Eradicating Female Genital Cutting:

Implications from Political Efforts in Burkina Faso*

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Abstract

Female genital cutting is regarded as a fundamental violation of human rights, subjecting girls to immediate and long-lasting traumatic health risks. Despite the concerted global effort to eradicate this practice, rigorous empirical studies aimed at understanding its impact are still scarce. Therefore, I explore the extensive and intensive impacts of Burkina Faso's political efforts, which include sensitization campaigns and legal prohibition. Applying a difference-in-differences approach to the historical ethnic homelands partitioned between Burkina Faso and Mali, I find that political efforts have reduced this practice overall, though they have had a weaker impact against the more radical forms of the practice that are performed by traditional cutters on younger girls, underscoring the difficulty of eradicating this practice completely. I suspect that the overall decline in this practice has apparently resulted from changes in people's preference. Consistently, at present, Burkinabé people have a much stronger aversion to female genital cutting compared to those in Mali. Importantly, this stronger aversion exists in all birth cohorts, although in practice the two countries have remarkably similar cutting rates among those who were born before Burkina Faso's political efforts. Overall, increasing aversion to female genital cutting appears to be an effective step toward eradicating it.

Keywords: Coordination failure, culture and institutions, female circumcision, gender, social norm

JEL classification: I12, J12, J16, Z13

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1 Introduction

Female genital cutting (FGC) is a traditional practice involving the partial or total removal of the external female genitalia or other injury to the female genital organs for cultural or other nonmedical reasons. Every year, more than 3 million infants and children are exposed to this practice; more than 200 million girls and women in 30 countries across Africa, the Middle East, and Asia are believed to have undergone this procedure (WHO, 2016). This practice is regarded as a fundamental violation of human rights, subjecting girls to immediate (e.g., pain, hemorrhage, and urinary tract infections) and long-lasting traumatic health risks (e.g., infertility, sexual problems, and labor complications) (e.g., Berg and Underland, 2013; Obermeyer, 2005; Whitehorn et al., 2002). Consequently, since the early 1990s, a growing number of policies aimed at eliminating this practice have been implemented at the international, national, and local levels (e.g., UNFPA and UNICEF, 2014), and the 2015 Sustainable Development Goals set by the United Nations General Assembly call for FGC eradication by 2030 (Goal 5.3).

Despite this concerted global effort, rigorous empirical studies aimed at understanding the impact of these policies are still scarce, with only a few exceptions (e.g., Camilotti, 2015; Hombrados and Salgado, 2019). To fill this knowledge gap, I explore the effect of Burkina Faso's political efforts aimed at eliminating FGC, which started in 1985. This country is widely known as a pioneering African state in the fight against this practice, with a strong political commitment (e.g., Colombo, 2013; Diop et al., 2008).

This study uses data on female respondents aged 15—49 years drawn from multiple rounds of the Standard Demographic and Health Surveys (DHS) in Burkina Faso (1998—99, 2003, 2010) and Mali (2001, 2006, 2012—13), with which Burkina Faso shares a border. It compares FGC prevalence between these two countries before and after the implementation of Burkina Faso's political efforts to eradicate this practice. More precisely, it applies the difference-in-differences (DID) approach to the historical ethnic homelands that are partitioned between these countries. Most African national boundaries were arbitrarily drawn by Europeans during colonial times and divide ethnic groups; thus, the same cultural practices (e.g., FGC) are often shared by two or more countries (e.g., Herbst, 1989; see also Zartman, 1965 for West Africa). Therefore, this identification strategy allows me to control for numerous unobserved factors, including cultural, historical, geographical, and ecological attributes.

Burkina Faso is bordered by six other countries; among these, I chose Mali as its comparison group for two major reasons. First, econometric researchers have increasingly doubted the validity of the parallel-trend assumption underlying the DID approach when the initial "levels" between treatment and control groups are different (Kahn-Lang and Lang, 2020). Among Burkina Faso's neighboring countries, only Mali has an FGC prevalence similar to

the prevalence seen in Burkina Faso before the latter's political efforts. Second, unlike Mali (e.g., 28 TOO MANY, 2014; 28 TOO MANY, 2018c), the other neighboring countries have also made noticeable efforts to eradicate this practice. Therefore, the parallel-trend assumption would not hold true if any other neighboring country were used as the control group.

As my empirical analysis shows, FGC declined in Burkina Faso by about 18% from the control mean likelihood of 87% over the 11 years following the implementation of its political efforts. However, this effect was somewhat weaker against the more radical forms of the practice that are performed by traditional cutters at or before five years of age, thereby indicating a difficulty in eliminating this practice completely. These findings are robust to possible violations of the parallel-trend assumption, as examined using a cutting-edge methodology developed in Rambachan and Roth (2019). According to the careful examination of the data, simultaneous policy changes are also unlikely to explain these findings.

After showing these main findings, I also discuss possible mechanisms that may underly the decline of FGC. Importantly, the above findings represent the consequences of all of Burkina Faso's political efforts, including not only the criminalization of FGC but also the government's sensitization campaigns. As shown in the exceptional work done by Platteau et al. (2017) (and briefly reconstructed in the present study), such efforts can result in FGC eradication through three major mechanisms: changes in people's expectations about others' cutting decisions, changes in the expected payoff of engaging in the practice (i.e., increased risk due to legal sanctions), and changes in people's aversion to (or preference for) this practice; the DHS data enables me to discuss the latter two, although the relevant analyses are still only exploratory.

In the present study, the so-called deterrence effect of the legal punishment for cutting is seen only among those who were not yet circumcised when the anti-FGC law was adopted; this population constitutes a small subsample, as most DHS respondents in Burkina Faso were born well before the formal introduction of the law, and FGC usually takes place during infancy (notably, formal legislation against FGC was introduced in 1996 although the government had publicly banned this practice in 1985). In contrast, Burkinabé respondents in all birth cohorts have a much stronger aversion to this practice than respondents in Mali, although the cutting rates among those who were born prior to Burkina Faso's political efforts are remarkably similar between these countries. Therefore, it appears to be useful to increase aversion to FGC when attempting to eradicate it. While other mechanisms may still play a role, empirical researchers have increasingly asserted the significance of altering people's attitude toward this practice (e.g., De Cao and La Mattina, 2019; Vogt et al., 2016).

The systematic literature review performed by Berg and Denison (2012) revealed a scarcity of methodologically

robust FGC-related empirical studies.[1] The present study makes two particular contributions to this sparsely extant research. First, it is most closely related to the works of Camilotti (2015) and Hombrados and Salgado (2019), which investigated the impact of the law against FGC in Senegal. Camilotti (2015) found that criminalizing FGC did not affect cutting rates, whereas Hombrados and Salgado (2019) did observe a decline in FGC after the law was implemented. The different results between these studies might be due to their different identification strategies. Among others, unlike Hombrados and Salgado (2019) (and the present study), Camilotti (2015) used DHS data only on girls born after FGC criminalization, and compared girls who were born in the year and the region in which legal sanctions were imposed with girls born at other times and/or places; thus, because the latter group includes girls born after FGC was criminalized, the law's impact might have been underestimated.[2]

The focus of the present study is not limited to the impact of criminalizing FGC; indeed, the deterrence effect of the law, although it may exist, does not appear to be a major contributor to the reported findings, as most Burkinabé respondents in the present study were born well before the legislation, as described above. This finding is noteworthy because, in many countries, political action to reduce this practice includes both sensitization campaigns and legal prohibition; therefore, whether this practice should be criminalized is an important consideration for most policymakers. Additionally, the present study also explores both extensive (e.g., the likelihood of FGC) and intensive (e.g., the type of FGC and cutter) margins regarding the adjustment of this practice, whereas intensive margins are not comprehensively examined in Camilotti (2015) and Hombrados and Salgado (2019). Notably, the aforementioned less pronounced decline in FGC practices that are performed at younger ages by traditional cutters may be attributable in part to an increased tendency to perform FGC in secret, as often observed elsewhere after FGC criminalization. Consistent with this possibility, criminalizing FGC in Senegal reduced the average age at cutting, according to Camilotti (2015).

Second, and more broadly, the present study also relates to empirical research on the origins (e.g., Becker, 2018) and persistence of FGC (e.g., Poyker, 2020). Researchers have long regarded this practice as a social convention, as described in a coordination game with homogeneous agents; thus, assembling a critical mass of people who publicly pledge to stop this practice (e.g., creation of an anti-FGC association) is critical to its eradication (i.e., tipping-point theory) (e.g., Hayford, 2005; Mackie, 1996; Shell-Duncan et al., 2011). However, empirical research has recently casted doubt on this idea by demonstrating within- and across-community heterogeneity in people's

[1] Three reasons may explain this scarcity (Obermeyer, 2005): 1) ethical considerations often make conducting FGC-related randomized controlled trials difficult; 2) FGC tends to be a community-wide practice, and its research must cover extensive geographical areas to find appropriate comparison groups, thereby requiring large population-based samples; and 3) making causal inferences without an adequate strategy is usually challenging in observational studies. The present study was designed to overcome this barrier.

[2] In Camilotti (2015), original household data were also used to compare girls who were born before and after the introduction of the law (i.e., single-difference estimator), which is also different from the DID approach used in Hombrados and Salgado (2019) and the present study.

preferences regarding this practice (e.g., Bellemare et al., 2015; Efferson et al., 2015; Novak, 2020). The present findings are similar in some ways to those of these recent studies, as they indicate the significance of changing preferences in attempts to discourage FGC (e.g., De Cao and La Mattina, 2019; Vogt et al., 2016).[3]

The remainder of the paper is organized as follows. Section 2 describes Burkina Faso's political efforts to combat FGC. The data overview and empirical strategy are presented in Sections 3 and 4, respectively. Section 5 reports the empirical findings, with the discussion of the underlying mechanisms. Concluding remarks are provided in Section 6.

2 Burkina Faso's political efforts to eliminate FGC

Burkina Faso is a landlocked nation in West Africa bordering six other countries: Benin, Côte d'Ivoire, Ghana, Mali, Niger, and Togo. Although FGC prevalence is high in Burkina Faso, the nation has shown a strong desire to eradicate this practice for more than three decades, with no strong political opposition to its eradication (see Diop et al., 2008 for the historical overview of Burkina Faso's relevant political actions).

FGC was first formally addressed in the political space in Burkina Faso during "National Week for Women" in 1985, established in that year by President Thomas Sankara in celebration of Burkinabé females. At that time, Sankara publicly banned FGC, though it was not for another 10 years that the practice was formally made illegal, as explained below (Prolongeau, 2006; UNICEF, 2013, p. 10). Sankara, a socialist revolutionary, is one of the most famous politicians in contemporary African history for his dedication to the betterment of the country as well as for his assassination at age 37 (e.g., Wilkins, 1989). During his term in office from August 1983 to his death in October 1987, his government promoted the political and social advancement of women in various spheres (e.g., Harsch, 1998; Skinner, 1988). Among other changes, it officially prohibited female circumcision while creating relevant education programs (e.g., Prolongeau, 2006; Westley, 1999; Williamson, 2013).

Shortly thereafter, in 1990, the National Committee to Fight against the Practice of Excision (CNLPE) was established through a presidential decree. Under the directorship of the permanent secretariat, this body has overseen all countrywide anti-FGC actions since its founding while maintaining autonomy in its activities. To raise public awareness of the harmful health consequences of this practice, the CNLPE has conducted various activities (e.g., workshops) involving religious and traditional leaders, police, medical experts, and women's and

[3]While the working paper has not yet been publicly available, in the work by Selim Gulesci, Sam Jindani, Eliana La-Ferrara, David Smerdon, Munshi Sulaiman, and Peyton Young, the authors additionally highlight the importance of facilitating moderate reforms against harmful social customs, as in Aldashev et al. (2012); see `https://events.ceu.edu/2020-10-20/cess-stepping-stone-approach-understanding-harmful-norms-theory-and-evidence-somalia`.

youth organizations. The CNLPE has also used public media such as radio and has succeeded in introducing an FGC module in the national school curriculum as well as training teachers on FGC (28 TOO MANY, 2015).

Formal legislation against FGC was introduced in 1996 and went into effect in February 1997. This law—considered one of the toughest in Africa—has been systematically enforced since its enactment (UNFPA, 2010, 2014). One of the CNLPE's relevant actions was the establishment of a national telephone hotline called the "Green Phone: SOS Excision," which was instituted in 1990 as a means of reporting cutters, parents, and others who have forced girls to undergo this practice. Additionally, special patrols have also been deployed in 17 provinces with high FGC prevalence. The result has been a gradual increase in convictions each year, from 94 in 1997—2005 to 646 in 2005—2009 (28 TOO MANY, 2015).

Owing to these strenuous political efforts, Burkina Faso has been recognized as a leader in the movement against FGC in Africa (Colombo, 2013; Diop et al., 2008; UNICEF, 2005, p. 18).

3 Data

In this study, I mainly use repeated cross-sectional data drawn from multiple rounds of the DHS in Burkina Faso (1998—99, 2003, 2010) and Mali (2001, 2006, 2012—13). The dataset enables me to analyze 72,583 female respondents from 42,529 households in 2,362 communities. Although these respondents are considered to be the main study sample, I occasionally use DHS data drawn from Burkina Faso's other neighboring countries, as detailed later. The DHS data is designed to provide nationally representative information on population, health, and nutrition.[4] In all the survey rounds, a similar two-stage sampling protocol was followed, including the first-stage selection of communities (clusters) from the population census, followed by the second-stage selection of households from the respective communities. All females aged between 15 and 49 years in each selected household were interviewed. Figure 1 shows the location of the DHS communities. See also Table S.1 in the supplementary material for a country-round breakdown of the study sample.

For the main study sample of females born before 1985, panel (A) in Table 1 shows summary statistics for several variables. In the ethnic homelands partitioned between Burkina Faso and Mali, 164 and 272 communities were located in Burkina Faso and Mali, respectively. I rely on Murdock (1959)'s classification to identify these homelands, a map of which is available from Nunn (2008). Out of 43 homelands mapped in these two countries, seven ethnic groups (contiguously) cross the national border between Mali and Burkina Faso (see the shaded area in Figure 1). The number of observations in Table 1 varies across the reported variables primarily because the

[4]Data and relevant documents are publicly available at `http://dhsprogram.com/data/available-datasets.cfm`.

collected information somewhat differs as per round and country.

These ethnic homelands, and many others in Africa, lie in multiple countries because the national borders were drawn during the colonial period by Europeans with limited knowledge of or concern for social and linguistic groups (e.g., Brownie, 1979; Herbst, 1989; Zartman, 1965). The partitioned measure of "artificial states," which highlights the artificiality of a state in the face of its ethnic distribution, is also high in the countries bordering Burkina Faso (see Alesina et al., 2011).

In Table 1, the circumcised proportion of respondents born before 1985 is 87% in the homelands split between Burkina Faso and Mali; no marked difference exists between these countries. The radical form of FGC, infibulation or pharaonic circumcision ("sewn closed"), is not particularly common in the surveyed areas. This practice is also predominantly performed by traditional cutters, leaving limited space for healthcare professionals to perform this operation.[5] For instance, before 1985, approximately 2% ($\approx \frac{0.01}{0.87}$) of circumcised females in Burkina Faso's split homelands were infibulated; approximately 91% ($\approx \frac{0.79}{0.87}$) of these procedures were performed by traditional cutters. The mean age of the respondents at the time of FGC in the same area was 5.46 years;[6] approximately 97% of circumcised females were cut before 15 years of age. Thus, because the DHS respondents are 15 years old and above, this study's FGC analysis is unlikely to encounter relevant censoring issues.

The sample was then restricted to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. For this sample, Figure 2 shows a histogram of the fraction of circumcised respondents in each DHS community (see also Figure S.2 in the supplementary material for a similar figure corresponding to the entire country). In Burkina Faso and Mali, the fractions of communities wherein all the residential respondents were circumcised were approximately 19% and 31%, respectively.

