Female Genital Cutting and Bride Price

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Abstract

This paper explores the relationship between female genital cutting (FGC) and the marriage market. I develop a general equilibrium model of parents' decisions to cut their daughters, where the bride price, the groom's traditional payment to the bride's family upon marriage, is determined endogenously in the marriage market. The model predicts that in a context where FGC is a marker of chastity, an unobservable but valuable trait in the marriage market, the practice increases the marital surplus, the bride price. I use a difference-in-differences approach and test the model's predictions on Egyptian data. I build a village-level dataset of the coverage of an anti-FGC campaign, using archive information on Egyptian radio transmitters and a radio propagation software. I find that cohorts exposed to the campaign are 13% less likely to be cut and receive a 24% lower bride price. When investigating whether FGC is a marker of chastity, I find that the decline in FGC is substituted by an increase in pre-marital virginity testing and child marriage. Finally, to better understand whether these marriage market returns provide an incentive for parents to cut their daughters, I conduct a cross-Africa analysis. I find that the practice of bride price is associated with a 16% higher likelihood of a daughter being cut.

Keywords: Female Genital Cutting, Matching, Marriage Market, Bride Price, Norms.

JEL Codes: J12, J16, D13, O15, I15

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1 Introduction

More than 200 million women alive today have undergone female genital cutting (FGC), a practice that involves partial or total removal of the female external genitalia for non-medical reasons (WHO, 2019). Despite the associated health costs, FGC remains alarmingly pervasive. At current rates, 4 million girls are at risk of being cut every year in 31 countries across Africa, the Middle East and Asia (WHO, 2021).[1] While existing research has focused primarily on preventive measures, little has been done to identify the root causes. However, isolating the core drivers is crucial to curb the practice, especially since existing policies have had limited success or even been met with a backlash.[2]

From its origins in Pharaonic times to present-day practice, FGC is believed to promote female chastity, a valuable but unobservable trait in marriage.[3] In the meantime, across Africa, it is customary for the bride's parents to receive a large financial transfer from the groom at marriage, namely the bride price.[4] Surprisingly, the relationship between FGC and these transfers at marriage remains unexplored. Can female genital cutting generate marriage market returns? Is the practice a marker of female chastity? Are these marriage market returns providing incentives for parents to cut their daughters?

To investigate these questions, I begin by developing a general equilibrium model of parents' decision to cut the daughters where the bride price is determined endogenously in the marriage market. In the model, imperfectly altruistic parents face a trade-off between the perceived health cost of cutting and the expected return on the marriage market. The return, the bride price, is the marital surplus transferred to the daughter at marriage and is determined in a frictionless marriage market based on two attributes, cutting and men's wealth. Transferable utility and complementarity of attributes in the marital output function lead to a unique stable equilibrium characterised by positive assortative matching. In equilibrium, the marital surplus, and hence the bride price, is higher for cut women. As a result, the bride price custom provides an additional monetary incentive for parents to cut their daughters. In the model, an exogenous shock that leads parents to update their priors on the health cost would increase the scarcity of cut women in the marriage market and consequently, the share of the marital surplus they receive at equilibrium.

To test the predictions of the model, I focus on Egypt, the cradle of the practice. Egypt is a country where strong restrictive norms regarding female sexuality, the third highest rate of FGC in the world, and comprehensive practice of bride price coexist. It also provides the opportunity to ex-

[1]Health consequences range from severe bleeding and problems urinating, to cysts, infections, complications in childbirth, and risk of newborn deaths. The associated cost is estimated at USD 1.4 billion annually (WHO, 2019).

[2]Some interventions lead to disengagement from health services and secrecy of the practice (UNICEF, 2021).

[3]For instance, the most invasive form of FGC, infibulation, makes sexual intercourse painful, making it a means of controlling a woman's sexuality (Becker, 2018; La Ferrara, Corno, and Voena, 2020).

[4]The bride price custom remains prevalent (Ashraf, Bau, Nunn, and Voena, 2020; Corno, Hildebrandt, and Voena, 2020).

ploit a unique natural experiment. Under increasing international pressure, the Egyptian Ministry of Health sponsored an anti-FGC campaign on the radio from 1994 to 2003. The program aimed to increase awareness about the health consequences of FGC using radio, a primary source of information at the time exclusively owned by the government. Leveraging this source of variation, I show that FGC generates marriage market returns. I find that women exposed to anti-FGC radio messages are less likely to be circumcised and receive a lower bride price. However, I also find that in response to the campaign, parents have substituted FGC with premarital virginity tests and preponing marriage timing, closer to puberty.

To exploit the local variation in exposure to the program, I build a village-level dataset of the anti-FGC radio signal reception. I use archive data from the Egyptian Radio and Television Union (ERTU) containing technical information about the radio transmitters. I use a radio propagation software and an irregular terrain model (ITM). The ITM algorithm predicts the variability of terrestrial radio wave propagation based on the distance to the transmitter and the topographical relief. This method of telecommunications engineering enables me to generate a unique dataset containing the reception areas of the program within each of the 2,458 villages in Egypt.[5] I link the village-level data of the radio campaign with two individual sources of data. Information on FGC comes from the five waves of the Egyptian Demographic and Health Survey (Egypt DHS, 1992 to 2014). The extensive module on FGC allows me to assess the accuracy of the ITM prediction and the impact of the campaign on FGC for more than 60,000 women.[6] Individual information on the bride price paid at marriage comes from the Egyptian Labor Market Survey 2018 (ELMPS, 2018). I use these data to explore the effect of the campaign on bride price and marriage market outcomes for more than 10,000 women.

