ethnic area FE	✓		✓		✓		✓	
DHS sampling unit FE		✓		✓		✓		✓
Male firstborn baseline	0.15	0.16	0.16	0.18	0.02	0.02	0.07	0.08
Percent effect	0.78	0.56	1.14	1.05	2.70	4.30	-1.85	-2.92
Observations	145,362	103,631	133,770	94,700	145,362	103,631	26,371	21,465

Notes: OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(4)), currently divorced (columns (5)-(6)), and ever divorced (columns (7)-(8)). The sample is limited to women whose firstborn child was born after been in a union and the child was born less than five years from the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B14: Effect of Female Firstborn on Polygamy and Divorce, Years since Birth ≥ 5

	Polygamous marriage				Divorced			
			Currently in union		Currently		Ever	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female firstborn	0.004***	0.004***	0.004***	0.005***	0.002***	0.002***	0.008***	0.008***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.000)	(0.004)	(0.001)	(0.004)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓		✓
Country FE	✓		✓		✓		✓	
Ethnic area FE	✓		✓		✓		✓	
DHS sampling unit FE		✓		✓		✓		✓
Male firstborn baseline	0.26	0.28	0.30	0.32	0.03	0.03	0.16	0.16
Percent effect	1.40	1.39	1.48	1.51	5.78	5.71	4.71	4.74
Observations	508,172	386,623	444,834	341,011	508,172	386,623	93,089	81,384

Notes: OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(4)), currently divorced (columns (5)-(6)), and ever divorced (columns (7)-(8)). The sample is limited to women whose firstborn child was born after been in a union and the child was born five years or more from the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B15: Effect of Female Firstborn on Partner Characteristics

	All				Firstborn before union				Firstborn after union			
	(1) Age	(2) Education	(3) At home	(4) No money	(5) Age	(6) Education	(7) At home	(8) No money	(9) Age	(10) Education	(11) At home	(12) No money
Female firstborn	-0.031	0.005	0.001	0.001	-0.076	0.003	0.004	-0.001	-0.023	0.005	0.000	0.001
	(0.142)	(0.177)	(0.478)	(0.200)	(0.215)	(0.751)	(0.237)	(0.677)	(0.312)	(0.179)	(0.747)	(0.102)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Male firstborn baseline	40.49	1.10	1.15	0.02	40.42	1.43	1.17	0.03	40.50	1.05	1.15	0.02
Percent effect	-0.08	0.43	0.07	4.56	-0.19	0.24	0.34	-3.17	-0.06	0.47	0.04	6.53
Observations	492,146	547,029	501,233	170,425	65,986	74,573	67,246	25,958	426,142	472,440	433,966	144,423

Table B16: Effect of Female Firstborn on Attitudes Towards IPV

	All							Firstborn before union		Firstborn after union	
			Beating justified if								
	(1) Any	(2) Mean	(3) Goes out	(4) Neg. child	(5) Argues	(6) Ref. sex	(7) Burns food	(8) Any	(9) Mean	(10) Any	(11) Mean
Female firstborn	0.003***	0.003***	0.004***	0.004***	0.002**	0.002*	0.002**	0.007**	0.003	0.002*	0.003***
	(0.007)	(0.001)	(0.000)	(0.001)	(0.037)	(0.095)	(0.036)	(0.018)	(0.148)	(0.074)	(0.003)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.52	0.32	0.37	0.40	0.35	0.30	0.21	0.46	0.26	0.54	0.34
Percent effect	0.61	0.91	1.20	1.03	0.69	0.61	1.01	1.43	1.04	0.43	0.87
Observations	563,980	563,980	563,961	563,949	563,841	563,913	563,916	106,779	106,779	457,192	457,192

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table B17: Effect of Female Firstborn on IPV