[Here, Table 1, Figure 1, and Figure 2]

4 Empirical strategy

To estimate the impact of Burkina Faso's political efforts, my initial strategy was to use the three most recent rounds of the Standard DHS in six neighboring countries as a comparison group. However, I eventually selected only Mali for three reasons. First, Ghana and Niger were excluded from the present analysis because the required information (i.e., the respondents' engagement in FGC and their community's GPS coordinates) was not available

[5] Since 1996, the World Health Organization has identified four types of FGC. According to the classification, infibulation is Type III: the "narrowing of the vaginal orifice with creation of a covering seal by cutting and appositioning the labia minora and/or the labia majora, with or without excision of the clitoris."

[6] This value was calculated excluding the respondents who identified "during infancy" as the timing of circumcision.

in these countries. Second, and more importantly, only Mali had an FGC prevalence similar to that in Burkina Faso prior to the latter's political efforts against FGC. In data drawn from the DHS in Benin (2001, 2011—12), Côte d'Ivoire (1998—99, 2011—12), and Togo (2013—14),[7] the mean circumcised proportions of the respondents born before 1985 were approximately 16%, 46%, and 11%, respectively; all of these were much smaller than those in Burkina Faso and Mali. Traditionally, the DID approach has been presumed to be useful as long as the treatment and control groups are similar in "trends," even if they are not similar in initial "levels." However, the parallel-trend assumption has recently been considered less plausible if the initial levels between these two groups are different (Kahn-Lang and Lang, 2020). Third, and related to the second, these three countries (along with Ghana and Niger) have also worked to eliminate FGC, thereby making the parallel-trend assumption less likely to hold true (see Figure S.1 in the supplementary material for the trend of the fraction of circumcised females in each of the three countries). For instance, FGC-specific criminal legislation was adopted in Benin in 2003, in Côte d'Ivoire in 1998, in Ghana in 1994 (amended in 2007), in Niger in 2003, and in Togo in 1998 (Shell-Duncan et al., 2013). By contrast, FGC remains legal in Mali, and noticeable efforts to eradicate this practice did not start until the early 2010s (e.g., 28 TOO MANY, 2014; 28 TOO MANY, 2018c). For these reasons, I analyze Mali as the only comparison group in the main empirical analysis (although the estimation results obtained after appending data drawn from the aforementioned DHS in Benin, Cote d'Ivoire, and Togo to the main study sample are reported in Table S.2 in the supplementary material, and the obtained implications remain unchanged).

Consequently, I compare changes in relevant outcomes for females born before and after 1985 between Burkina Faso and Mali. Precisely, for female i who was born in year t residing in community j, I estimate the following equation through ordinary least squares (OLS):

$$y_{ijt} = \alpha_1 + \alpha_2 D_{ijt} \cdot B_j + \alpha_3 D_{ijt} \cdot S_j + \alpha_4 \mathbf{x_{ijt}} + v_j + \rho_{ijt} + \epsilon_{ijt}, \tag{1}$$

where y_{ijt} corresponds to the outcomes of interest (e.g., FGC); D_{ijt} is a dummy variable that equals one for respondents born in or after 1985 and zero otherwise; B_j is an indicator that equals one for communities in Burkina Faso and zero otherwise; S_j takes one if community j is located in historical ethnic homelands split between Burkina Faso and Mali and zero otherwise; $\mathbf{x_{ijt}}$ contains other determinants of outcomes specific to a respondent and her household (i.e., birth order, religion, and country-ethnicity indicators categorized into 22 groups), including year-of-interview fixed effects; v_j is a dummy for each community; ρ_{ijt} is the year-of-birth fixed effects; and ϵ_{ijt} represents

[7] Of the three most recent rounds of the Standard DHS in these countries, only these rounds included all relevant information.

stochastic error. The community fixed effects subsume the level effects of B_j and S_j, whereas the year-of-birth fixed effects do so for D_{ijt}. In the main study sample, the females' birth years range from 1948 to 1997.

I rely on Murdock (1959)'s classification to identify historical ethnic homelands (including S_j). By contrast, the country-ethnicity indicators are discernible at the individual level (regardless of respondents' residential ethnic homelands) from the DHS; ethnic groups in the DHS are not necessarily categorized consistently across countries or even across survey rounds within the same country. Therefore, for each country, ethnic groups were categorized for consistency across survey rounds, which resulted in 12 groups for Burkina Faso and 10 groups for Mali. In the empirical model, the vector $\mathbf{x_{ijt}}$ does not include respondents' education because Burkina Faso's political efforts might have affected it by influencing their FGC decisions (Hombrados and Salgado, 2019).

The specification (1) takes a conceptually similar approach to that in Michalopoulos and Papaioannou (2014) and identifies the main DID estimate, α_2, by considering data variation within the same ethnic homeland. This control is "theoretically" critical, as "[n]ational boundaries (in Africa) are not all important, . . . as the distribution of genital cutting is better understood by ethnic groups, and groups practicing genital cutting often straddle national boundaries," according to Shell-Duncan and Hernlund (2000, p. 7). By including the $D_{ijt} \cdot S_j$ (and v_j) in the regressors, I control for the time-varying (and time-invariant) influence of unobserved geographical, ecological, cultural, and historical attributes specific to areas where particular ethnic groups reside (although the reported findings are "empirically" robust in not controlling for $D_{ijt} \cdot S_j$; results are available upon request).

Because the DHS provides locational information only on respondents' present communities, respondents' current residences are assumed to be near where their FGC would have been performed during childhood/puberty. If this assumption introduced an invalidating amount of noise into the measured exposure to Burkina Faso's political influence, the subsequent empirical analysis would reveal no meaningful results; however, the reported findings diminish the importance of this concern, which will, nevertheless, be more carefully addressed in subsection 5.2.3.

Studies on FGC such as Bellemare et al. (2015), which analyzed West Africa, tended to use standard errors clustered at the (DHS) community level. However, FGC-related standard errors are likely to be correlated within ethnic homelands (Shell-Duncan and Hernlund, 2000, p. 7). Political attitudes toward FGC may also vary across countries, a possibility that requires further attention, considering West Africa's decentralized political system (e.g., Boko, 2002; Dickovick and Wunsch, 2014). Therefore, I primarily report asymptotic-theory-based standard errors clustered at the ethnic-homeland (43 groups) and country-region levels (22 groups).[8]Additionally, for the

[8]These 22 groups include 13 regions in Burkina Faso and nine regions in Mali. To identify a region corresponding to each DHS community, I matched a community's GPS latitude/longitude coordinates with these countries' maps sourced from the World Bank (`https://datacatalog.worldbank.org/dataset/burkina-faso-administrative-boundaries-2017`) for Burkina Faso and DIVA-GIS (`http://www.diva-gis.org/datadown`) for Mali.

key estimates, I also report p-values that adopt the wild cluster bootstrap (with 999 replications) for these two dimensions (Cameron et al., 2008; Roodman et al., 2019); the obtained implications remain unchanged. This two-way clustering method is expected to increase the reliability of statistical inference.

To gain insight into the parallel-trend assumption underlying the DID approach, Figure 3 plots the fractions of circumcised females by country and year of birth averaged within five-year bins, with the vertical line indicating 1985. This figure is based on only the subsample consisting of females who live in ethnic homelands partitioned between Burkina Faso and Mali (see Figure S.2 in the supplementary material for a similar figure corresponding to the entire country). Two findings are observed: a stable trend in both countries until around 1975 and a declining trend only in Burkina Faso since 1975.

The fact that the decline in FGC in Burkina Faso apparently began in 1975, well before FGC was first denounced by the president in 1985, raises a concern about the validity of the parallel-trend assumption. Yet this decline may be less noteworthy than it seems if the anti-FGC efforts that began in 1985 affected the cutting decisions made for females born between 1975 and 1985 who were not yet circumcised in 1985. This is not implausible, as indicated in Figure 4, which shows a histogram of the age during FGC for respondents in the split homelands who were born before and after 1985, respectively (see Figure S.2 in the supplementary material for a similar figure corresponding to the entire country); in Burkina Faso, approximately 95% of circumcised females underwent this practice between ages 0 and 10. Nevertheless, I will check the sensitivity of the DID estimates to possible violations of the parallel-trend assumption in subsection 5.2.4.

[Here, Figure 3 and Figure 4]

5 Empirical findings

5.1 Main results

In column (a) in Table 2, I estimated equation (1) for an indicator of one if the respondent was circumcised, controlling for indicators for Burkina Faso (B_j) and those respondents born in or after 1985 (D_{ijt}), and the year-of-interview fixed effects only. Controls additionally included an indicator for communities located in the ethnic homelands partitioned between Burkina Faso and Mali (S_j), and its interaction term with D_{ijt} in column (b), and further the remaining individual characteristics in column (c). The indicators B_j and S_j, and D_{ijt} were replaced with the community fixed effects and the year-of-birth fixed effects, respectively, in column (d). The results display a stable pattern across the columns, showing that Burkina Faso's political efforts reduced the cutting rate by

approximately 16 percentage points from the control mean of 87% (i.e., 18 % decrease).

A dummy for respondents circumcised at or before five years old was also estimated in columns (a)—(b) in Table 3. In the DHS, approximately 50% of the circumcised respondents identified "during infancy" as their age at circumcision. Therefore, to increase the sample size (and thus the power of the statistical test) as well as to avoid potential bias arising from the unnecessary selection of the sample, these respondents were assumed to have undergone this practice before the age of five years, and the estimated sample included these respondents; however, this inclusion only trivially affected the magnitude and statistical significance of the estimates (results based on data excluding these respondents are available upon request).

Presumably, young children raise less suspicion about and speak out less against criminal activities. Therefore, it has been argued that the introduction of an anti-FGC law, along with the resulting incentives for parents to pursue FGC in secret, has facilitated a decrease in the age at cutting (e.g., Camilotti, 2015; Hernlund, 2000; Shell-Duncan et al., 2011; Shell-Duncan et al., 2013). Admittedly, all of the DHS respondents in Burkina Faso were born in or before 1995, that is, before the formal introduction of the nation's anti-FGC law, which became effective in February 1997. Therefore, in the present study, this concern is likely relevant only to the subsample who were not yet circumcised at the time of legislation. Nevertheless, if this tendency still exists, the likelihood that a girl was circumcised at a younger age is likely to increase. The estimated coefficients in columns (a)—(b) in Table 3 are greater than those in Table 2, indicating that those practices performed before five years old declined less evidently than those performed after five years old. While this finding may not necessarily imply that Burkina Faso's policies led to a decrease in the average age at cutting, it still indicates a relatively greater difficulty in reducing the forms of this practice that are performed at lower ages.

I also estimated an indicator of one if the genitals were sewn closed and zero otherwise (notably, this indicator took a value of zero for uncircumcised respondents), in columns (c)—(d) in Table 3. The estimated coefficients are negative, but its values (close to zero) considerably increased from those in Table 2. This finding implies that Burkina Faso's political efforts primarily discouraged less radical forms of cutting. A dummy denoting whether respondents were circumcised by traditional cutters was also estimated in columns (e)—(f) in Table 3 (this indicator was also set to zero for uncircumcised respondents). The increase in these coefficients from those in Table 2 suggest that those practices performed by traditional cutters declined less steeply than those performed by other types of cutters (e.g., healthcare professionals), again, indicating a difficulty in eliminating this practice completely. Notably, traditional cutters may be able to perform FGC more secretly than the others can. Therefore, this finding may even indicate that the nationwide policies have increased the likelihood that FGC will be performed in secret,

similar to the aforementioned decrease in the average age at cutting following FGC criminalization.

[Here, Table 2 and Table 3]

5.2 Threats to identification

In this subsection, I discuss four major threats to causal identification.

5.2.1 Reporting bias

There is a concern pertaining to the accuracy of self-reported FGC status (e.g., De Cao and Lutz, 2018).[9] Systematic misreporting is unlikely to occur in Mali's DHS data because FGC is not legally prohibited in that country. However, because Burkina Faso strictly criminalizes this practice (at the time of the surveys), some residents may not report their FGC status truthfully to avoid legal consequences.

In the present study, however, this concern is unlikely to be significant for four reasons. First, and most importantly, Novak (2020) analyzed data drawn from the three rounds of the DHS in Burkina Faso (1998—99, 2003, 2010), similar to the present study, and concluded that misreporting is not a major concern in this data; she determined this by carefully comparing the self-reported FGC status of the DHS respondents with more objective FGC assessments of patients who visited rural clinics in Burkina Faso for gynecological exams, as surveyed and measured by Jones et al. (1999). Additionally, she also compared the rate of self-reported FGC status in the same birth cohorts across the three rounds of the DHS (performed just after, somewhat after, and long after the legislation came into effect in 1997) and found no strong evidence indicating systematic misreporting in response to the law. Second, misreporting FGC for fear of legal sanctions, although it may still exist, is unlikely to be pronounced because all of the respondents in Burkina Faso were born in or before 1995, such that more than 90% of circumcised respondents were cut before the introduction of the law, which has no retroactive power. Third, and related to the second, Burkinabé respondents born in the early 1990s appear only in the data drawn from the 2010 round, because the DHS respondents are 15—49 years old at the point of the surveys. Therefore, any respondents who had been circumcised in violation of the law would have already gone more than 10 years without any legal consequences, which would mitigate their fear of punishment. Fourth, the DHS assures respondents of the strict confidentiality of their responses to the survey questions.

[9] Although some studies have supported its reliability (e.g., Morison et al., 2001), others have found inconsistencies between self-reported and clinically determined FGC, casting doubt on self-reported information regarding FGC status (e.g., Jackson et al., 2003) and FGC types (e.g., Elmusharaf et al., 2006). Therefore, similar measurement concerns have often compelled researchers to acknowledge the limitations of their studies (e.g., Bellemare et al., 2015) or to devise innovative means of assessing FGC status (e.g., Efferson et al., 2015). For example, Efferson et al. (2015)'s study of Sudan relied on henna applied to circumcised girls' feet to assess respondents' FGC status.

5.2.2 Selected survival: Decline in mortality attributed to FGC abandonment

The effectiveness of Burkina Faso's political efforts may artificially reduce the observed rate of cutting because the number of females who abandon FGC and (if the health consequences are significant) survive to the time of the surveys may increase with no increase in the number of circumcised females. However, this concern is relevant only if these political efforts have succeeded in reducing FGC. Thus, it solely affects the magnitude of the α_2 and does not reject the expected sign. Additionally, this concern would not markedly alter the estimates because radical forms of FGC are rare in the studied areas. Also puzzling is why this practice would have long persisted if it significantly increases female mortality. In the literature, no strong evidence has indicated that this practice considerably increases mortality risk during the procedure (in childhood) and/or during childbirth (in adulthood); see Obermeyer (2005) and Wagner (2015) for the literature review.

5.2.3 Selected relocation

Because the respondents might have previously resided in locations other than their present DHS communities, the dummy B_j is seen as a proxy for exposure to Burkina Faso's political influence measured with noise; this concern exists because females' relocation to nearby villages upon marriage is common in patrilineal African societies. However, females' within-country relocation is not a significant concern in the present study because the main treatment of interest is "growing up in Burkina Faso (precisely, $D_{ijt} \cdot B_j$)."[10] Additionally, the findings are also robust even to the possibility of international relocation, provided that the relevant measurement error does not systematically differ between Burkina Faso and Mali (and over time). Therefore, one major concern pertaining to the present context is discussed in this subsection: Burkina Faso's political efforts to discourage FGC might have encouraged Burkinabé parents with a strong disposition to have their daughters circumcised to send these daughters to Mali to undergo FGC and to marry because Mali has no anti-FGC laws (e.g., Sayagues, 2009).

However, this possibility is unlikely to undermine the main implication of the present study for three reasons. First, if Burkinabé parents were sending their daughters to Mali at a high rate, FGC rates would be increasing in Mali's split homelands, which is not the case, as indicated in Figure 3. Second, within the split homelands, this form of migration would increase the likelihood that married females in Burkina Faso were lifelong residents of their current DHS communities, compared with those residing in Mali. To check this, I estimated equation (1) for an indicator of one if the respondents were not born in their current DHS communities using data pertaining

[10] Notably, in the aforementioned regression analysis, excluding $D_{ijt} \cdot S_j$ from the regressors did not alter the obtained implications (see column (a) in Table 2, for example; results corresponding to other outcomes are also available upon request), although this control is theoretically important. This finding also makes within-country relocation a much smaller concern in the present study.

to married females, although this information was only available in limited DHS rounds, that is, in Burkina Faso (1998—99, 2003) and Mali (2001, 2006). The estimated α_2 is 0.007 with a standard error of 0.026. Therefore, no significant difference in lifelong residence exists between these countries.