To better understand causality in the relationship between FGC and bride price, I leverage the plausible exogenous variation generated by differential exposure to the anti-FGC radio campaign across birth-villages and across cohorts, *à la* Duflo (2001). More specifically, I exploit the fact that in Egypt, age at cutting is naturally upward bounded by 15, as the practice is performed before puberty. This implies that exposure to anti-FGC radio campaign messages can affect the cutting decision for women aged below 15 in 1994, the young cohort, and not for women aged 15 and above in 1994, the old cohort. Hence, a woman's exposure to the campaign is jointly defined by the strength of the anti-FGC messages in her village of birth and her age at the time the broadcast started. This allows me to identify the effect of the campaign (treatment) on FGC and bride price by comparing both within-villages (young and old cohorts) and within-cohorts (treated and untreated villages) using a

[5]This method has recently become popular among economists (Olken, 2009; Enikolopov, Petrova, and Zhuravskaya, 2011; DellaVigna, Enikolopov, Mironova, Petrova, and Zhuravskaya, 2014; Yanagizawa-Drott, 2014; Adena, Enikolopov, Petrova, Santarosa, and Zhuravskaya, 2015; Durante, Pinotti, and Tesei, 2019; Gagliarducci, Onorato, Sobbrio, and Tabellini, 2020; Armand, Atwell, and Gomes, 2020).

[6]Women are asked in multiple waves of the DHS whether they heard of FGC messages on the radio in the last year.

difference-in-differences approach.

I find that women exposed to anti-FGC messages are 13% less likely to be cut and receive a 25% lower bride price at marriage. What drives the decline in bride price? The difference-in-differences compares the average bride price of the exposed women to the unexposed women.[7] The average bride price is across the cut and uncut women. Assuming that a village is a marriage market, the change in the average bride price for exposed women varies depending on two competing forces: a partial equilibrium effect and general equilibrium effect. In partial equilibrium, the prices in the marriage market are held constant. A positive shock to parents' perceived health cost negatively affects the decision to cut. Therefore, among the exposed women, fewer are cut, thus, fewer women receive a high bride price. This leads to a decrease in the average bride price (partial equilibrium effect). In general equilibrium, when prices in the marriage market are allowed to change, the scarcity of cut women increases their marital surplus, the bride price. Hence, among the exposed women, the remaining cut women should receive a higher bride price. This leads to a rise in the average bride price (general equilibrium effects). Hence, the 25% decline in bride price implies that the general equilibrium effects do not offset the partial equilibrium effect. These results are in line with the model prediction, namely, for sufficiently low general equilibrium effects, the average bride price should decline.

I observe empirically a manifestation of these general equilibrium effects on the old cohort. I leverage a third source of variation: whether a woman was married in 1994. In presence of general equilibrium effects, all cut women who marry after 1994 should receive a higher bride price in treated villages. Hence, in the old cohort, where the share of cut women is held constant, women married after 1994 should receive on average a higher bride price in treated villages, relative to women already married in 1994. As expected, I observe that within the old cohort women married after 1994 receive a higher bride price in the treated villages. Furthermore, this increase is larger for the youngest women within the old cohort.

Observing empirically these general equilibrium effects allows me to rule out alternative explanations for the decline in bride price, such as a change in broader gender norms or in preferences. That is because any changes unrelated to FGC would have a similar effect, a decline in bride price, on all women married after 1994 in treated villages, whereas I observe an increase in bride price for women in the old cohort who married after 1994. Finally, I account for these GE effects on the old cohort when estimating the main difference-in-differences in bride price, as they represent a violation of the SUTVA assumption (Stable Unit Treatment Value). These more robust estimates show that

[7] The exposed women are the women in the young cohort and in treated villages. The unexposed women are women in the old cohort (control cohort) and untreated villages (control villages). More specifically, the difference-in-differences compares the change in average bride price over the two cohorts (young and old) in treated villages to the change in the average bride price over the two cohorts in untreated villages.

treated women experience a 24% decline in their bride price. Additionally, I do not find evidence of a decline at the extensive margins, the practice of paying a bride price. Taken together, these results demonstrate that FGC generates returns in the marriage market and increases the bride price at marriage.

I further substantiate the main finding that FGC increases the bride price at marriage. Using the pooled Egyptian DHS for which GPS coordinates are available, I construct an indicator of FGC prevalence by village and age cohort. I merge this indicator with the ELMPS data, which contains individual information on bride price. Exploiting the substantial within-villages and within-cohorts variation in FGC, I find that an increase of 10% in FGC in a woman's cohort and the village of birth increases her bride price by about 12%. Additionally, I exploit the segregated nature of marriage markets. In Egypt, both the Coptic and Muslim communities practice FGC, but marriage is highly homogamous, and only Muslims pay the bride price. Consistent with this, I find that a woman's bride price is not affected by FGC prevalence among Coptic women of her birth cohort and village of birth. These results give additional support to the hypothesis that FGC increases the value of the transfer received at marriage.

To substantiate that my main results are consistent with the model predictions, I test for positive assortative matching between FGC and the husband's wealth. I employ an alternative empirical approach, an instrumental variable (IV). The IV strategy exploits the differential exposure to anti-FGC radio messages as an instrument for FGC. As predicted by the model, I find that being cut increases the likelihood of marrying a relatively wealthier husband by 65%. In addition, cut women are 78% more likely to marry a relatively more educated man. ching between FGC and the husband's wealth.

A key question remains, what is the intrinsic function of FGC that explains why cut women generate higher marriage market returns? To answer this question, I analyze the behavioural response to parents' exposure to the campaign. I show that in response to forgoing FGC, parents have substituted alternative cultural practices intended to restrict female sexuality. Using IV estimates, I find that cut women are 83% to 97% less likely to have a pre-marital virginity examination. Similarly, I find evidence that child marriage substitutes for the practice of FGC. I find that being cut delays the timing of marriage, with this effect being concentrated at the age following the onset of female puberty. For instance, cut women are 7% to 8% more likely to be married after 16. These results suggest that by cutting daughters, parents respond to an entrenched demand for markers of chastity in the marriage market.