	All			Firstborn before union			Firstborn after union		
	(1) Any IPV	(2) Emotional	(3) Physical/sexual	(4) Any IPV	(5) Emotional	(6) Physical/sexual	(7) Any IPV	(8) Emotional	(9) Physical/sexual
Female firstborn	-0.005*	-0.004	-0.003	-0.011	-0.011	-0.007	-0.004	-0.002	-0.002
	(0.099)	(0.182)	(0.358)	(0.138)	(0.133)	(0.341)	(0.264)	(0.442)	(0.629)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Male firstborn baseline	0.43	0.29	0.35	0.47	0.32	0.39	0.42	0.29	0.34
Percent effect	-1.16	-1.27	-0.77	-2.42	-3.37	-1.82	-0.87	-0.81	-0.45
Observations	99,172	99,161	99,167	16,496	16,494	16,496	82,637	82,628	82,632

C Heterogeneity Analysis: Additional Empirical Analysis

C.1 OLS Estimates

Table C1: Female Firstborn, Kinship, and Family Structure: OLS Estimates, , with Ethnic Area Fixed Effects

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn × Patrilineal	-0.003	-0.004	-0.002	0.002	-0.001	0.035***
	(0.495)	(0.683)	(0.649)	(0.587)	(0.619)	(0.002)
Female firstborn	0.007	-0.000	0.009*	0.002	0.002	0.000
	(0.117)	(0.971)	(0.074)	(0.393)	(0.121)	(0.966)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.003	-0.004	0.006**	0.004***	0.002***	0.036***
	(0.125)	(0.372)	(0.012)	(0.001)	(0.000)	(0.000)
Observations	138,616	36,188	102,383	480,492	541,068	541,068

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table C2: Female Firstborn, Kinship, and Family Structure: OLS Estimates, , with DHS Cluster and Religion Fixed Effects

	Subsequent marriage					
	Overall (1)	< 5 (2)	≥ 5 (3)	Polyg. (4)	Div (5)	Fert. (6)
Female firstborn × Patrilineal	-0.002	0.009	-0.002	0.002	-0.001	0.037***
	(0.720)	(0.485)	(0.812)	(0.468)	(0.749)	(0.002)
Female firstborn	0.007	-0.007	0.009	0.001	0.002	-0.003
	(0.120)	(0.540)	(0.104)	(0.611)	(0.219)	(0.756)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Religion FE	✓	✓	✓	✓	✓	✓
DHS sampling unit FE	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.005**	0.002	0.008***	0.004***	0.002***	0.034***
	(0.037)	(0.736)	(0.010)	(0.005)	(0.001)	(0.000)
Observations	122,193	24,832	87,525	452,928	508,573	508,573

p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

C.2 RD Estimates

Table C3: Female Firstborn, Kinship, and IPV (> 2012): RD (Age ≤ 40)

	Firstborn before union				Firstborn after union			
	(1) Any IPV	(2) Emotional	(3) Physical/sexual	(4) Severe physical/sexual	(5) Any IPV	(6) Emotional	(7) Physical/sexual	(8) Severe physical/sexual
Female firstborn × Patrilineal	0.158***	0.113***	0.118***	0.049	-0.022	-0.020	-0.003	-0.008
	(0.001)	(0.009)	(0.010)	(0.169)	(0.267)	(0.274)	(0.885)	(0.529)
Female firstborn	-0.092***	-0.068***	-0.083***	-0.023	0.013	0.023*	-0.004	0.006
	(0.001)	(0.008)	(0.003)	(0.249)	(0.371)	(0.071)	(0.785)	(0.546)
Patrilineal pair	-0.046	-0.073*	-0.013	-0.007	0.038*	0.027	0.039**	0.031**
	(0.299)	(0.060)	(0.762)	(0.818)	(0.082)	(0.189)	(0.049)	(0.025)
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.066*	0.044	0.036	0.026	-0.009	0.003	-0.007	-0.002
	(0.070)	(0.202)	(0.330)	(0.385)	(0.495)	(0.799)	(0.604)	(0.798)
Observations	3,548	3,548	3,548	3,545	17,861	17,859	17,861	17,848

Notes: This Table presents geographic RD regressions where the dependent variables are women's report of having ever experienced IPV. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table C4: Female Firstborn, Kinship, and Subsequent Marriage: RD Estimates (100 km)