Third, using an insight obtained from Lee (2009) (i.e., bounds on treatment effects) and Oster (2019) (i.e., assessment of bias attributed to unobservables), I also evaluated the proportion of respondents residing in Mali's partitioned ethnic homelands who were considered highly likely to have undergone FGC, which was necessary to eliminate the identified effects of Burkina Faso's political efforts. More precisely, first, I used data pertaining only to respondents born "before" 1985 and regressed an FGC indicator on age, birth order, religion dummies, country-ethnicity indicators, year-of-interview fixed effects, and ethnic-homeland fixed effects. Second, based on the estimated coefficients, predicted FGC indicator values were calculated for all respondents; these may be considered the likelihood that each respondent would have undergone FGC in the absence of Burkina Faso's political efforts. Third, I re-estimated equation (1) by excluding from the sample those respondents who were born in or after 1985, who resided in Mali's split homelands, and who belonged to the top H percent of the predicted value distribution (within Mali's split homelands).

The results are reported in panel (A) of Table 4, where the value of H varies from zero (i.e., full sample) to 90. As expected, the magnitude of the FGC-discouraging effects decreases as the H value increases. However, even excluding the top 90% of the predicted value distribution does not eliminate the FGC-discouraging effects statistically and economically. These results imply that, for selected relocation to explain the previous findings, I must assume that more than 90% of the respondents who were born in or after 1985, who were considered likely to have undergone FGC, and who now reside in Mali's split homelands, migrated into these areas from corresponding homelands in Burkina Faso (and possibly elsewhere). Based on the available data, however, relocation on such a massive scale has not occurred, making this possibility unlikely. For example, although only limited DHS rounds, such as those in Mali (2001, 2006), provide this information, only approximately 48% of the respondents born in or after 1985 and now residing in Mali's split homelands are not lifelong residents of the surveyed communities.[11]

[Here, Table 4]

[11] I also obtained Mali's (1998 and 2009) population census data, which refers to 10% of the total population and is available from the "Integrated Public Use Microdata Series, International: Version 7.0" (Minnesota Population Center, 2018). In this census data, females over 15 years of age whose previous residence was in a different major administrative unit or abroad constituted only 13% in the administrative units located within 100 km (in terms of the units' centroid) of Burkina Faso's national border (i.e., 20 out of 47 total units). See `https://international.ipums.org/international-action/sample_details/country/ml#ml1998a` and `ttps://international.ipums.org/international-action/sample_details/country/ml#ml2009a` for details of Mali's census in 1998 and 2009, respectively. A map of the administrative units is also available from `https://international.ipums.org/international/gis.shtml`.

5.2.4 Parallel-trend assumption: Pre-trend and confounding policy changes

Two concerns exist about the parallel-trend assumption. First, the secular, pre-existing trend (i.e., pre-trend) toward less frequent FGC in Burkina Faso—owing to possible macro-level environmental changes (e.g., modernization)—could bias the estimates. To explore this, by interacting B_j and S_j with different ten-year birth cohorts, the most flexible specification of equation (1) was estimated for the examined outcomes, and the coefficients corresponding to each birth cohort are reported with 95% confidence intervals in Figure 5. Because I normalized the coefficient corresponding to the 1975—1984 birth cohort to the value of zero, the remaining coefficients indicate how these outcomes changed over time relative to the (ten-year) period just before the start of Burkina Faso's political efforts to discourage this practice. Admittedly, researchers have increasingly doubted the usefulness of this conventional event-study estimator as a test for pre-trends (e.g., Bilinski and Hatfield, 2019; Kahn-Lang and Lang, 2020; Roth, 2020) and some have shown that it can generate spurious pre-tends even when the parallel-trend assumption holds true (e.g., Callaway and Sant'Anna, 2020; Sun and Abraham, 2020). Nevertheless, consistent with the trend in FGC as noted in Figure 3, the decline of FGC in Burkina Faso began with females born around 1975 and passed to those born thereafter.

However, as discussed in Section 4, Sankara's public commitment to FGC eradication in 1985 might have facilitated the abandonment of this practice among females born between 1975 and 1985 who were not yet circumcised in 1985; indeed, such females are likely to have existed at that time because a nonnegligible number of Burkinabé females are circumcised between ages 0 and 10. Therefore, I also used 1975 as the threshold year, and reported the estimation results of equation (1) in panel (B) of Table 4. The obtained implications remain unchanged.

Second, simultaneous policy changes (as well as macro-level environmental changes) relevant to women's rights might have generated the declining trend in FGC during both the pre- and post-treatment periods because Sankara laid the foundation for the women's empowerment movement that was subsequently launched in this country. To explore this, I plotted the trends of (likely) relevant outcomes in Figure S.3 (for the ethnic homelands split between Burkina Faso and Mali) and Figure S.4 (for the entire country) in the supplementary material. The estimation results of equation (1) for these outcomes are also reported in Table 5, wherein the adopted sample is reported at the bottom of the table because the relevant information was not collected in all DHS rounds.

In columns (a) and (b), I estimated indicators for women's highest completed level of education. Additionally, the DHS provides information on whether its respondents have been married and have given birth to children as well as their age when they first experienced these events. Limiting the sample to respondents who were over 18

years of age when the DHS interview was conducted, the likelihoods of getting married and giving birth to children by age 18 were analyzed in columns (c) and (d), respectively. This age limit was selected because the committee of the United Nations Convention on the Rights of the Child sets the legal threshold of marriageable age at 18 years. Moreover, limiting the sample to married females, I also estimated a dummy for their engagement in polygynous relationships [column (e)], a dummy for their intrahousehold decision-making (DM) power, namely an indicator for females who can independently make decisions about their healthcare, large household purchases, or visits to their relatives [column (f)], and a dummy for females who suffered from emotional, physical, or sexual violence by their spouses (i.e., intimate-partner violence or IPV) [column (g)]. Furthermore, the DHS also provides data on the children born to all female respondents (up to 20 births).[12] Using the daughters born to the respondents as the analytical unit (their birth years range from 1963 to 2013), I also estimated an indicator of one if a daughter had died within five years after birth and zero otherwise after controlling for "mother" fixed effects [column (h)]; to avoid any censoring issue, only data on girls born more than five years prior to the DHS interview was used in this estimation.

There is no strong evidence suggesting the salience of effective confounding policy changes in Burkina Faso, except for that on women's delayed marriage and fertility. For example, female education did not increase concomitantly with FGC abandonment. This finding may even suggest that female education decreased during the analyzed periods if education is regarded as a substitute for FGC, i.e., a premarital investment improving girls' marriage prospects (Hombrados and Salgado, 2019). The absence of any impact on polygyny despite Sankara's regulations against it is also notable. While the results, although statistically insignificant based on the bootstrap p-value, exhibit an increase in intrahousehold DM power among Burkinabé females, this finding is apparently attributable to a decline in DM power in Mali (see Table 1) and/or to possible specification error relevant to the time trend (see Figure S.3). The results also reveal no improvement in girls' mortality in Burkina Faso.[13]

Notably, even the findings that appear to indicate later marriage and delayed fertility may not necessarily invalidate the previous findings for three reasons. First, the decision of whether a girl should undergo FGC occurs long before her decision to marry.[14] Therefore, delayed marriage and fertility are unlikely to influence cutting decisions, although these findings may indicate the salience of simultaneous policy changes, for example, the Code of Persons and Family, 1989, in which Burkina Faso set the legal threshold of females' marriageable age at 17 years (Calimoutou et al., 2016). Second, these findings may also "result" from FGC abandonment. Theoretically, female

[12] In the present data, no woman reported more than 16 births.

[13] A similar finding was also obtained for boys' mortality; the results are available upon request.

[14] The mean ages at first marriage and first childbirth among respondents born before 1985 are 17.59 and 19.13, respectively, in Burkina Faso and 17.04 and 18.79, respectively, in Mali.

marriage may be interpreted as a bride's parents' (or a bride's) decision to accept the first proposal that provides them with higher utility than their reservation payoff. If a daughter does not undergo FGC and the resulting improvement in her health increases her contribution to her household's earning capacity and, consequently, her reservation utility, her parents may delay her marriage (e.g., Ermisch, 2003).[15] Consistently, Wagner (2015), who analyzed the DHS data, found that circumcised females were more likely to marry early and have many children. Third, and related to the second, the probability of early marriage declined by about 2% per year from the control mean likelihood of 70% according to the estimates; simultaneous policy changes, which do "not" improve female education (and, likely, their employability), are unlikely to explain this effect size.[16] Instead, the causal link from FGC abandonment to delayed marriage may explain this notable decrease in early marriage.

Finally, to further alleviate the aforementioned two concerns, I also checked the sensitivity of the estimated impacts to possible violations of the parallel-trend assumption. To this end, I applied a methodology developed in Rambachan and Roth (2019) to the most flexible empirical specification (as estimated in Figure 5), and the results are reported in Figure 6.[17] On the left end of each panel in Figure 6, I first plotted 95% confidence intervals of the original OLS estimates corresponding to the (immediate) treatment effects on women born between 1985 and 1994. Then, I reported 95% fixed length confidence intervals (FLCIs) corresponding to those impacts after placing several restrictions, as governed by the parameter M in the horizontal axis of each panel, on differences in time trends (i.e., differential time trends) of the potential outcomes achieved in the absence of the treatment (i.e., Burkina Faso's political efforts) between Burkina Faso and Mali. Particularly, denoting the differential time trends from (ten-year) period $t-1$ to t as δ_t, I consider the case of $(\delta_{t+1} - \delta_t) \in (\delta_t - \delta_{t-1}) \pm M$ for all t. The existence of a possible treatment-specific linear time trend corresponds to the case of $M = 0$.

As the results of cutting decisions demonstrate (top-left panel), the value of M must be greater than 0.05 for the violation of the parallel-trend assumption to explain the identified impacts on women born between 1985 and 1994. Notably, and as recalled in Figure 3, the fraction of circumcised females in Mali held constant throughout the analyzed periods. Until around 1975, the circumcised fraction in Burkina Faso had likewise held constant, only beginning its declining trend thereafter. Therefore, I can reject the null of no treatment effect unless a change in the circumcised fraction (achieved in the absence of the treatment) in Burkina Faso from (ten-year) period 1975—

[15] According to public health research (e.g., Marphatia et al., 2017), delaying marriage may also improve women's health (e.g., anemia, BMI), which may facilitate further delay in marriage.

[16] In Kenya, Duflo et al. (2015) provided education subsidies for schoolgirls enrolled in the sixth grade at the onset of their experimental study and showed that the likelihoods of their marriage and pregnancy declined by 2% per year from the respective control mean likelihoods of 27% and 33% after five years. After an experimental intervention in rural India, which provided information on female employment opportunities over three years, Jensen (2012) found decreased likelihoods of marriage and childbirth in females aged 15—21 years by 2% and 4% per year compared with the control mean likelihoods of 71% of marriage and 43% of childbirth.

[17] I used an R command, `HonestDiD`, developed by the authors and available at `https://github.com/asheshrambachan/HonestDiD`.

84 to 1985—94 goes outside "the corresponding change from period 1965—74 to 1975—84 $\times$ 2 $\pm$ 0.05."[18]

In Burkina Faso's split homelands, the mean circumcised fractions of women born in the periods 1965—1974, 1975—1984, and 1985—1994 were 0.890, 0.833, and 0.718, respectively and the present, particular concern is a (possibly increasing) declining trend that may exist in the absence of the treatment. Therefore, I can reject the null unless the circumcised fraction in the period 1985—94 would have declined by more than 16.3 percentage points ($= (0.833 - 0.890) \times 2 - 0.05$) from 0.833 without the treatment. However, this decline is greater than the actual decline, which is 11.5 percentage points ($= 0.718 - 0.833$) and includes the treatment effect. Therefore, the possible violation of the parallel-trend assumption alone is unlikely to explain the identified impacts on females born between 1985 and 1994.

[Here, Table 5, Figure 5, and Figure 6]

5.3 Discussion on underlying mechanisms

According to the outstanding, comprehensive discussion done in Platteau et al. (2017), three major mechanisms may underly the aforementioned impacts on the practice of FGC: changes in people's expectations about others' cutting decision, changes in the expected payoff for engaging in FGC (i.e., legal punishment), and changes in people's aversion to (or preference for) this practice; see also Section S.1 in supplementary material, where I explain them by developing a theoretical framework considering females' coordination in marriage markets, referring to Mackie (1996)'s seminal theory of marriage convention.[19] Unfortunately, the DHS data does not enable me to explore the first mechanism because it provides no information on the respondents' expectations about others' behavior. Additionally, it is also difficult to identify the impact of such expectations owing to the well-known reflection problem (Manski, 1993), because no strong identification strategy for it is available in the present study. Therefore, I discuss the remaining two mechanisms in this subsection.

First, FGC-related legal sanctions might have affected the expected payoff for engaging in FGC. Indeed, the

[18] To see this, denote the potential outcome of female i achieved if not treated at period t as $y_{it}^{k}(0)$ where $k \in (BF, ML)$ (BF and ML represent Burkina Faso and Mali, respectively), thereby $\delta_{t+1} - \delta_t = (E[y_{it+1}^{BF}(0) - y_{it}^{BF}(0)] - E[y_{it+1}^{ML}(0) - y_{it}^{ML}(0)]) - (E[y_{it}^{BF}(0) - y_{it-1}^{BF}(0)] - E[y_{it}^{ML}(0) - y_{it-1}^{ML}(0)])$. Since $E[y_{it+1}^{ML}(0) - y_{it}^{ML}(0)] \approx E[y_{it}^{ML}(0) - y_{it-1}^{ML}(0)]$ for all t (Figure 3), it becomes that $\delta_{t+1} - \delta_t \approx E[y_{it+1}^{BF}(0) - y_{it}^{BF}(0)] - E[y_{it}^{BF}(0) - y_{it-1}^{BF}(0)]$. Then, the restriction of interest becomes $E[y_{it+1}^{BF}(0) - y_{it}^{BF}(0)] - E[y_{it}^{BF}(0) - y_{it-1}^{BF}(0)] \in E[y_{it}^{BF}(0) - y_{it-1}^{BF}(0)] - E[y_{it-1}^{BF}(0) - y_{it-2}^{BF}(0)] \pm M$, particularly yielding $E[y_{i,85-94}^{BF}(0) - y_{i,75-84}^{BF}(0)] - E[y_{i,75-84}^{BF}(0) - y_{i,65-74}^{BF}(0)] \in E[y_{i,75-84}^{BF}(0) - y_{i,65-74}^{BF}(0)] - E[y_{i,65-74}^{BF}(0) - y_{i,55-64}^{BF}(0)] \pm M$. Since $E[y_{it}^{BF}(0) - y_{it-1}^{BF}(0)] \approx 0$ until around the period of 1965—1974 (Figure 3), $E[y_{i,65-74}^{BF}(0) - y_{i,55-64}^{BF}(0)] \approx 0$. Thus, the restriction implies $E[y_{i,85-94}^{BF}(0) - y_{i,75-84}^{BF}(0)] \in 2E[y_{i,75-84}^{BF}(0) - y_{i,65-74}^{BF}(0)] \pm M$.

[19] Mackie (1996)'s theory has received much publicity in the fields of anthropology and sociology. Mackie (1996) proposed a conceptual game-theoretical framework wherein FGC persists as a social convention—a group-level behavior maintained as one of multiple self-enforcing equilibria in a suitably defined game—in Africa's typical intramarrying communities, where males believe that uncircumcised females are unfaithful, and females believe that males will not marry uncircumcised females. The decline of FGC in connection with the well-known Senegalese Tostan Project is seen as proof of this hypothesis and has attracted significant interest from relevant policymakers and practitioners (e.g., Diop and Askew, 2009; Mackie, 2000).