I dedicate the last part of my analysis to a testable prediction, namely, that the practice of bride price increases a woman's probability of being circumcised. So far, I have shown evidence that FGC is a marker of chastity and generates marriage market returns for women. Are these marriage market returns, in turn, generating an incentive for parents to cut? To answer this question, I leverage the substantial variation in bride price practice across ethnic groups in Africa. I pool the 57 waves of the DHS for the 17 African countries where cutting is practiced. I link this dataset to the Murdock Ethnographic Atlas, which contains information about the ancestral practice of bride price for 1,265 ethnic groups around the world. I obtain a comprehensive database of more than 400,000 nationally representative observations. Exploiting variation across ethnic groups and within countries, I find that belonging to an ethnic group that practices bride price is associated with a 13% to 16% increase in the likelihood of being cut. These results support the hypothesis that the returns on the marriage market for parents, the bride price, generate an incentive to cut their daughters.

Related literature. The contribution of this paper is threefold. First, my paper relates to a strand of economic literature that, since Becker (1973), has engaged in the economic analysis of the marriage market and its importance for economic development.[8] An extensive literature has focused on the return of education on the marriage market and its role in explaining the gender gap in human capital investment.[9] So far, FGC has been suggested as being valued in the marriage market (Chesnokova and Vaithianathan, 2010; Rai and Sengupta, 2013; Hombrados and Salgado, 2018) but lack of data has made it difficult to support such an assumption, let alone causally. My paper fills that gap by providing the first study on the impact of FGC on marriage market outcomes and bride price. By showing that FGC increases women's marriage surplus, I contribute to advancing our understanding of the economics of marriage markets in developing countries.

Second, this paper speaks to literature that highlights the importance of culture and gendered norms for economic development. A growing literature has highlighted the role of norms such as trust, family ties, patrilineality, inheritance rules, son preference, and polygyny in influencing a wide range of economic outcomes.[10] Focusing on gender norms, a growing literature has shown that female labor force participation is highly affected by existing normative beliefs affecting fertility (Fernández and Fogli, 2006), household production (Fernández and Fogli, 2009), and the desirability of traits such as ambition (Bursztyn, Fujiwara, and Pallais, 2017) or religiosity, in the case of veiling (Carvalho, 2013). So far, the literature on FGC has focused on the health and social costs associated with this norm. By showing that non-compliance with the norm results in sizable financial losses

[8] A few of the many are Rao (1993); Bloch and Rao (2002); Botticini and Siow (2003); Chen (2004); Anderson (2007a); Field and Ambrus (2008); Baland and Ziparo (2018); Duflo et al. (2009); Lafortune (2013); Vogl (2013); Low (2014); Jayachandran (2015); Adams and Andrew (2019); Reynos (2019); Bhalotra et al. (2020).

[9] For a not exhaustive list, see Chiappori, Iyigun, and Weiss (2009); Doepke and Tertilt (2009); Becker, Hubbard, and Murphy (2010); Bailey and Dynarski (2011); Eckstein and Lifshitz (2011); Chiappori, Oreffice, and Quintana-Domeque (2012); Lafortune (2013); Attanasio and Kaufmann (2014); Wiswall and Zafar (2015); Blundell, Costa Dias, Meghir, and Shaw (2016); Adda, Dustmann, and Stevens (2017); Ashraf, Bau, Nunn, and Voena (2020).

[10] See, among others, Jacoby (1995); Tertilt (2005); La Ferrara (2007); Algan and Cahuc (2010); Aghion, Algan, Cahuc, and Shleifer (2010); Nunn and Wantchekon (2011); Algan and Cahuc (2014); Alesina, Algan, Cahuc, and Giuliano (2015); La Ferrara and Milazzo (2017); Jayachandran and Pande (2017).

on the marriage market, this paper sheds light on an important economic cost of social norms for women.

Finally, this paper adds to the discussion about the impact of marriage payments on the well-being of women in developing countries. Although the payment of a dowry in India is prohibited, it still prevails and has been linked to alarming consequences for women's well-being.[11] The bride price has lately been criticized for reducing women's access to divorce, increasing domestic violence, and contributing to early marriages.[12] This criticism has been contrasted with findings showing that bride price plays a crucial role in parents' decisions to invest in their daughters' human capital, as education generates positive returns in the marriage market (Ashraf, Bau, Nunn, and Voena, 2020). In line with this mechanism, this paper finds that across Africa, the bride price practice is associated with an increase in FGC. This underlines the unexplored negative effects of bride price in addition to shedding light on a harmful form of premarital investment, FGC.

The paper is structured as follows. Section 2 provides an overview of the practice of bride price and FGC. Section 3 introduces the model. Section 4 presents the data and the empirical setting. Section 5 outlines the empirical strategy. Section 6 presents the main results. Section 7 presents additional results. Section 8 concludes.

2 Background on bride price and FGC

2.1 Bride Price

Although the historical origins of the bride price are not exactly known, the custom can be traced back to 3000 BC. Bride price was practiced in many important ancient civilizations such as the Egyptians, Mesopotamians, Hebrews, and Aztecs (Quale, 1988). For the marriage to be legally valid, the payment of a bride price was required under the rule of the Germanic tribes in China (Davis, 1994). The bride price has been almost ubiquitous in the countries of sub-Saharan Africa: more than 90% of the ethnic groups in sub-Saharan Africa traditionally paid the bride price (Goody, 1973). The historical records show that these payments can be large enough to affect savings and the distribution of wealth across families and generations. The bride price is usually viewed as a payment to the bride's parents in exchange for the right to her labor and reproductive capabilities. The amount required is fairly uniform within society and depends directly on the number of rights transferred, rather than the families' wealth.

For instance, the bride price was higher among Bedouin tribes when the bride married a more

[11]These consequences include: domestic violence (Srinivasan and Bedi, 2007; Menon, 2020), age at marriage (Field and Ambrus, 2008; Corno and Voena, 2016; Tapsoba, 2022), bargaining power (Anderson and Bidner, 2015), and sex-selective abortion (Bhalotra, Chakravarty, and Gulesci, 2018).