			Years since birth			
			< 5		≥ 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	-0.022	-0.021	-0.048	-0.040	-0.013	-0.013
	(0.156)	(0.183)	(0.192)	(0.276)	(0.452)	(0.449)
Female firstborn	0.021*	0.021*	0.020	0.018	0.025*	0.027**
	(0.078)	(0.079)	(0.426)	(0.468)	(0.054)	(0.047)
Patrilineal pair	0.050***		0.018		0.066***	
	(0.002)		(0.541)		(0.000)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	-0.001	-0.000	-0.028	-0.022	0.013	0.014
	(0.905)	(0.999)	(0.292)	(0.412)	(0.222)	(0.199)
Observations	12,917	12,917	3,496	3,484	9,414	9,413

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (3) to (6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table C5: Female Firstborn, Kinship, and Subsequent Marriage: RD Estimates (50 km)

			Years since birth			
			< 5		≥ 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	-0.014	-0.014	-0.046	-0.044	-0.005	-0.007
	(0.491)	(0.501)	(0.304)	(0.346)	(0.814)	(0.773)
Female firstborn	0.014	0.014	0.020	0.020	0.017	0.019
	(0.375)	(0.390)	(0.512)	(0.529)	(0.317)	(0.288)
Patrilineal pair	0.079***		0.067*		0.090***	
	(0.000)		(0.063)		(0.000)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	-0.000	-0.001	-0.026	-0.024	0.012	0.012
	(0.984)	(0.966)	(0.430)	(0.483)	(0.430)	(0.430)
Observations	6,217	6,213	1,736	1,723	4,463	4,457

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (3) to (6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table C6: Female Firstborn, Kinship, and Postmarital Outcomes: RD Estimates (100 km)

	Polygamous union		Currently Divorced		Fertility	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	0.003	0.002	0.001	0.000	0.070**	0.066**
	(0.754)	(0.822)	(0.841)	(0.955)	(0.038)	(0.046)
Female firstborn	-0.007	-0.006	0.004	0.004	-0.058**	-0.053**
	(0.383)	(0.422)	(0.125)	(0.122)	(0.035)	(0.047)
Patrilineal pair	0.028**		0.002		-0.011	
	(0.026)		(0.454)		(0.765)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	-0.004	-0.004	0.005**	0.004**	0.013	0.013
	(0.531)	(0.498)	(0.014)	(0.023)	(0.524)	(0.504)
Observations	57,943	57,943	63,755	63,755	63,755	63,755

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(2)), currently divorced (columns (3)-(4)), and the number of children the woman ever gave birth to (colimns (5)-(6)). The sample is limited to women whose firstborn child was born after been in a union. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.

Table C7: Female Firstborn, Kinship, and Postmarital Outcomes: RD Estimates (50 km)

	Polygamous union		Currently Divorced		Fertility	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	0.009	0.005	-0.005	-0.006	0.110^{**}	0.108^{**}
	(0.501)	(0.700)	(0.230)	(0.189)	(0.020)	(0.021)
Female firstborn	-0.014	-0.012	0.006^{*}	0.007^{*}	-0.078^{**}	-0.076^{**}
	(0.198)	(0.260)	(0.059)	(0.056)	(0.042)	(0.046)
Patrilineal pair	0.029^{*}		0.003		-0.032	
	(0.058)		(0.324)		(0.483)	
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Cluster geographic controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Pair FE	✓	✓	✓	✓	✓	✓
Ethnic area FE		✓		✓		✓
Female firstborn+Female firstborn*Patrilineal	-0.005	-0.007	0.001	0.001	0.031	0.032
	(0.575)	(0.425)	(0.620)	(0.728)	(0.250)	(0.243)
Observations	26,417	26,417	29,047	29,047	29,047	29,047

Notes: This Table presents geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(2)), currently divorced (columns (3)-(4)), and the number of children the woman ever gave birth to (colimns (5)-(6)). The sample is limited to women whose firstborn child was born after been in a union. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the DHS sampling unit.