(relative) difficulty in reducing those forms of the practice that are performed at younger ages by traditional cutters (i.e., those forms that are likely to be practiced in secret), as found above, may suggest the salience of this mechanism. Nevertheless, all of the DHS respondents in Burkina Faso were born in or before 1995, that is, before the strict law against this practice was formally enforced in February 1997. Therefore, the deterrence effect of FGC criminalization is limited to those who were not yet circumcised when the law was introduced, which is likely only a subsample. Consequently, this mechanism alone is unlikely to explain the decline in cutting completely.

Second, Burkina Faso's political efforts might have changed people's aversion to FGC. According to the permanent secretary of the CNLPE (recall Section 2), informing people that FGC can lead to complications during childbirth has thus far been seen as effective at altering Burkinabé people's hearts and minds (and, thus, discouraging FGC) because they tend to cherish children, and thus to be particularly concerned about reproductive health (UNFPA, 2010). The DHS data enables me to analyze the respondents' attitudes toward the statement that the practice of FGC should continue. To explore this mechanism strictly, however, it would be necessary to compare Burkina Faso and Mali in the degree to which the attitudes changed over time when females (particularly mothers, who decide whether or not to have their daughters circumcised) were "surveyed" before and after 1985, which is impossible because all of the DHS data is drawn from surveys conducted after 1985.

Nevertheless, I analyzed females' (notably, current) level of aversion to or preference for FGC according to their country and year of birth in Figure 7, wherein the top-left panel plots the fraction of those who agree that this practice should continue (i.e., FGC supporters), along with the bottom-left panel showing a histogram of this fraction in each DHS community. Additionally, the right two panels provide similar information corresponding to male respondents; in the DHS, male household members aged 15—59 (for Burkina Faso) or 15—54 (for Mali) belonging to approximately 30—40% of the selected households were interviewed (see Table S.1 in the supplementary material for the country-round breakdown; the birth years of these male members range from 1936 to 1999). In this figure, the analyzed sample is restricted to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali (see Figure S.2 in the supplementary material for similar panels corresponding to the entire country).

Regardless of gender and year of birth, the fraction of FGC supporters is much lower in Burkina Faso (21.1% of females and 16.4% of males in the split homelands, on average) than it is in Mali (68.5% of females and 69.1% of males in those homelands, on average); this difference is statistically significant (corresponding regression results are available upon request). In Burkina Faso, the distribution pertaining to the fraction of FGC supporters in each community is also more clearly skewed to the left, and the fraction of analyzed communities in which no female

(or male) respondent supports this practice is approximately 15% (or 33%).

Additionally, Table 6 also reports the benefits of having and not having FGC, which are (once again, currently) perceived by females [panel(A)] and males [panel(B)] that reside in the partitioned ethnic homelands (see Table S.3 in the supplementary material for this information corresponding to the entire country). This information, collected through a yes-no question for each item, is available from the limited DHS rounds, that is, Burkina Faso (2003) and Mali (2001), exactly in a comparable manner between these countries. Across both males and females, the fraction of respondents who believe that avoiding this practice would reduce medical problems and pain (likely, during childbirth) is larger in Burkina Faso than in Mali. Compared to those in Mali, a smaller number of Burkinabé respondents also agree that this practice would result in better hygiene.

Admittedly, the much stronger current aversion to FGC (and relevant perceived benefits) in Burkina Faso might have preexisted the government's efforts to eradicate this practice. If this is true, however, it is difficult to explain why the cutting rates were so similar in Burkina Faso and Mali prior to Burkina Faso's efforts (recall Figure 3). In contrast, the government's efforts might have increased aversion to FGC, thereby reducing it in practice. Consistently, changing people's attitudes about FGC has increasingly been considered to be of great importance in any effort to eradicate it (e.g., De Cao and La Mattina, 2019; Vogt et al., 2016). Therefore, it is unlikely that this mechanism would not play a role at all, although future research should still aim to validate this conjecture more rigorously.

[Here, Figure 7 and Table 6]

6 Conclusion

In this study, I examined the impacts of Burkina Faso's political efforts to eradicate the practice of FGC. To this end, I compared Burkina Faso and Mali before and after the former undertook anti-FGC political efforts within the historical ethnic homelands partitioned between these countries.

Burkina Faso's political efforts have in fact discouraged FGC. However, those forms of the practice that take a more radical form and are performed on girls younger than five years old by traditional cutters have declined less markedly than other types of cutting, suggesting a difficulty in eradicating this practice completely (although infibulation is, admittedly, unusual in the studied areas); this limited decline in the practices performed at younger ages by traditional cutters may even result from an increased tendency to perform FGC in secret and to avoid prosecution; such a tendency has often been noted elsewhere after FGC is criminalized (e.g., Camilotti, 2015;

Hernlund, 2000; Shell-Duncan et al., 2011; Shell-Duncan et al., 2013).

In the present study, however, the criminalization of FGC alone is unlikely to explain its overall decline because most Burkinabé respondents, as examined herein, were born well before the formal introduction of the anti-FGC law. Rather, broader political efforts might have succeeded in changing people's preferences regarding this practice. Consistently, compared to those in Mali, at present, Burkinabé respondents belonging to all birth cohorts have a much stronger aversion to FGC, in spite of the remarkable similarity in cutting rates between the two countries among those who were born prior to Burkina Faso's political efforts. While I do not exclude the influence of other mechanisms, it seems that increasing aversion to FGC has been useful as a means of eradicating it, as is reported in more and more other settings (e.g., De Cao and La Mattina, 2019; Vogt et al., 2016). This remark may be of particular importance given that FGC criminalization may possibly drive the practice underground such that it is performed in secret (e.g., Camilotti, 2015).

Admittedly, the reported findings may not be generalizable to broader spatial and temporal contexts. The practice of FGC varies across societies and ethnic groups in terms of circumcision age and the manner of performance (e.g., Ahmadu, 2000; Gosselin, 2000b). The mechanisms sustaining FGC may also change over time. Several aspects of the present context may also be unique. For example, Burkina Faso experienced no substantive change in its leadership system for two decades following the coup d'état in 1980;[20] such stability in its political regime might have increased the credibility of the government's political commitment to eradicating FGC, thereby facilitating the decline of this practice (Poyker, 2020). Additionally, the public prohibition of FGC by Sankara, a charismatic politician who has remained influential in the political space even long after his death (e.g., Hagberg, 2015; Harsch, 2013; Ouedraogo, 2018), might have prompted social changes, as he played the role of an "opinion leader" (Platteau et al., 2017). Nevertheless, the areas and periods studied in this research are still relatively larger and longer than those in other case studies; thus, the reported findings possess a certain external validity. The high prevalence of FGC in West Africa also increases the significance of the present research (e.g., Sipsma et al., 2012). Therefore, these findings are expected to include important academic and policy implications, which may be generalized in a much broader context in future empirical research.

[20] See `https://www.systemicpeace.org/polity/polity4x.htm` for the regime trend, as in the well-known Polity IV project, for example.

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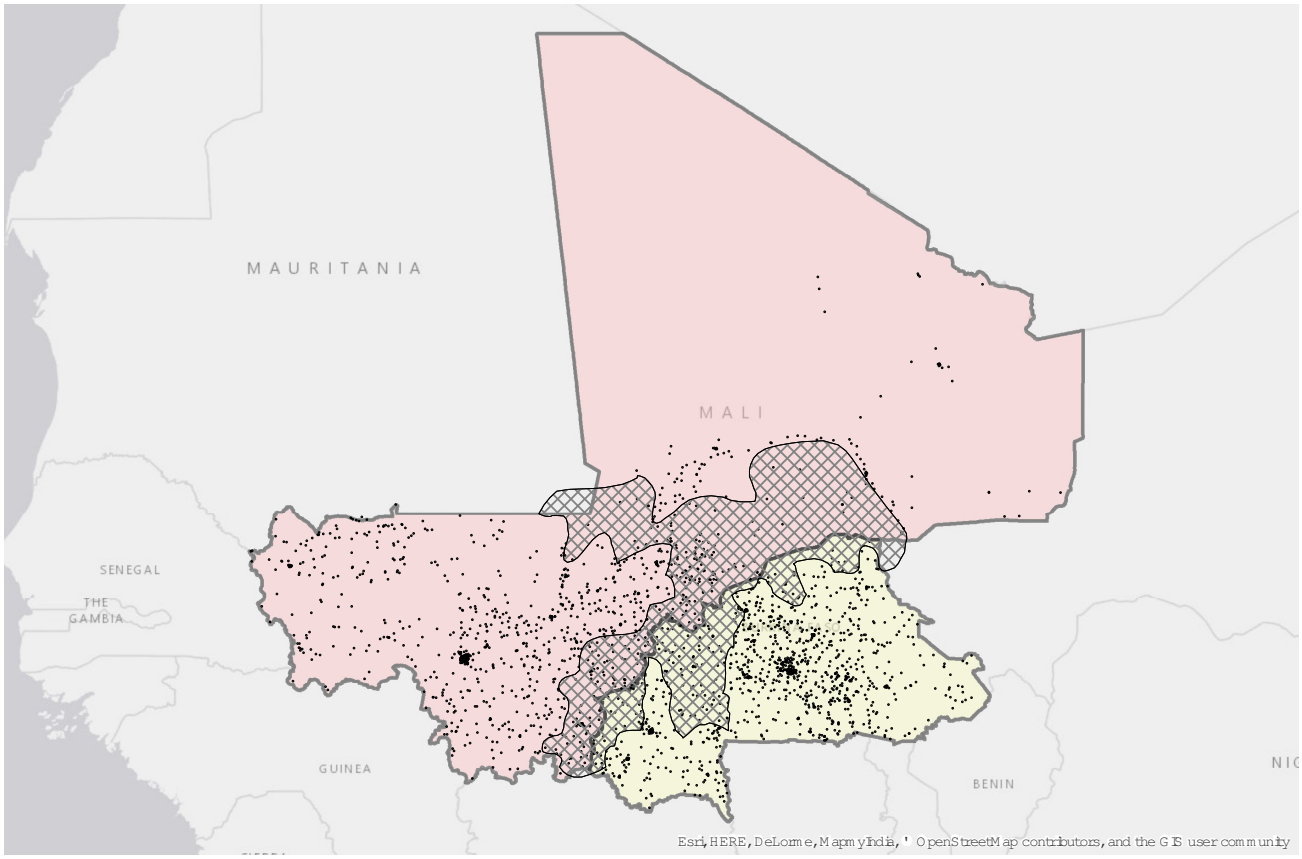

Figure 1: DHS communities (dot), Burkina Faso (yellow), Mali (red), and split ethnic homelands (shaded area)

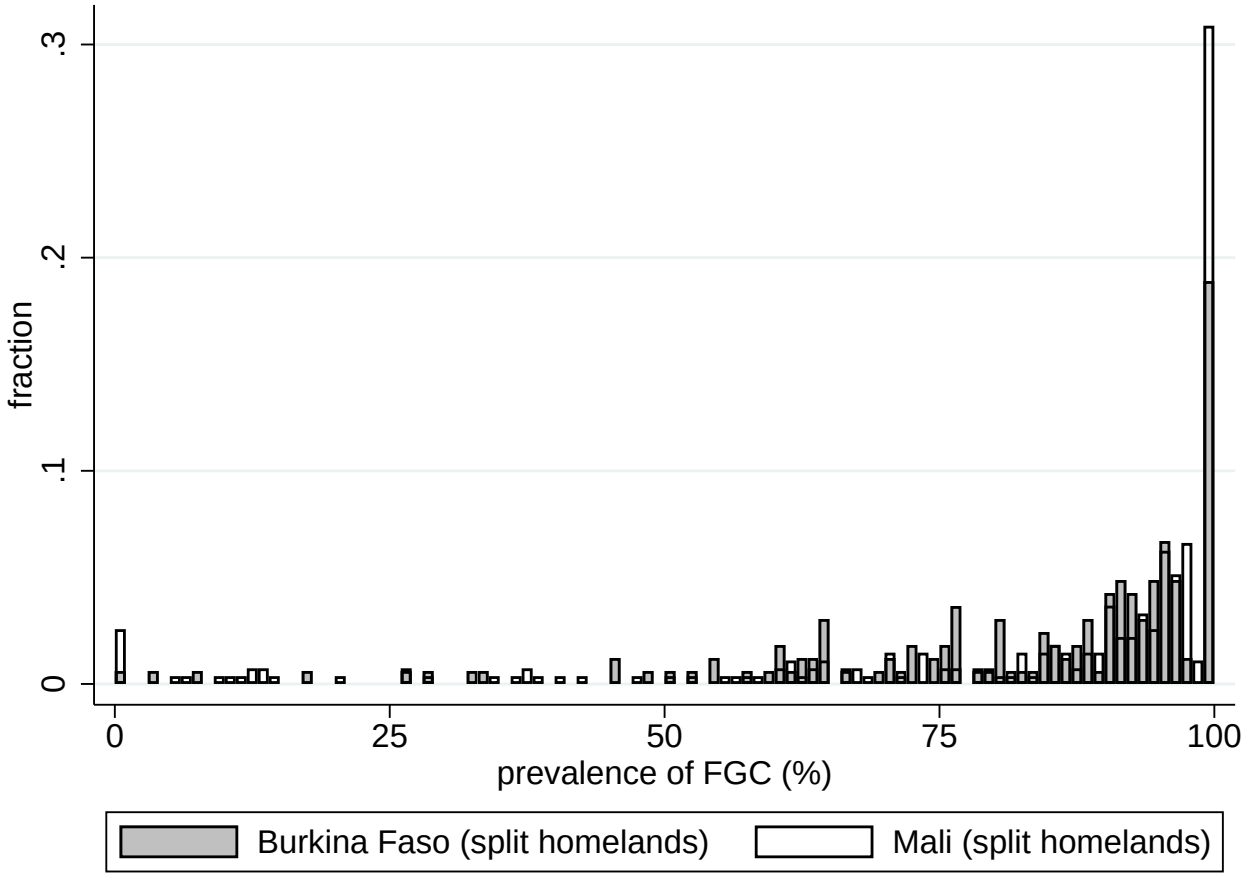

Figure 2: Distribution of cutting rates across the DHS communities

Note: This figure shows a histogram of the fraction of circumcised respondents in each DHS community after restricting the sample to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. See Figure S.2 in the supplementary material for a similar figure corresponding to the entire country.