[12]See, for instance, Platteau and Gaspart (2007); Gaspart and Platteau (2010); Corno, Hildebrandt, and Voena (2020).

distant relative to compensate for the groom's right to expand his lineage. Women who reach puberty earlier receive a higher bride price to compensate for higher expected fertility (Dekker and Hoogeveen, 2002; Borgerhoff Mulder, 1995). Finally, the ancient bride price was often viewed as a direct payment for a bride's virginity (Anderson, 2007b). In today's practice, the woman's virginity remains a key determinant of the bride price, especially in a society with restrictive norms about female sexuality. Using Palestinian data, Papps, Davis, Grossbard-Shechtman, Mair, Pryor, Reyna, Gratton, Schneider, Tapper, and Wilder (1983) document that a virgin bride receives a significantly higher bride price than a non-virgin. Virginity would be a way of ensuring that the woman's fertility is not compromised and thus serves as a guarantee of the paternity of future offspring. Similarly, in the early 2000s, the Saudi government had to put a legal cap on the bride price for virgins to encourage the marriage of previously married women Hudson and Matfess (2017). Similarly, evidence that virgin brides receive higher bride prices has been found in many ethnic groups across Africa (Mangena, Ndlovu et al., 2013; Sankar and Rajeshkannan, 2014; Ademiluka, 2021).

2.2 Female Genital Cutting

Historically, FGC in its most invasive form, called infibulation, originated in ancient Egypt to control women's sexuality. Infibulated women have had their entire clitoris, labia minora, and most or all of the labia minora removed. Additionally, opposite raw sides of the vulva are then sewn together to form a physical barrier over the vaginal opening. This procedure aims to make vaginal penetration painful and therefore undesirable. In a recent working paper, La Ferrara, Corno, and Voena (2020) trace the spread of the practice across Africa to the route of the African slave trade on the Red Sea. Infibulated female slaves were sold at higher prices in the market because the infibulation ensured chastity and loyalty to the owner and prevented unwanted pregnancies. As the practice solidified through the slave trade and became associated with virginity and purity, the adoption of the practice spread among the rest of the population and gradually took on less severe forms. FGC remains a practice today that is characterized by a strong demand for chastity and control of female sexuality, and the prevalence of infibulation is higher among ethnic groups characterized by restrictive norms about premarital sex. Along the same line, Becker (2018) shows that the current practice of infibulation is intensified in ethnic groups who practice pastoralism, a form of agriculture characterized by the frequent and prolonged absence of men from the settlement. She shows that in a context in which the behavior of women is less observable for men, the central function of infibulation is to reduce paternal uncertainty. In current practice, FGC also persists in its least invasive form as it is believed to offer evolutionary fitness benefits by reducing the risk of non-paternity for men (Howard and Gibson, 2019; Catania, Abdulcadir, Puppo, Verde, Abdulcadir, and Abdulcadir, 2007). Therefore, parents would presumably continue the practice to improve their daughters' marriage prospects (Mackie, 1996; Nour, 2008; Becker, 2018; Hombrados and Salgado, 2018).

3 Model

I now describe a theoretical framework that helps us understand the relationship between FGC and bride price. To do so, I draw on seminal papers by Chiappori, Iyigun, and Weiss (2009) and Ashraf, Bau, Nunn, and Voena (2020).

3.1 Setup

The model has two periods. There are multiple ethnic groups e, and there is a unit mass of women (daughters) and a unit mass of men (sons) in each ethnic group. Parents have only one child and enjoy utility from consumption $\{c\}_{t=1}^{2}$ and from the well-being of their child.

A daughter's utility is denoted as v, and the weight parents place on this utility is given by $\gamma \in [0;1]$. A son's utility is denoted as u, and the weight parents place on this utility is δ. Let y be the parents' income in each period, and let $r \geq 0$ be the discount rate. There is no borrowing or saving.

In the first period, parents choose consumption (c_1) and also decide whether to cut their daughter ($F \in [0,1]$), at a perceived health cost (α_i). Parents are heterogeneous in their prior beliefs about the health cost.[13] Let's assume that α_i is a normal random variable $\alpha_i \sim \mathcal{N}(\mu_\alpha, \sigma_\alpha^2)$ of a probability density function $g()$ and a cumulative distribution function $G()$. Daughters, indexed i, are affected by the perceived health cost in their first period utility in a multiplicative way ($\alpha_i Fi$). Sons are randomly assigned a wealth (ω). In the second period, parents consume (c_2), daughters marry, and marriage market transfers are made. The bride price, denoted BP_e, is the marriage market transfers paid by the groom and given to the bride's parents in ethnic groups that engage in this custom. The indicator I_e denotes ethnic groups in which the groom pays a bride price to the bride's family at marriage ($I_e = 1$) as opposed to ethnic groups in which he does not pay a bride price ($I_e = 0$).

3.1.1 The Household Problem

Parents choose whether to cut their daughter to maximize their utility. Their problem is

$$\begin{aligned} \max_{F_i, c \geq 0} \quad & c_1 + \frac{c_2}{1+r} + \gamma \left[-\alpha_i F_i + \frac{(1-I_e)v_2}{1+r} \right] \\ \text{subject to} \quad & c_1 \leq y \ \text{ and } \ c_2 \leq y + I_e BP. \end{aligned} \tag{1}$$

For ethnic groups that do not practice the bride price tradition, $I_e = 0$ and $BP_e = 0$, whereas for

[13] Because of different environmental factors such as access to information

ethnic groups that do practice the bride price, $I_e = 1$, and the bride price is an equilibrium object $BP(F_i, \omega_j)$ that depends on the bride's FGC status, the groom's wealth, and the perceived health cost of FGC. Regarding the parents of a son, even though the son's utility u enters the utility of the parents, the optimization problem can be ignored as there is no relevant decision on the son's side. [14]

3.1.2 The Marriage Market

I consider ethnic groups with a bride price tradition ($I_e = 1$), where the bride's parents appropriate the marriage market transfer, and ethnic groups without a bride price tradition ($I_e = 0$), where the bride and the groom share the marriage surplus through the intra-household allocation of resources.