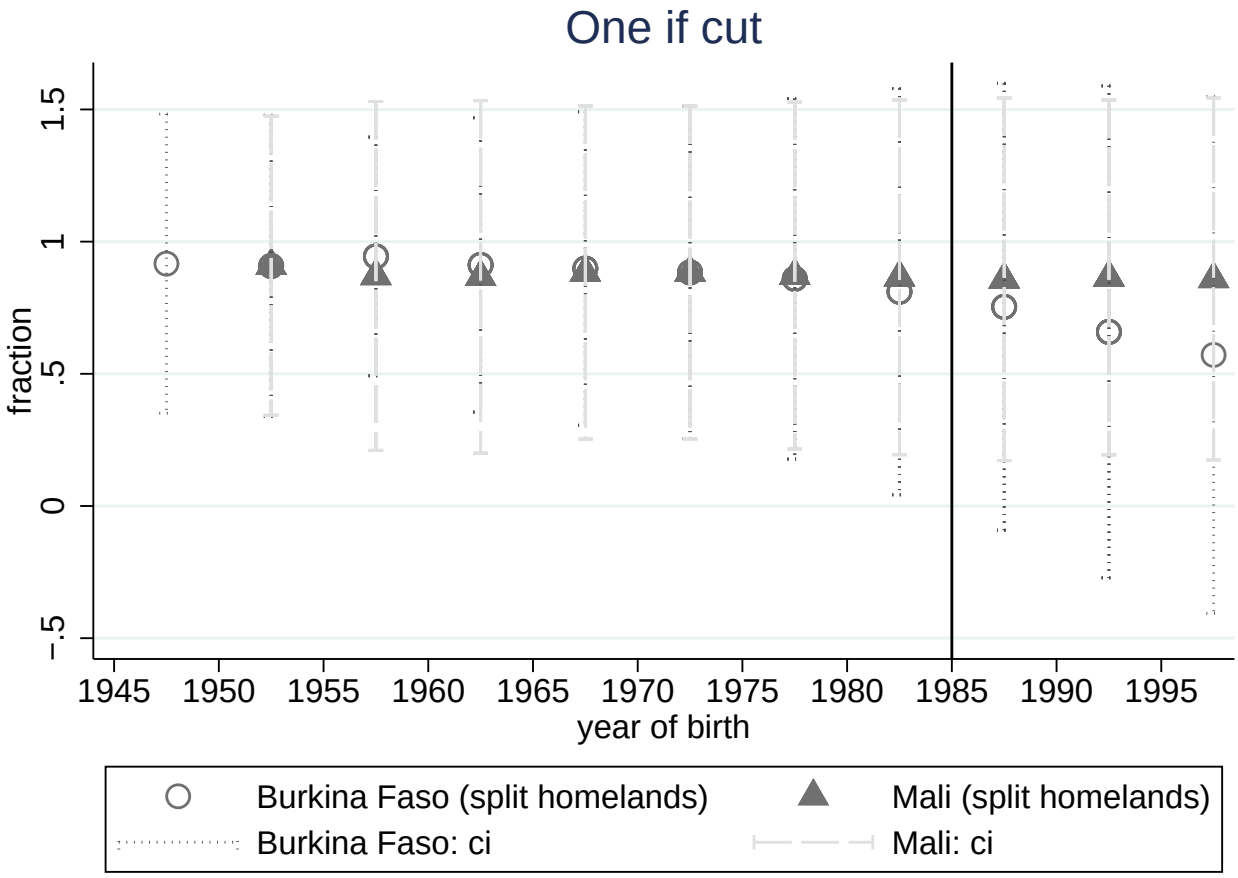

Figure 3: Trend of FGC

Note: This figure reports the values of FGC status averaged within five-year bins, with 95% confidence intervals (ci), after restricting the sample to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. For example, the average value corresponding to respondents born between 1980 and 1984 (or 1985 and 1989) is plotted at 1982.5 (or 1987.5) in terms of the year of birth. See Figure S.2 in the supplementary material for a similar figure corresponding to the entire country.

Figure 4: Distribution of age during FGC

Notes: (1) This figure shows a histogram of the age at FGC for respondents after restricting the sample to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. See Figure S.2 in the supplementary material for a similar figure corresponding to the entire country. (2) In this figure, respondents who referred to "during infancy" as the timing of circumcision were excluded from the analytical sample.

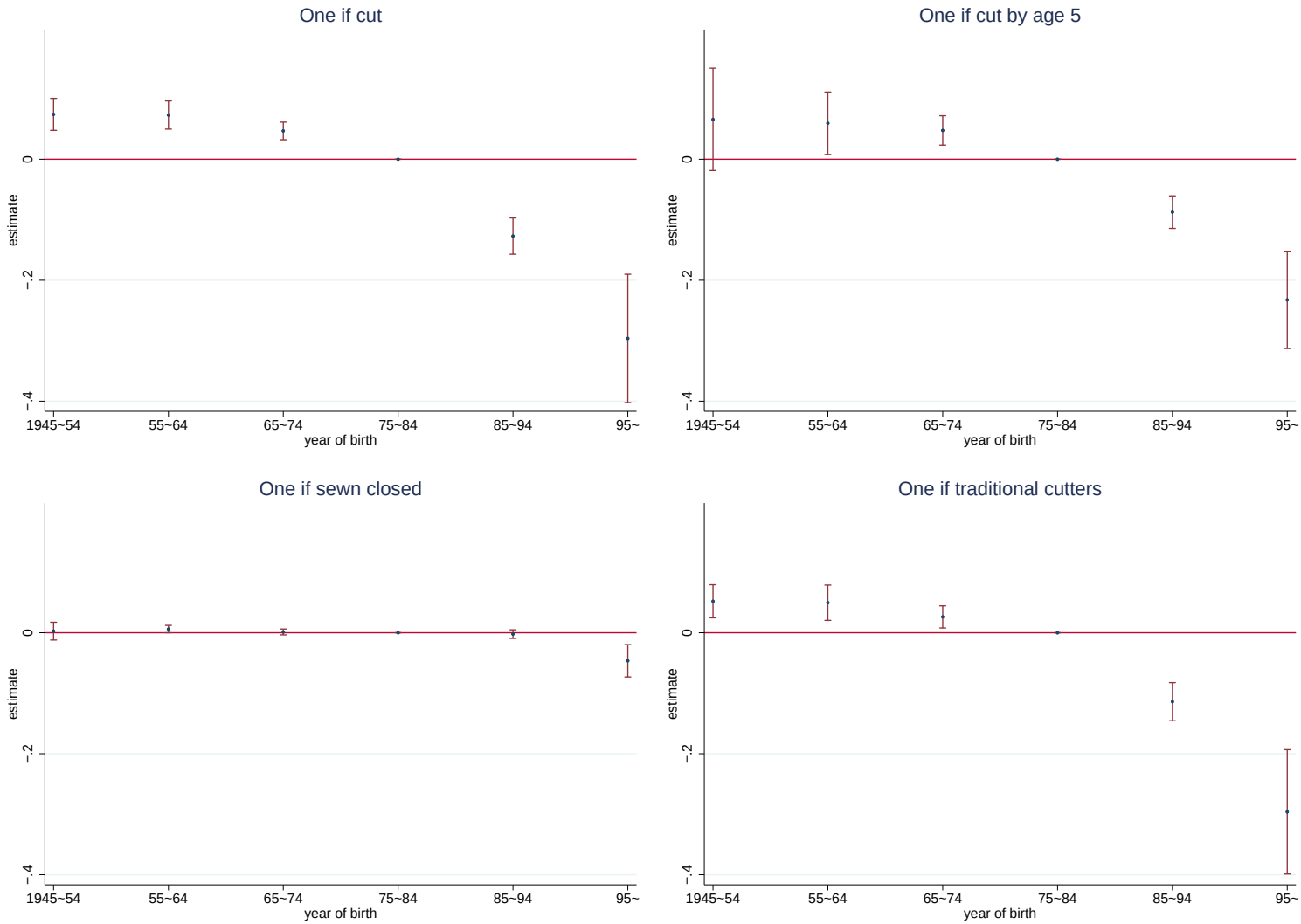

Figure 5: "Naive" analysis of the parallel-trend assumption: Event-study plot of the estimated coefficients (OLS)

Notes: (1) This figure reports α_2 in equation (1) with 95% confidence intervals. (2) Standard errors are clustered at the ethnic-homeland and country-region levels based on asymptotic theory. (3) The coefficients corresponding to the 1975—1984 periods are normalized to the value of zero.

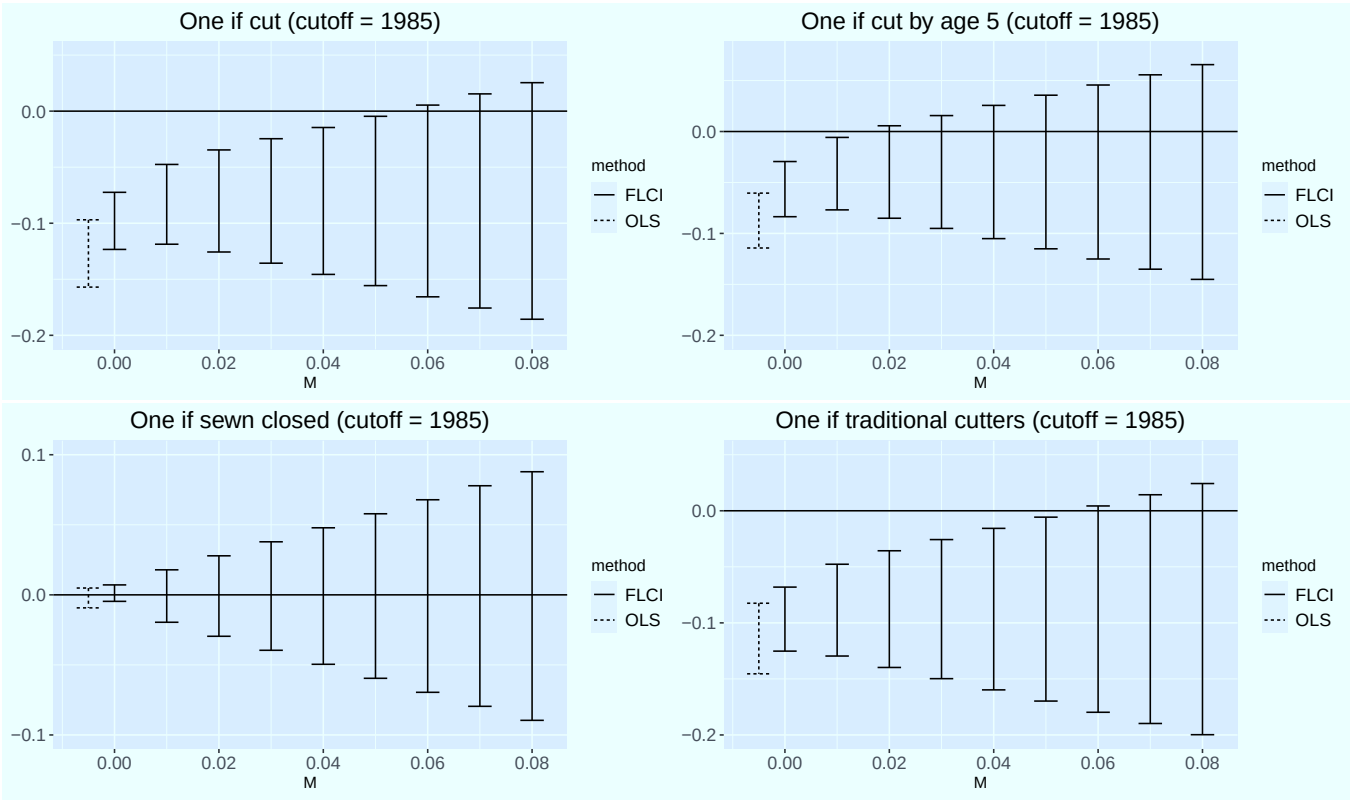

Figure 6: Sensitivity analysis of the parallel-trend assumption: Impacts on females born between 1985 and 1994

Notes: (1) The 95% confidence intervals of the original OLS estimates correspond to the treatment effects on females born between 1985 and 1994, as estimated in Figure 5. (2) The 95% fixed length confidence intervals (FLCIs) correspond to those impacts obtained after placing the restriction $(\delta_{t+1} - \delta_t) \in (\delta_t - \delta_{t-1}) \pm M$ for all t on differences in time trends of the potential outcomes achieved in the absence of the treatment between Burkina Faso and Mali, wherein the differential time trend from (ten-year) period $t-1$ to t is denoted as δ_t; see Rambachan and Roth (2019) for the details of the methodology.

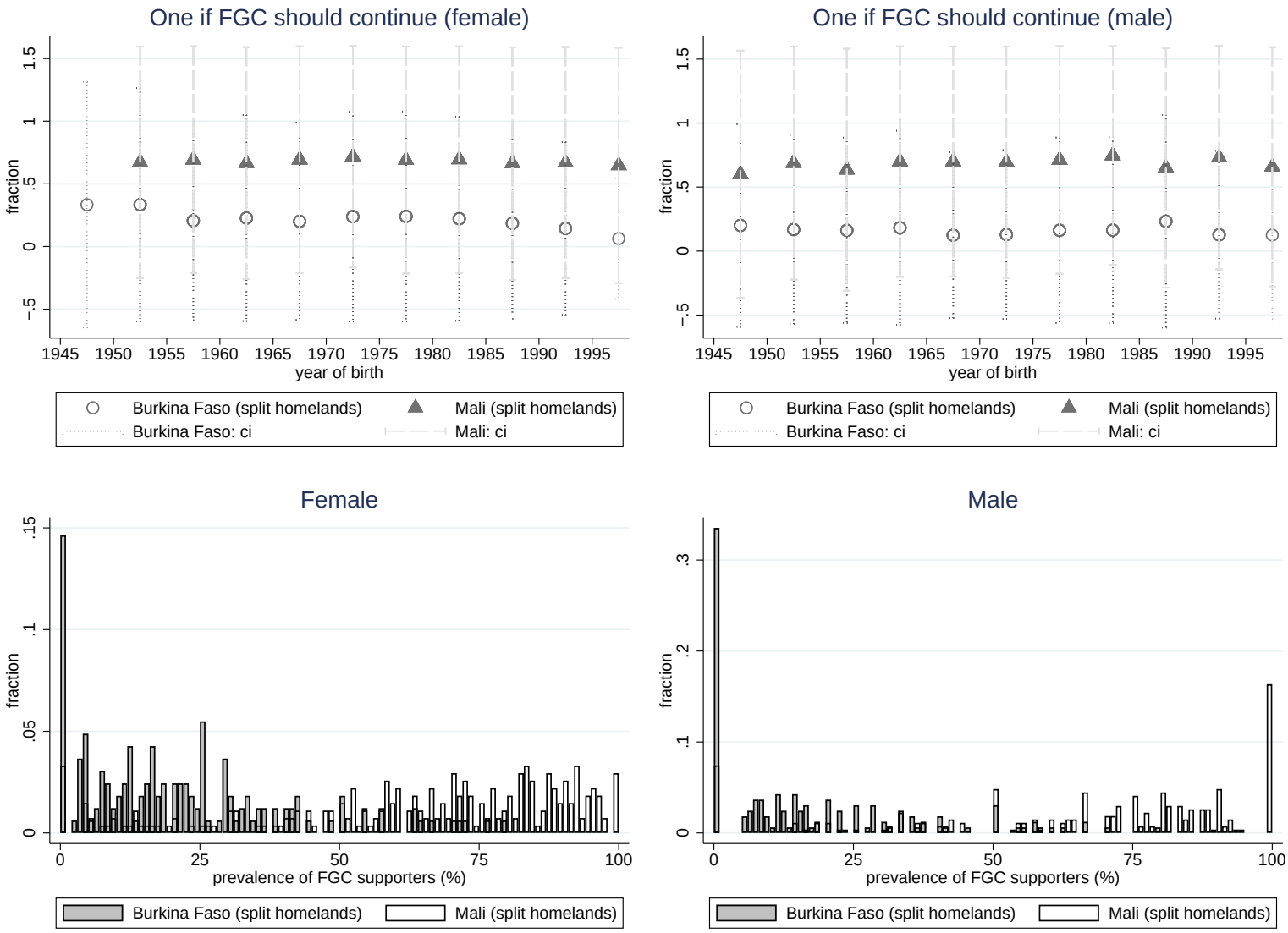

Figure 7: Preference for FGC

Notes: (1) The top panels report the values of respondents' preference for FGC averaged within five-year bins, with 95% confidence intervals (ci). (2) The bottom panels show a histogram of the fraction of respondents who agree that FGC should continue in each DHS community. (3) In this figure, the sample is restricted to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. See Figure S.2 in the supplementary material for a similar figure corresponding to the entire country.