There exists a continuum of men with a total mass N whose incomes ω are distributed on [0,1] according to some distribution F. There is a continuum of women with a total mass M whose FGC status is distributed on [0,1] according to some distribution G. I assume a population of the same size such that $N = M$. Women are indexed i and men are indexed j. I define ξ_i and ξ_j to be the woman's and man's respective payoff if they remain single and ξ_{ij} the total value of a marriage between i and j.

Marriage surplus is defined as $z(i,j) = \xi_{ij} - \xi_i - \xi_j$. Since payoffs depend on each spouses characteristics, namely, the FGC status for the woman and wealth for the man, they can be indexed by F and ω such as $\xi_{ij} = \xi_{F\omega}$, $\xi_i = \xi_F$, $\xi_j = \xi_\omega$ and $z(i,j) = z(F,\omega)$ with $F \in \{0,1\}$ and $\omega \in [0,1]$. I assume that the marriage surplus is always positive $z(i,j) > 0$, which ensures that everyone marries in equilibrium and that the marriage surplus is increasing in spousal characteristics such that $z(1,j) - z(1,j^{'}) > 0$, $z(1,j) - z(0,j) > 0$, $z(1,j) - z(0,j) > 0$ and $z(0,j) - z(0,j^{'}) > 0$ for any $j > j^{'}$. I also make the standard supermodularity assumption on the form of the household output function, which captures the idea of complementary between the spousal characteristics and implies that $z(1,j) + z(0,j^{'}) > z(1,j^{'}) + z(0,j)$. I solve the model backward, starting with the marriage market.

3.2 Matching in the marriage market

3.2.1 Who marries whom

A match in the marriage market is an equilibrium outcome if it is stable. That is, if no pair of a man and a woman who are currently not matched with each other would both obtain a strictly higher utility by matching with each other than what they get under the matching outcome, and no man (woman) who is matched with a woman (man) under the matching outcome would receive a strictly higher utility if he (she) were to remain single. Each spouses choose the partner that maximizes their

[14]The problem of parents of a son can be expressed as follows: $\max_{c \geq 0} c_1 + \frac{c_2}{1+r} + \delta \left[\omega_j + \frac{u_2}{1+r}\right]$ with $c_1 \leq y$ and $c_2 \leq y$ where, consistent with the setting, the bride price is paid by the groom.

utility from the marriage, taking into account the reservation utility of the other partner:

$$V_J = \max_I \{z(i,j) - U_I\} \tag{2}$$

$$U_I = \max_J \{z(i,j) - V_J\} \tag{3}$$

Problem 2 can be rewritten such that a woman with attribute F_1 and payoff V(1), as well as a woman with attribute F_0 and payoff V(0), are going to choose between a partner with wealth ω or ω' such that

$$U(\omega)' = z_\omega(F,\omega) \tag{4}$$

$$U(\omega) = \max\{[z(1,\omega) - V_1]; [z(0,\omega) - V_0]\}. \tag{5}$$

From 5 we obtain that the equilibrium return to cutting is given by:

$$V_1 - V_0 = z(1,\omega^*) - z(0,\omega^*) \equiv z_F(F,\omega^*). \tag{6}$$

From result 6, it follows that any man with wealth below ω^* would gain a higher utility from marrying an uncut woman rather than paying V_1 to a cut woman. Similarly, any man with wealth higher than ω^* will be better off marrying a cut woman rather than an uncut one. Hence, the equilibrium on the marriage market is characterized by positive assortative matching.

PREDICTION 1. *The unique stable equilibrium is characterized by positive assortative matching in FGC and wealth.*

Proof: See Appendix A.1. Q.E.D.

3.2.2 Who gets what

Positive assortative matching implies that if there exist e uncut women in the marriage market, such that $e = \sum_{i=1}^{M}(F_i = 1)$, the equilibrium assignment $\Psi(F,\omega)$ will be as describe by Figure 1.[15]

[15] I use e for the share of uncut women in the marriage market. It is different than the indicator I_e that denotes whether the ethnic group practice the bride price custom.

$$\Psi(F,\omega) = \begin{cases} F_0 \text{ marry } \omega \in [0,e] \\ F_1 \text{ marry } \omega \in (e,1] \end{cases}$$

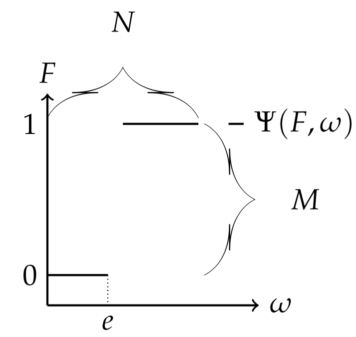


Figure 1: Assignment under Positive Assortative Matching

Notes: Figure 1 presents the equilibrium matching between men and women. $\Psi(F,\omega)$ is the equilibrium assignment. M is the population of women, and N is the population of men. ω, on the x-axis,is the wealth of men, and e is the share of uncut women. F, on the y-axis, takes the value of 0 (uncut women) and 1 (cut women). In equilibrium, the bride price of all cut women is pinned down by the share of uncut women e.

The equilibrium return to cutting will be defined as the marginal surplus that a cut woman brings to the marriage with a man with wealth $\omega^* = e$ and becomes

$$\Delta V \equiv V_1 - V_0 = z(1,e^*) - z(0,e^*). \tag{7}$$

Hence, the equilibrium marital surplus is endogenously determined by who marries whom on the marriage market. We can then rewrite $V(F)$ as a function of the woman's type and the equilibrium assignment profile $\Psi(e)$ such that $V(F) = V(F,\Psi)$.