Table 1: Summary statistics

	Split homelands (BF)			Split homelands (Mali)			Non-split homelands		
	Mean	Std.	No. of obs.	Mean	Std.	No. of obs.	Mean	Std.	No. of obs.
(A) Born before 1985	164 communities			272 communities			1926 communities		
One if cut	0.87	0.33	3510	0.87	0.33	5291	0.86	0.34	41727
One if sewn closed (zero if not cut)	0.01	0.12	3163	0.07	0.25	4791	0.04	0.19	36376
One if cut by traditional cutters (zero if not cut)	0.79	0.40	3357	0.80	0.39	5881	0.79	0.40	40822
Age at FGC#	5.46	3.58	1548	7.16	3.86	2193	6.60	3.89	17524
One if support "FGC should continue"	0.22	0.41	3370	0.69	0.46	5911	0.44	0.49	41152
One if married by age 18†	0.74	0.43	3508	0.69	0.45	6172	0.67	0.46	42117
One if gave birth by age 18†	0.47	0.49	3508	0.50	0.50	6172	0.46	0.49	42117
One if polygyny‡	0.49	0.50	3316	0.44	0.49	5960	0.45	0.49	38750
One if DM power‡	0.29	0.45	2449	0.22	0.41	5953	0.28	0.45	34606
One if had any DV‡	0.18	0.38	939	0.19	0.39	2281	0.22	0.41	11385
Age	32.48	8.84	3656	32.46	8.28	6313	31.84	8.63	43688
Highest level of completed education									
Primary (dummy)	0.06	0.25	3654	0.04	0.20	6313	0.10	0.30	43688
Secondary (dummy)	0.00	0.04	3654	0.00	0.05	6313	0.01	0.12	43688
Birth order	3.31	2.08	3655	3.21	2.16	6313	3.18	2.06	43653
One if Muslim	0.74	0.43	3651	0.84	0.36	6298	0.74	0.43	43608
One if Christian	0.18	0.38	3651	0.08	0.27	6298	0.16	0.37	43608
One if urban	0.14	0.34	3656	0.15	0.36	6313	0.30	0.46	43688
(B) Born in or after 1985	130 communities			243 communities			1635 communities		
One if cut	0.71	0.45	1181	0.85	0.34	1956	0.77	0.41	15060
One if sewn closed (zero if not cut)	0.00	0.09	1149	0.10	0.30	1517	0.05	0.22	13462
One if cut by traditional cutters (zero if not cut)	0.68	0.46	1144	0.74	0.43	1949	0.70	0.45	14794
Age at FGC#	5.41	3.08	346	5.90	3.67	613	5.63	3.57	4793
One if support "FGC should continue"	0.16	0.37	1180	0.66	0.47	1951	0.41	0.49	15040
One if married by age 18†	0.72	0.44	744	0.72	0.44	1351	0.64	0.47	9324
One if gave birth by age 18†	0.51	0.50	744	0.56	0.49	1351	0.45	0.49	9325
One if polygyny‡	0.27	0.44	700	0.29	0.45	1374	0.24	0.43	8601
One if DM power‡	0.34	0.47	699	0.14	0.35	1373	0.24	0.42	8593
One if had any DV‡	0.13	0.34	540	0.23	0.42	693	0.23	0.42	5039
Age	19.34	3.23	1204	19.29	3.45	2154	19.16	3.37	15568
Highest level of completed education									
Primary (dummy)	0.16	0.37	1204	0.18	0.38	2154	0.24	0.42	15563
Secondary (dummy)	0.00	0.04	1204	0.00	0.07	2154	0.01	0.12	15563
Birth order	3.75	2.30	1204	3.37	2.33	2154	3.48	2.22	15546
One if Muslim	0.75	0.42	1204	0.83	0.37	2150	0.76	0.42	15539
One if Christian	0.19	0.39	1204	0.08	0.28	2150	0.17	0.38	15539
One if urban	0.19	0.39	1204	0.20	0.40	2154	0.39	0.48	15568

Notes: (1) This table reports summary statistics by the location of the surveyed communities, namely the ethnic homelands partitioned between Burkina Faso (BF) and Mali, and the remaining areas. (2) The information is relevant only to respondents aged 18 or above for †, married respondents for ‡, and respondents that exclude those who referred to "during infancy" as the timing of circumcision for #, respectively.

Table 2: Extensive effects on FGC (OLS)

Dependent variable:	One if cut			
	(a)	(b)	(c)	(d)
Burkina Faso	-0.182***	-0.182***	-0.177***	-0.160***
× Born in or after 1985	(0.018)	(0.018)	(0.019)	(0.018)
	[0.001]	[0.001]	[0.000]	[0.000]
Split ethnic homelands	-	-0.002	0.006	0.019
× Born in or after 1985		(0.017)	(0.017)	(0.017)
Burkina Faso	-0.114**	-0.115**	-0.119***	-
	(0.049)	(0.051)	(0.044)	
Split ethnic homelands	-	0.004	0.013	-
		(0.039)	(0.017)	
Born in or after 1985	-0.003	-0.002	-0.008**	-
	(0.003)	(0.005)	(0.004)	
Birth order	-	-	0.001	0.002***
			(0.001)	(0.001)
Muslim	-	-	0.058*	0.026**
			(0.030)	(0.010)
Christian	-	-	-0.095***	-0.073***
			(0.033)	(0.015)
R-squared	0.056	0.056	0.190	0.408
No. of obs.	69355	69355	68916	68916
Country-ethnicity FE	NO	NO	YES	YES
Year-of-birth FE	NO	NO	NO	YES
Community FE	NO	NO	NO	YES
Year-of-interview FE	YES	YES	YES	YES

Notes: (1) Figures ( ) are asymptotic-theory-based standard errors clustered at the ethnic-homeland and country-region levels. *** denotes significance at 1%, ** at 5%, and * at 10%. (2) Figures [ ] are p-values based on the wild cluster bootstrap (with 999 replications) adopted for the ethnic-homeland and country-region dimensions.

Table 3: Intensive effects on FGC (OLS)

Dependent variables:	One if cut by age 5	One if cut by age 5	One if sewn closed (zero if not cut)	One if sewn closed (zero if not cut)	One if traditional cutters (zero if not cut)	One if traditional cutters (zero if not cut)
	(a)	(b)	(c)	(d)	(e)	(f)
Burkina Faso	-0.132***	-0.118***	-0.005	-0.005	-0.147***	-0.138***
× Born in or after 1985	(0.017)	(0.018)	(0.005)	(0.004)	(0.019)	(0.017)
	[0.006]	[0.009]	[0.372]	[0.254]	[0.000]	[0.001]
Split ethnic homelands	-0.000	-0.003	-0.003	-0.010	0.010	0.019
× Born in or after 1985	(0.024)	(0.022)	(0.006)	(0.007)	(0.020)	(0.019)
Burkina Faso	-0.127*	-	-0.093***	-	-0.190***	-
	(0.069)		(0.015)		(0.040)	
Split ethnic homelands	0.022	-	0.004	-	0.015	-
	(0.036)		(0.008)		(0.018)	
Born in or after 1985	0.057***	-	0.001	-	-0.040***	-
	(0.013)		(0.005)		(0.006)	
Birth order	-0.001	-0.002*	-0.000	-0.000	0.000	0.002***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Muslim	0.101***	0.009	0.007	0.016**	0.035	0.018
	(0.030)	(0.012)	(0.005)	(0.007)	(0.031)	(0.011)
Christian	-0.039	-0.078***	0.004	0.010**	-0.110***	-0.074***
	(0.036)	(0.016)	(0.004)	(0.005)	(0.035)	(0.014)
R-squared	0.112	0.284	0.057	0.286	0.120	0.326
No. of obs.	68916	68916	60062	60062	67513	67513
Country-ethnicity FE	YES	YES	YES	YES	YES	YES
Year-of-birth FE	NO	YES	NO	YES	NO	YES
Community FE	NO	YES	NO	YES	NO	YES
Year-of-interview FE	YES	YES	YES	YES	YES	YES

Notes: (1) Figures ( ) are asymptotic-theory-based standard errors clustered at the ethnic-homeland and country-region levels. *** denotes significance at 1%, ** at 5%, and * at 10%. (2) Figures [ ] are p-values based on the wild cluster bootstrap (with 999 replications) adopted for the ethnic-homeland and country-region dimensions.

Table 4: Selected relocation and alternative cutoff (OLS)

Dependent variables:	One if cut	One if cut by age 5	One if sewn closed (zero if not cut)	One if traditional cutters (zero if not cut)
(A) Trim Malians, considered likely to have undergone FGC				
(1) $H = 0$ (i.e., full sample)				
Coefficient	-0.160***	-0.118***	-0.005	-0.138***
Standard errors	(0.018)	(0.018)	(0.004)	(0.017)
Bootstrap p-value	[0.000]	[0.009]	[0.254]	[0.001]
(2) $H = 30$				
Coefficient	-0.153***	-0.113***	-0.005	-0.132***
Standard errors	(0.020)	(0.019)	(0.004)	(0.019)
Bootstrap p-value	[0.001]	[0.011]	[0.283]	[0.001]
(3) $H = 60$				
Coefficient	-0.143***	-0.103***	-0.002	-0.123***
Standard errors	(0.025)	(0.022)	(0.006)	(0.023)
Bootstrap p-value	[0.005]	[0.017]	[0.818]	[0.006]
(4) $H = 90$				
Coefficient	-0.134***	-0.093***	-0.001	-0.118***
Standard errors	(0.033)	(0.028)	(0.006)	(0.029)
Bootstrap p-value	[0.018]	[0.040]	[0.890]	[0.018]
(B) Cutoff = 1975				
Coefficient	-0.102***	-0.084***	-0.004**	-0.076***
Standard errors	(0.012)	(0.018)	(0.002)	(0.011)
Bootstrap p-value	[0.001]	[0.014]	[0.026]	[0.003]

Notes: (1) Figures ( ) are asymptotic-theory-based standard errors clustered at the ethnic-homeland and country-region levels. *** denotes significance at 1%, ** at 5%, and * at 10%. (2) Figures [ ] are p-values based on the wild cluster bootstrap (with 999 replications) adopted for the ethnic-homeland and country-region dimensions.

Table 5: Falsification test (OLS)

Dependent variables:	Highest education		One if	One if	One if	One if	One if	One if
	Primary (dummy)	Secondary (dummy)	married by age 18	gave birth by age 18	polygyny (dummy)	have DM power	had any IPV	die by age 5
Sample:	All	All	Age $\geq$ 18	Age $\geq$ 18	Married	Married	Married	Daughter
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Burkina Faso	0.000	-0.004	-0.115***	-0.098***	-0.001	0.023*	-0.009	0.030***
× Born in or after 1985	(0.016)	(0.004)	(0.029)	(0.029)	(0.013)	(0.014)	(0.019)	(0.009)
	[0.995]	[0.570]	[0.006]	[0.025]	[0.967]	[0.146]	[0.674]	[0.001]
Split ethnic homelands	0.001	0.007**	0.012	0.027	0.009	0.005	-0.021	0.029**
× Born in or after 1985	(0.015)	(0.003)	(0.030)	(0.030)	(0.018)	(0.012)	(0.017)	(0.012)
Birth order	0.000	-0.000	0.001	0.002*	0.002**	0.001	0.001	0.003
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.007)
Muslim	0.008	-0.007*	0.036**	0.006	0.024**	-0.003	-0.058***	-
	(0.009)	(0.004)	(0.015)	(0.013)	(0.011)	(0.015)	(0.022)	
Christian	0.082***	0.012***	-0.076***	-0.069***	-0.165***	0.009	-0.037	-
	(0.012)	(0.004)	(0.017)	(0.012)	(0.021)	(0.015)	(0.027)	
Single birth (dummy)	-	-	-	-	-	-	-	-0.265***
								(0.020)
Mother's age at birth	-	-	-	-	-	-	-	-0.004*
(years)								(0.002)
R-squared	0.274	0.117	0.156	0.097	0.228	0.247	0.253	0.418
No. of obs.	72120	72120	62809	62809	58315	53291	20746	87805
Country-ethnicity FE	YES	YES	YES	YES	YES	YES	YES	NO
Year-of-birth FE	YES	YES	YES	YES	YES	YES	YES	YES
Community FE	YES	YES	YES	YES	YES	YES	YES	NO
Year-of-interview FE	YES	YES	YES	YES	YES	YES	YES	YES
Mother FE	NO	NO	NO	NO	NO	NO	NO	YES
Sample DHS								
Burkina Faso 1998-99	YES	YES	YES	YES	YES	NO	NO	YES
Burkina Faso 2003	YES	YES	YES	YES	YES	YES	NO	YES
Burkina Faso 2010	YES	YES	YES	YES	YES	YES	YES	YES
Mali 2001	YES	YES	YES	YES	YES	YES	NO	YES
Mali 2006	YES	YES	YES	YES	YES	YES	YES	YES
Mali 2012-13	YES	YES	YES	YES	YES	YES	YES	YES

Notes: (1) Figures ( ) are asymptotic-theory-based standard errors clustered at the ethnic-homeland and country-region levels. *** denotes significance at 1%, ** at 5%, and * at 10%. (2) Figures [ ] are p-values based on the wild cluster bootstrap (with 999 replications) adopted for the ethnic-homeland and country-region dimensions.

Table 6: Perceived benefits of having and not having FGC: Split homelands

Country:	Burkina Faso (DHS 2003)			Mali (DHS 2001)		
	Mean	Std	No. of obs	Mean	Std	No. of obs
(A) Female sample						
Benefits of FGC (dummy for each item)						
Better hygiene	0.04	0.20	1468	0.11	0.32	2401
Social acceptance	0.40	0.49	1468	0.47	0.49	2401
Better marriage prospects	0.01	0.11	1468	0.04	0.20	2401
Preserve virginity	0.02	0.15	1468	0.05	0.21	2401
Male pleasure	0.00	0.07	1468	0.01	0.12	2401
Religious approval	0.06	0.23	1468	0.17	0.38	2401
Benefits of not having FGC (dummy for each item)						
Fewer medical problems	0.31	0.46	1468	0.04	0.21	2401
Avoid pain	0.28	0.45	1468	0.08	0.28	2401
More female sexual pleasure	0.03	0.17	1468	0.04	0.20	2401
More pleasure for males	0.01	0.11	1468	0.04	0.19	2401
Follow religion	0.01	0.10	1468	0.03	0.19	2401
(B) Male sample						
Benefits of FGC (dummy for each item)						
Better hygiene	0.03	0.18	406	0.12	0.33	633
Social acceptance	0.15	0.36	406	0.27	0.44	633
Better marriage prospects	0.02	0.16	406	0.04	0.20	633
Preserve virginity	0.01	0.13	406	0.12	0.33	633
Male pleasure	0.01	0.12	406	0.10	0.30	633
Religious approval	0.08	0.28	406	0.17	0.38	633
Benefits of not having FGC (dummy for each item)						
Fewer medical problems	0.52	0.50	406	0.09	0.29	633
Avoid pain	0.25	0.43	406	0.07	0.26	633
More female sexual pleasure	0.02	0.16	406	0.08	0.27	633
More pleasure for males	0.04	0.21	406	0.08	0.27	633
Follow religion	0.02	0.14	406	0.00	0.09	633

Note: In this table, the sample is restricted to those who reside in the ethnic homelands partitioned between Burkina Faso and Mali. See Table S.3 in the supplementary material for similar information corresponding to the entire country.

Supplementary material to "Eradicating Female Genital Cutting: Implications from Political Efforts in Burkina Faso"

S.1 Conceptual framework

In this section, I explain three major mechanisms underlying the impact of political efforts on the practice of FGC: changes in people's expectations about others' cutting decision, changes in the expected payoff for engaging in FGC (i.e., legal punishment), and changes in people's aversion to (or preference for) this practice. Toward this end, I reorganize the outstanding, more comprehensive discussion done in Platteau et al. (2017) and provide a theoretical sketch considering females' coordination in marriage markets, referring to Mackie (1996)'s seminal theory of marriage convention;[21] the logic is quite general, however, and can be applied to other mechanisms supporting FGC if bride prices offered by males are replaced with other economic rents (e.g., social capital) provided by different types of stakeholders (e.g., elders).[22]

Consider a normal-form game played by females in an intramarrying community with the size of the female population normalized as one, wherein two marriage-related customs—FGC and something else—exist. Each female is characterized by the strength of her (or her parents') aversion to or preference for FGC (because of the health risks, for example), as governed by a parameter $\theta \in [0, 1]$ that is distributed according to the cumulative distribution function $F(\theta)$. In this game, a female (or her parents) decides whether or not to undergo FGC as well as whether or not to accept a given proposal, namely, a bride price offered by a male. Females conforming to a community's dominant customs are assumed to receive higher bride price offers than nonconforming females, because conforming females are perceived as faithful future wives. Accordingly, and for analytical simplicity, circumcised (or uncircumcised) females are assumed to obtain bride prices γb (or $(1-\gamma)b$) by accepting a given proposal, whereby $b > 0$ is exogenous and $\gamma \in [0, 1]$ is the fraction of circumcised females (and thus, endogenous) in a community.[23] In contrast, females obtain utility normalized at the level of zero when they remain single.