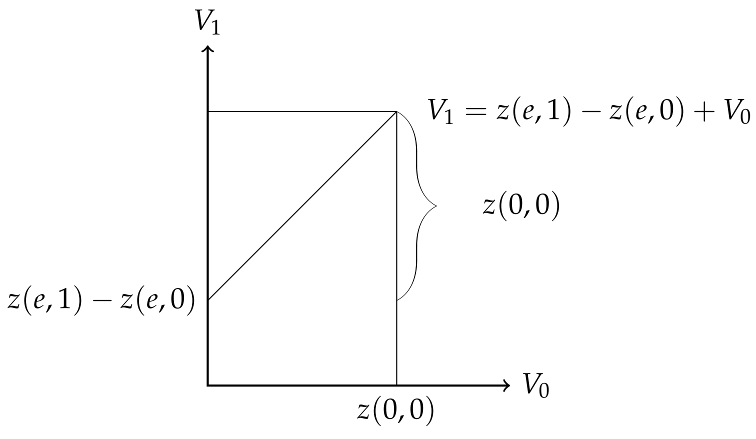


Figure 2: Marriage Market Return to FGC

Notes: Figure 2 presents the area that describes all the marriages that satisfy 7. On the y-axis, we have women with attribute F_1 and payoff V(1) and on the x-axis, we have women with attribute F_0 and payoff V(0). $z(e,1)$ and $z(e,0)$ are the joint surplus of a match between a man with wealth e and a cut woman (F_1) or a uncut woman (F_0), respectively. $z(0,0)$ is the joint surplus of a match between a man with wealth 0 and an uncut woman (F_0).

Figure 2 represents the area that describes all the marriages that satisfy 7. The allocation of marital surplus in the lowest quality match $z(0,0)$ is indeterminate due to finite number, and consequently, the whole set of possible sharing rules differ by a constant, V_0.

PREDICTION 2. *Cut women command a higher bride price payment at marriage relative to uncut women.*

Proof: See Appendix A.2. Q.E.D.

An important result to draw from Chiappori, Iyigun, and Weiss (2009) is that in equilibrium, all women from the same type (cut or uncut) receive the same share of the marriage surplus, no matter whom they marry, because all the men on the other side rank them in the same manner. If a woman were to ask for a higher share than the one defined by the market, she could not obtain it because she could be replaced by an equivalent alternative.

3.3 Household decision about FGC

I next examine the implications of the returns to cutting for the household decision to cut the daughter. Substituting the budget constraints into the objective function, I find that parents choose to cut their daughter as long as the return to FGC exceeds the costs associated with FGC:

$$\alpha_i \leq \frac{\Delta V}{1+r}(I_e \frac{1-\gamma}{\gamma} + 1).$$

This implies that there exists a perceived health threshold $\alpha^*_{I_e}$ that determines parents' decision to cut their daughter in the first period:

$$\alpha_i \leq \alpha^*_{I_e} \equiv \frac{\Delta V}{1+r}(I_e \frac{1-\gamma}{\gamma} + 1). \tag{8}$$

Parents will cut their daughters if the perceived health cost faced by their daughters (α_i) is lower than the equilibrium threshold ($\alpha^*_{I_e}$) where $\alpha^*_{I_e}$ is the health cost of FGC faced by the marginal daughter and depends on I_e. Therefore, the probability of a daughter i to be cut is given by $P_{I_e}(F_i = 1) = P(\alpha_i \leq \alpha^*_{I_e}) = G(\alpha^*_{I_e})$.

Comparing the health cost threshold for a daughter from ethnic groups with and without a bride price, the health cost threshold for a daughter from an ethnic group that practices the bride price is $\alpha^*_{I_e=1} = \frac{\Delta V_i}{1+r}(\frac{1-\gamma}{\gamma} + 1)$, while the health cost threshold for a daughter from a non-bride-price ethnic group is $\alpha^*_{I_e=0} = \frac{\Delta V_i}{1+r} + 1$. Imperfect altruism, ($\gamma \in \{0, 1\}$), implies that $\alpha^*_{I_e=1} > \alpha^*_{I_e=0}$, hence $G(\alpha^*_{I_e=1}) > G(\alpha^*_{I_e=0})$. The bride price provides an additional incentive for parents to cut their daughter.

PREDICTION 3. *The probability of a daughter being cut is higher among ethnic groups that engage in bride price payments.*

Proof: See Appendix A.3. Q.E.D.

The intuition behind this prediction is illustrated by Figure 3.

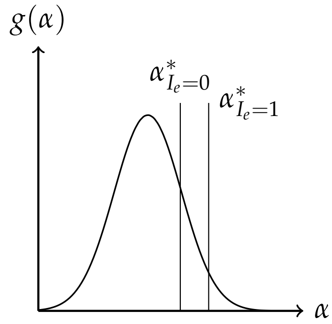


Figure 3: Distribution of the Perceived Health Cost

Notes: Figure 3 shows a hypothetical normal distribution of the parents' perceived health cost α_i and the two equilibrium thresholds $\alpha^*_{I_e}$ for parents belonging to an ethnic group with bride price $\alpha^*_{I_e=1}$ and those without bride price $\alpha^*_{I_e=0}$.

Figure 3 shows a hypothetical normal distribution of the parents' perceived health cost α_i and the two equilibrium thresholds $\alpha^*_{I_e}$ for parents belonging to an ethnic group with bride price $\alpha^*_{I_e=1}$ and those without bride price $\alpha^*_{I_e=0}$. The structure of the distribution implies that there is more density at $\alpha^*_{I_e=1}$ than there is at $\alpha^*_{I_e=0}$. The probability of a daughter being cut is given by the density; therefore it follows that the probability of being cut is higher for girls belonging to bride price groups than for those who belong to a non-bride-price ethnic group.