[21] Mackie (1996)'s theory has received much publicity in the fields of anthropology and sociology. Mackie (1996) proposed a conceptual game-theoretical framework wherein FGC persists as a social convention—a group-level behavior maintained as one of multiple self-enforcing equilibria in a suitably defined game—in Africa's typical intramarrying communities, where males believe that uncircumcised females are unfaithful, and females believe that males will not marry uncircumcised females.

[22] Young (2008, 2015) enumerate several mechanisms that sustain a normative equilibrium, such as a motive to "coordinate" with others in a particular type of transaction (e.g., marriage as claimed in Mackie, 1996), "peer pressure," and "symbolic signaling" of the holding of particular values or particular group membership. According to Shell-Duncan et al. (2011)'s study of Senegal and the Gambia, FGC signals respect for a hierarchical social system among females, which provides circumcised females with access to the community's network-based social capital. In Meru, Kenya, Thomas (2000) also links FGC to the maintenance of elders' authority among females of different age groups. Similarly, elderly females in Mali were reported to advocate FGC as a means of maintaining control over the gendered sphere of power (e.g., Gosselin, 2001).

[23] For instance, when $\gamma = 0.8$, circumcised females obtain larger bride prices than uncircumcised ones by $0.6b$ $(= 0.8b - 0.2b)$. This utility premium is zero if there is no majority custom (i.e., $\gamma = 0.5$).

FGC reduces circumcised females' utility by the exogenous amount of $c = \theta E > 0$; herein, females are assumed to incur different costs depending upon their degree of aversion to FGC θ and an external environmental factor $E > b$ (e.g., legal punishment and anti-FGC pressure applied by non-governmental organizations). Consequently, married circumcised (or uncircumcised) females receive $\gamma b - \theta E$ (or $(1-\gamma)b$).

The aforementioned three mechanisms can be considered in this framework. First, political efforts may change females' expectations about others' behavior (i.e., the expected proportion of females in a community who are circumcised). To illustrate this mechanism in the simplest manner, let us assume homogeneous preferences, namely $\theta = \bar{\theta} \in (0,1)$ for all females, as Mackie (1996) originally assumed. Then, when the perceived cost of FGC is not particularly high (i.e., $b > \bar{\theta}E$),[24] two stable pure-strategy Nash equilibria arise—FGC and no-FGC equilibria—wherein all (or no) females in a community are circumcised in the former (or latter), and all females in the community marry.[25] The FGC equilibrium is inferior to the no-FGC equilibrium and thus is a coordination failure because shifting from the former to the latter improves females' total welfare from $b - \bar{\theta}E$ to b. However, if more than a $\frac{b-\bar{\theta}E}{2b}$ $(= 1 - \frac{b+\bar{\theta}E}{2b} < \frac{1}{2})$ fraction of the females abandon FGC, a shift from the FGC to the no-FGC equilibrium is achieved in a self-enforcing manner.[26] Political efforts may facilitate such an equilibrium transition by signaling a community's contemporary attitude toward FGC (i.e., enabling people to believe that no one will practice FGC in the near future).

Importantly, empirical research has recently confirmed the existence of within- and across-community heterogeneity in preferences for FGC, thereby challenging Mackie (1996)'s original idea, which conceptualizes this practice in a coordination game with homogeneous agents (e.g., Bellemare et al., 2015; Efferson et al., 2015; Novak, 2020). In a situation containing such heterogeneity, females decide to undergo FGC if and only if [27]

$$\frac{(2F(\theta)-1)b}{E} \geq \theta. \tag{S.1.1}$$

[24] When the cost is too high, namely $b < \bar{\theta}E$ (e.g., a considerable mortality risk), an FGC equilibrium cannot arise.

[25] Proof is given as follows. Females always have an (weak) incentive to accept a proposal. Then, when the equilibrium fraction of circumcised females is $\gamma^* = \underline{\gamma} \leq \frac{\bar{\theta}E}{b}$, it becomes $\underline{\gamma}b - \bar{\theta}E \ (\leq 0) \leq (1-\underline{\gamma})b$. In this case, females do not undergo FGC, which leads to $\underline{\gamma} = 0 < \frac{\bar{\theta}E}{b}$ (no-FGC equilibrium). Second, when $\gamma^* = \overline{\gamma} > \frac{b+\bar{\theta}E}{2b}$ $(> \frac{\bar{\theta}E}{b})$, it becomes $\overline{\gamma}b - \bar{\theta}E > (1-\overline{\gamma})b$. In this case, females undergo FGC, which leads to $\overline{\gamma} = 1 > \frac{b+\bar{\theta}E}{2b}$ (FGC equilibrium). Third, consider the case in which $\frac{\bar{\theta}E}{b} < \gamma^* = \hat{\gamma} \leq \frac{b+\bar{\theta}E}{2b}$, namely $(1-\hat{\gamma})b \geq \hat{\gamma}b - \bar{\theta}E > 0$. When $(1-\hat{\gamma})b > \hat{\gamma}b - \bar{\theta}E$, females do not undergo FGC; this leads to $\hat{\gamma} = 0 \leq \frac{\bar{\theta}E}{b}$, which contradicts the definition of $\hat{\gamma}$. When $(1-\hat{\gamma})b = \hat{\gamma}b - \bar{\theta}E$ (i.e., $\hat{\gamma} = \frac{b+\bar{\theta}E}{2b}$), females randomly undergo FGC with the probability $\frac{b+\bar{\theta}E}{2b}$, which is, however, not stable, as even a small deviation from this fraction leads to either the FGC or no-FGC equilibrium.

[26] Therefore, following Schelling (2006), Mackie (1996) claims that organizing a group that includes a critical minimum number of people who refuse FGC and make this choice public knowledge are necessary for the eradication of this practice. Because $\frac{b-\bar{\theta}E}{2b} < \frac{1}{2}$, this group does not necessarily have to include most of the female community members. The decline of FGC in connection with the well-known Senegalese Tostan Project is seen as proof of this hypothesis and has attracted significant interest from relevant policymakers and practitioners (e.g., Diop and Askew, 2009; Mackie, 2000).

[27] Given a certain value of γ, females with $\theta < \hat{\theta}$ practice FGC if a female with $\theta = \hat{\theta}$ does so. Therefore, the fraction of circumcised females in a community is replaced with $F(\theta)$ in this equation.

Therefore, possible equilibria depend upon the underlying distribution of females' preferences for FGC, and Figure S.5 demonstrates some of them. In this figure, the curve represents the left-hand side of equation (S.1.1), namely the utility that females acquire by practicing FGC divided by the common cost attributed to the external environmental factor, whereas the 45-degree line corresponds to its right-hand side, namely, their aversion to FGC. In Figure S.5a, two stable FGC and no-FGC equilibria (denoted by B and C, respectively) exist along with the tipping point (denoted by A) although even the FGC equilibrium is an interior solution with a large proportion of circumcised females. Therefore, similar to the aforementioned coordination game with homogeneous females, political efforts may result in the eradication of FGC by changing females' expectations about others' behavior.[28]

Second, political efforts may alter the payoffs people can expect to receive from engaging in FGC. One straightforward tool of relevance is FGC criminalization, which corresponds to an increased E. In one example, depicted in Figure S.5b, no one practices FGC at equilibrium (denoted by C) for fear of strict legal sanctions. This effect is called the deterrence effect of the law. Admittedly, the present social-norm framework is not the only way to explain this effect (e.g., Plateau and Wahhaj, 2014), and too radical a law, which would likely be in strong conflict with prevailing social norms, may backfire (e.g., Acemoglu and Jackson, 2017; Aldashev et al., 2012).[29]

Third, political efforts may also change people's preferences regarding FGC. For example, if political efforts shift the distribution of females' FGC-aversion toward the right, so that almost all females come to be clustered around a θ value that is close to one (namely, the curve lies entirely below the 45-degree line, similar to Figure S.5b), everybody will abandon FGC.

[28] According to the FGC conceptualization based on a coordination game with homogeneous agents, communities tend to reveal a cutting rate of either one (FGC equilibrium) or zero (no-FGC equilibrium). Although the DHS communities may not necessarily correspond to the "communities" of theoretical relevance (e.g., the intramarrying community), therefore, the interior cutting rates, as shown in Figure 2, may pertain to communities that are shifting from an FGC to a no-FGC equilibrium and/or those that have a stable internal equilibrium with heterogeneous agents, consistent with the interpretation provided by Novak (2020)'s study on this practice in Burkina Faso.

[29] In contrast, the law's impact on people's expectations about others' cutting decisions (and thus, on FGC) is called the expressive effect because it works by sending a message that the state supports FGC eradication rather than facilitating social changes through sanctions (e.g., Cooter, 2000).

(For the supplemental appendix)

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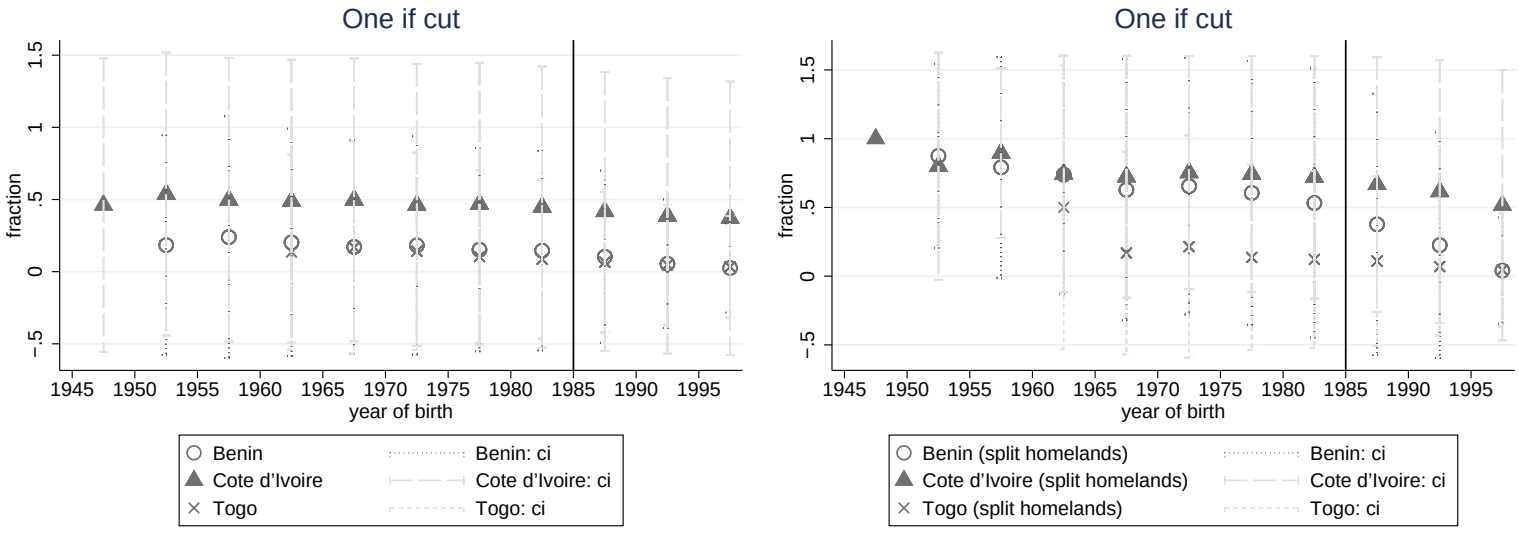


Figure S.1: Trend of FGC: Benin, Côte d'Ivoire, and Togo

Notes: (1) This figure plots the values of FGC status averaged within five-year bins, with 95% confidence intervals (ci). For example, the average value corresponding to respondents born between 1980 and 1984 (or 1985 and 1989) is plotted at 1982.5 (or 1987.5) in terms of the year of birth. (2) Data used is drawn from multiple rounds of the Standard DHS in Benin (2001, 2011—12), Côte d'Ivoire (1998—99, 2011—12), and Togo (2013—14). (3) The right panel restricts the sample to respondents who reside in the ethnic homelands partitioned between Burkina Faso and the three neighboring countries.