3.4 Information and Bayesian Learning

I consider a Bayesian framework in which parents update their prior about the health cost associated with FGC after receiving some information through the radio campaign. Suppose parents see a signal s that contains information on the health cost associated with FGC where the signal is denoted as

$$s = \alpha + \eta, \eta \sim N(\mu_\eta, \sigma^2_\eta).$$

The signal is an unbiased piece of data about α (the health cost) and η is a normally distributed noise term. Consistent with the purpose of the anti-FGC campaign which is to reveal that the cost of health care is higher, I consider the case in which $\mu_\eta > \mu_\alpha$. Bayes' rule then gives the posterior belief

$$g(\alpha|s)d\alpha = \frac{p(s|\alpha)p(\alpha)}{p(s)} = \frac{p(s|\alpha)g(\alpha)d\alpha}{p(s)}.$$

It follows that the posterior distribution of α is given by the cumulative distribution function $\Phi(\widehat{\alpha})$:

$$\widehat{\mu} \equiv \mathbb{E}[\alpha|s] = \frac{\tau_\alpha\mu_\alpha + \tau_\eta s}{\tau_\alpha + \tau_\eta} \quad \text{and} \quad \widehat{\sigma} \equiv \text{Var}[\alpha|s] = \frac{1}{\tau_\alpha + \tau_\eta}.$$

where $\tau_\alpha^{-1} = \sigma_\alpha$ and $\tau_\eta^{-1} = \sigma_\eta$. The posterior belief is a weighted average of the prior belief and the signal, where each information is weighted by its relative precision. If a signal contains no information about the health cost, the posterior belief would be the same as the prior belief. The posterior variance is lower than the prior variance, which illustrates that additional information reduces uncertainty about the health cost (α).

3.4.1 Equilibrium Threshold of Perceived Health Cost

I now turn to the first comparative statics of interest: what is the effect of the radio campaign on the probability of cutting? The effect of parents' exposure to the campaign on the probability of cutting their daughter is given by the partial derivative:

$$\frac{\partial P_{I_e}(F_i = 1)}{\partial s} = \frac{\partial G(\alpha_i < \alpha^*_{I_e} | s)}{\partial s} < 0. \tag{9}$$

The probability of parents cutting their daughter decreases with the signal transmitting information about the health cost associated with FGC.

Prediction 4. *Parents' exposure to anti-FGC health information decreases the probability that they will cut their daughter.*

Proof: See Appendix A.4. Q.E.D.

The intuition behind this prediction is illustrated by Figure 4 which shows a hypothetical normal distribution of parents' perceived health cost prior before and after the campaign. The signal (the campaign) is represented by the dotted line ($g(s)$) and is distributed around the true value of the FGC health cost (α). The prior beliefs about ($g(\alpha)$) are represented by the solid line and centered around a lower average. It follows that the posterior perceived health cost for parents, represented by the dashed line, is now centered around a closer value to the real health cost. The equilibrium threshold that determines the probability of a girl being cut is represented by $\alpha^*_{I_e}$. As illustrated, for a given $\alpha^*_{I_e}$ the density below the posterior distribution is lower than the density below the prior distribution of α_i.

3.4.2 Equilibrium share of marriage surplus and bride price

I now turn to the second and third comparative statics of interest: what is the effect of the campaign on the equilibrium bride price of a woman and the aggregate bride price in the marriage market?

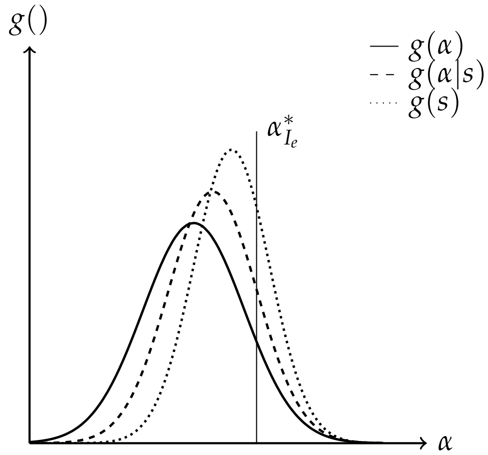


Figure 4: Unconditional and Conditional Distribution of Perceived Health Cost Associated with Cutting

Notes: Figure **??** presents the distributions of health costs associated with cutting. The signal (the campaign) is represented by the dotted line $g(s)$ and is distributed around the true value of the FGC health cost α. The prior beliefs about $g(\alpha)$ are represented by the solid line and centered around a lower average. The posterior distribution of the health costs is $g(\alpha|s)$.

Marital Surplus and bride price. Since the population of uncut women is given from the household decision problem, it follows that $e \equiv \sum_{i=1}^{M}(F_i = 0)$ is now endogenously determined in the model and can be written as a function of s:

$$e(\alpha, s) = \sum_{i=1}^{M}(F_i = 0) = 1 - G(\alpha_i < \alpha^*_{I_e}|s). \tag{10}$$

The effect of parents' exposure to the campaign on the equilibrium bride price is going to be given by the change on the bride price for a cut woman, given by the following partial derivative:

$$\frac{\partial V_1\left(\Psi(e)\right)}{\partial s} = \frac{\partial z_F(F, \Psi)}{\partial \Psi}\frac{\partial \Psi(e)}{\partial e}\frac{\partial e}{\partial s} > 0. \tag{11}$$

In Equation 11, $\frac{\partial e}{\partial s}$ describes the change in the population of uncut women after parents have been exposed to health awareness information on FGC. The population of uncut women increases as the probability of being cut is decreasing with the signal, as described by Figure 4.