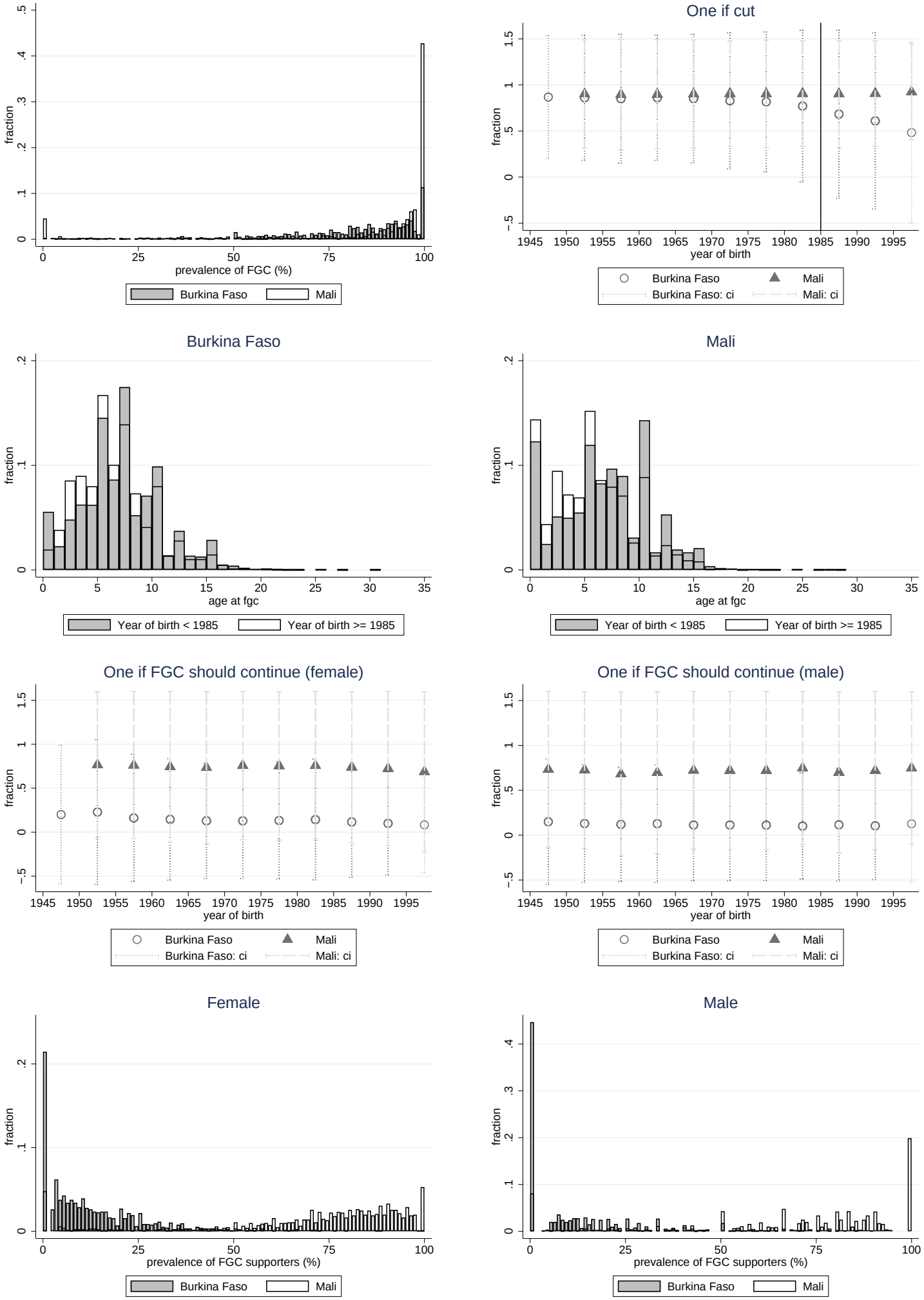


Figure S.2: FGC-related information: Entire country

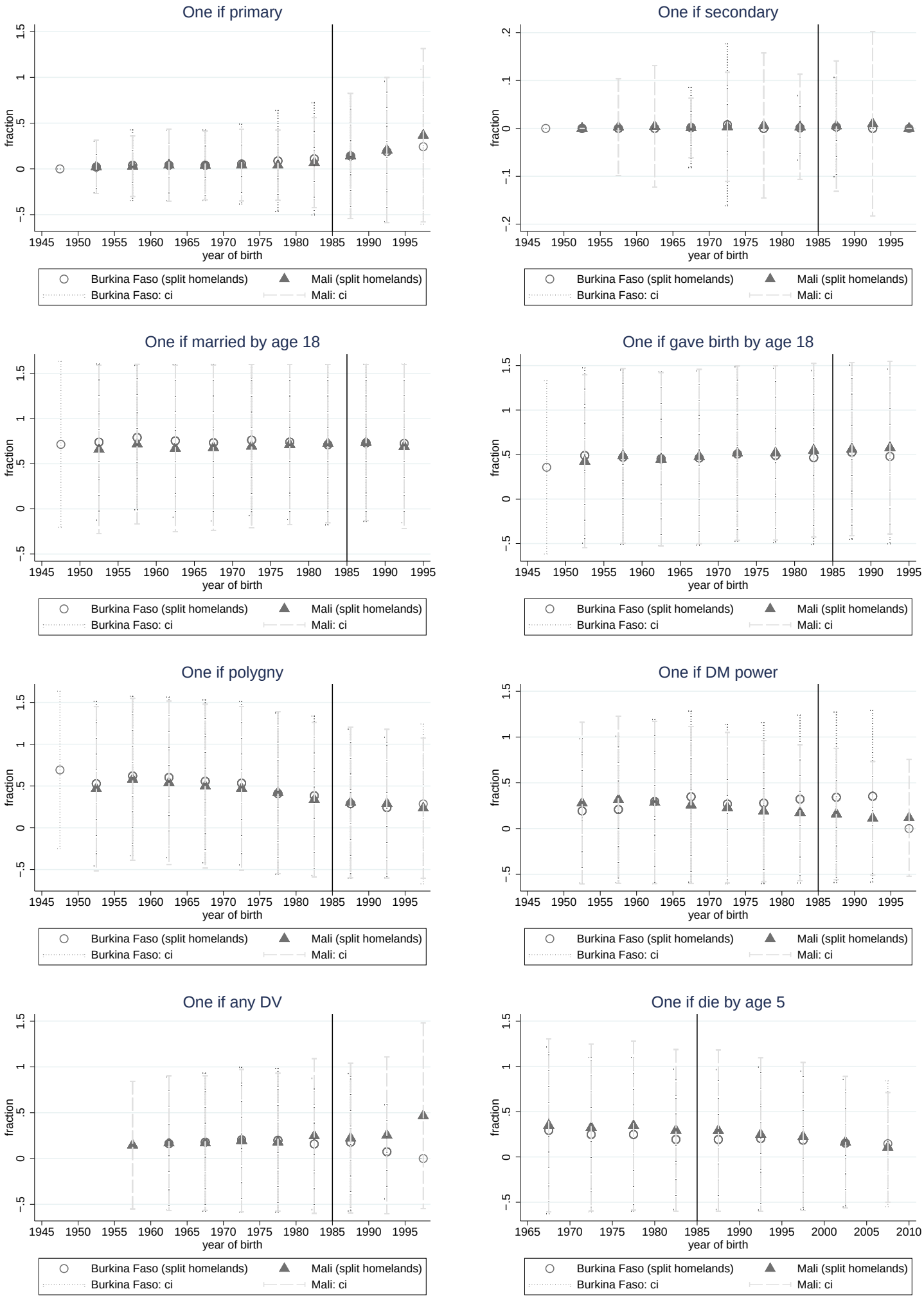


Figure S.3: Trend of empowerment outcomes: Split homelands

Notes: (1) This figure plots the values of the analyzed variables averaged within five-year bins, with 95% confidence intervals (ci). For example, the average value corresponding to respondents born between 1980 and 1984 (or 1985 and 1989) is plotted at 1982.5 (or 1987.5) in terms of the year of birth. (2) The sample is restricted to respondents who reside in the ethnic homelands partitioned between Burkina Faso and Mali.

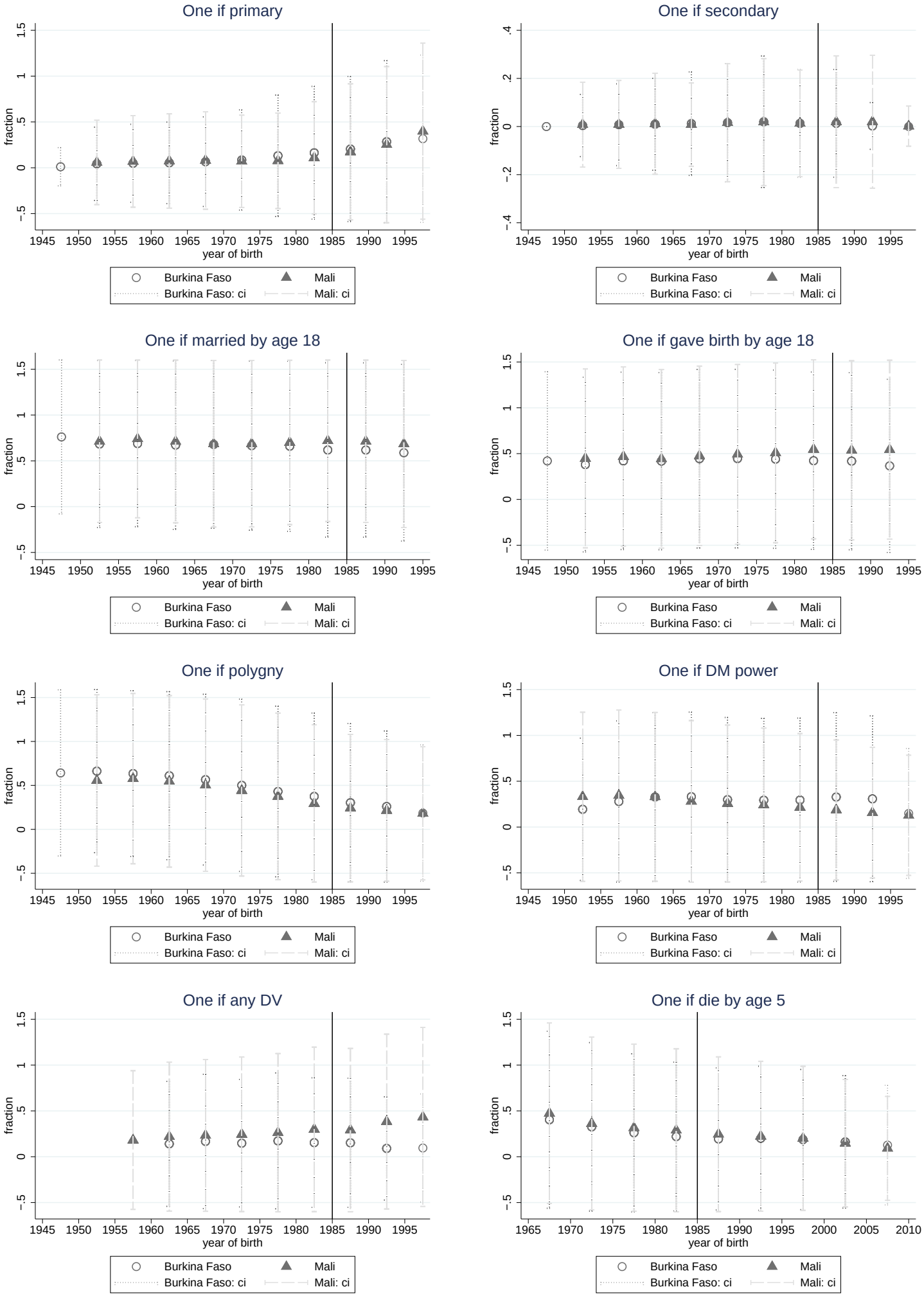
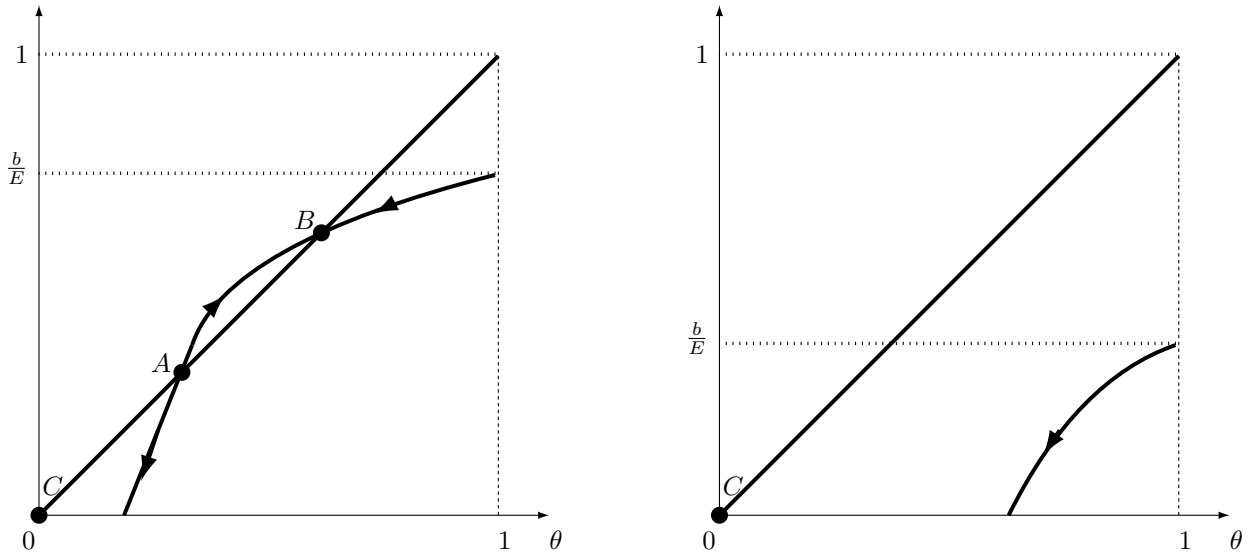


Figure S.4: Trend of empowerment outcomes: Entire country

Note: This figure plots the values of the analyzed variables averaged within five-year bins, with 95% confidence intervals (ci). For example, the average value corresponding to respondents born between 1980 and 1984 (or 1985 and 1989) is plotted at 1982.5 (or 1987.5) in terms of the year of birth.



(a) Two stable equilibria: B and C

(b) One stable equilibria: C (large E)

Figure S.5: Examples of coordination games

Table S.1: Sample composition

	DHS round	No. of respondents	No. of households	No. of communities
(A) Female sample				
Benin	2001	6209	4248	246
	2011–12	16522	12365	746
Burkina Faso	1998–99	6379	3867	208
	2003	12393	7276	397
	2010	16124	10874	541
Côte d'Ivoire	1998–99	2936	1537	133
	2011–12	9461	6242	329
Mali	2001	12774	2105	399
	2006	14506	10447	405
	2012–13	10407	7960	412
Togo	2013–14	9480	6837	330
Total		117191	73758	4146
(B) Male sample				
Burkina Faso	1998–99	2612	1820	208
	2003	3582	2419	397
	2010	6911	5262	541
Mali	2001	3394	1221	398
	2006	4183	3089	405
	2012–13	4395	3510	412
Total		25077	17321	2461

Table S.2: Results with additional data drawn from Benin, Côte d'Ivoire, and Togo

Dependent variables:	One if cut	One if cut by age 5	One if sewn closed (zero if not cut)	One if traditional cutters (zero if not cut)
	(a)	(b)	(c)	(d)
Burkina Faso	-0.117***	-0.094***	0.008	-0.109***
× Born in or after 1985	(0.032)	(0.022)	(0.005)	(0.027)
	[0.011]	[0.000]	[0.206]	[0.027]
Split ethnic homelands	-0.032	-0.000	-0.012*	-0.030
× Born in or after 1985	(0.032)	(0.019)	(0.006)	(0.026)
Birth order	0.002***	-0.001	0.000	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Muslim	0.082***	0.058***	0.011**	0.072***
	(0.023)	(0.019)	(0.005)	(0.019)
Christian	-0.048***	-0.045***	0.000	-0.042***
	(0.016)	(0.014)	(0.003)	(0.015)
R-squared	0.665	0.457	0.275	0.579
No. of obs.	104948	104948	95198	103417
Country-ethnicity FE	YES	YES	YES	YES
Year-of-birth FE	YES	YES	YES	YES
Community FE	YES	YES	YES	YES
Year-of-interview FE	YES	YES	YES	YES

Notes: (1) In this table, data drawn from multiple rounds of the Standard DHS in Benin (2001, 2011—12), Côte d'Ivoire (1998—99, 2011—12), and Togo (2013—14) is appended to the main study sample. (2) Figures ( ) are asymptotic-theory-based standard errors. Standard errors are clustered at the ethnic-homeland (94 groups) and country-region (56 groups) levels. *** denotes significance at 1%, ** at 5%, and * at 10%. (3) Figures [ ] are p-values based on the wild cluster bootstrap (with 999 replications) adopted for the ethnic-homeland and country-region dimensions. (4) The 56 country-region groups include 12 departments in Benin, 13 regions in Burkina Faso, 18 districts in Côte d'Ivoire, nine regions in Mali, and four regions in Togo. To identify a region corresponding to each DHS community, I matched a community's GPS latitude/longitude coordinates with these countries' maps sourced from the World Bank (`https://datacatalog.worldbank.org/dataset/burkina-faso-administrative-boundaries-2017`) for Burkina Faso and DIVA-GIS (`http://www.diva-gis.org/datadown`) for the remaining countries. (5) Information on respondents' birth order was unavailable in all rounds of the Benin DHS and the 1998—99 DHS of Côte d'Ivoire. For these rounds, the sample average was applied.

Table S.3: Perceived benefits of having and not having FGC: Entire country

	Burkina Faso (DHS 2003)			Mali (DHS 2001)		
	Mean	Std	No. of obs	Mean	Std	No. of obs
(A) Female sample						
Benefits of FGC (dummy for each item)						
Better hygiene	0.05	0.21	11957	0.18	0.38	12371
Social acceptance	0.23	0.42	11957	0.39	0.48	12371
Better marrige prospects	0.02	0.14	11957	0.06	0.23	12371
Preserve virginity	0.03	0.19	11957	0.06	0.23	12371
Male pleasure	0.00	0.06	11957	0.02	0.15	12371
Religious approval	0.02	0.15	11957	0.19	0.39	12371
Benefits of not having FGC (dummy for each item)						
Fewer medical problems	0.41	0.49	11957	0.05	0.21	12371
Avoid pain	0.26	0.44	11957	0.06	0.24	12371
More female sexual pleasure	0.03	0.19	11957	0.04	0.20	12371
More pleasure for males	0.02	0.15	11957	0.04	0.21	12371
Follow religion	0.00	0.08	11957	0.03	0.17	12371
(B) Male sample						
Benefits of FGC (dummy for each item)						
Better hygiene	0.02	0.16	3357	0.16	0.36	3201
Social acceptance	0.08	0.28	3357	0.27	0.44	3201
Better marriage prospects	0.01	0.13	3357	0.04	0.20	3201
Preserve virginity	0.04	0.19	3357	0.11	0.31	3201
Male pleasure	0.00	0.09	3357	0.05	0.21	3201
Religious approval	0.03	0.18	3357	0.18	0.39	3201
Benefits of not having FGC (dummy for each item)						
Fewer medical problems	0.58	0.49	3356	0.08	0.28	3201
Avoid pain	0.29	0.45	3356	0.05	0.23	3201
More female sexual pleasure	0.08	0.27	3356	0.09	0.29	3201
More pleasure for males	0.04	0.21	3356	0.05	0.23	3201
Follow religion	0.01	0.12	3356	0.02	0.14	3201