In Equation 11, $\frac{\partial \Psi(e)}{\partial e}$ describes the change in the equilibrium assignment after the change in the uncut population. Figure 5a describes this change: for a variation Δe, the equilibrium assignment will linearly shift to the right by the value of Δe and becomes Ψ' with $\Psi' > \Psi$. Finally, the first term of the derivative describes the change in the sharing rule of surplus subsequent to the change in the equilibrium assignment, as illustrated in Figure 5b. The equilibrium bride price that was defined by the maximization problem 5 is now going to be determined by the level of utility for which a man with wealth e' is indifferent between marrying an uncut and a cut woman. The new marriage market return to cutting at equilibrium will be defined by a cut woman's marginal contribution to the marriage with e′ such that $\Delta V' = V_1 - V_0 = z(1,e') - z(0,e')$ with $\Delta V' > \Delta V$. Hence, the total effect of parents' exposure to the campaign is an increase in the marital surplus that a cut daughter will extract on the marriage market. As V_0 is determined by the allocation of marital surplus in the lowest quality match $z(0,0)$, it remains indeterminate and is independent of the population of cut women.

Let's define a given marriage market Φ. Since there is a unique bride price at equilibrium that clears each marriage market, the equilibrium bride price in a given marriage market can be indexed as $V_1\left(\Psi(e)\right)^{\Phi}$ and the marital surplus received in a new equilibrium $V_1\left(\Psi'(e')\right)^{\Phi'}$. Assuming that the campaign independently affects different local marriage markets, the effect of the campaign on the equilibrium bride price can be expressed as comparing the bride price in the treated and untreated marriage market such that

$$V_1^*\left(\Psi'(e')\right)^{\Phi'} > V_1^*(\Psi(e))^{\Phi}. \tag{12}$$

As the new equilibrium share of surplus received by cut women increases after the campaign, as shown by result 11, it follows that the equilibrium bride price in a marriage market in which parents have been exposed to the campaign is higher than in an untreated marriage market.

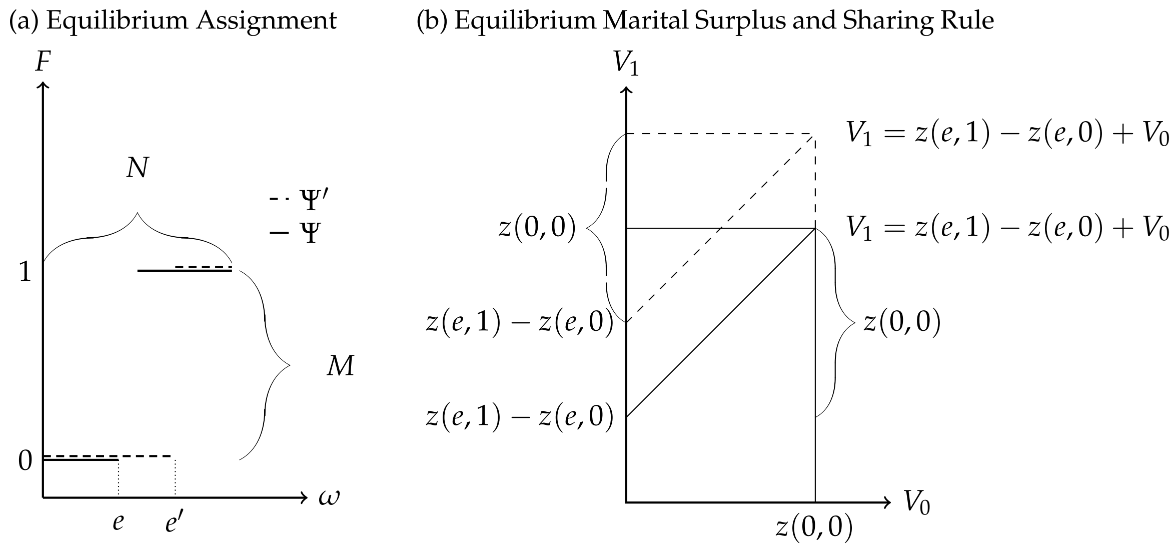


Figure 5: Changes in Assignment and Surplus Share on Marriage Market

Notes: Panel a presents the changes in the equilibrium assignment of couples. ω is wealth, and F takes the value of 0 (uncut women) and 1 (cut women). The share of cut women declines from e to $e^{'}$ after the campaign. Ψ and $\Psi^{'}$ are equilibrium allocations before and after the campaign. Panel b presents the equilibrium marital surplus and sharing rule among couples. $z(e,F)$ is the surplus produced by a man of wealth ω and female a with cut status F.

PREDICTION 5. *The marital surplus and bride price received by cut women at equilibrium ($V_1^*\left(\Psi(e)\right)$) are higher in marriage markets in which girls parents have been exposed to the campaign (Φ'), relative to marriage markets in which parents are not exposed (Φ).*

Proof: See Appendix A.5. Q.E.D.

Average marital surplus and bride price in the marriage market. The aggregate bride price payment in a given marriage market Θ can be expressed as

$$V_\Theta = eV_0 + (1-e)V_1 \tag{13}$$

and can be rewritten as

$$V_\Theta = (1-e)\left[z(1,e) - z(0,e)\right] = (1-e)\, z_f(F,e). \tag{14}$$

The effect of parents exposure to the campaign on the average bride price in a given marriage market is given by

$$sign\left(\frac{\partial V_\Theta}{\partial s}\right) = -\frac{\partial e}{\partial s}(z_f(F,e)) + \frac{\partial z_f(F,e)}{\partial s}(1-e). \tag{15}$$

The second part of the derivative in Equation 15 is positive and captures the increase in the value of marital surplus received by cut women at equilibrium, as in equation 11, weighted by the population of cut women. The first term of the derivative in Equation 15 is negative and describes a situation in which the increase in the population of uncut women leads to more women receiving V0 at marriages, and hence, the average marriage payment declines. With some manipulation, 15 tells us

$$\left(\frac{\partial V_\Theta}{\partial s}\right) > 0 \qquad \text{if } z'_F(F,e) > \frac{z_F(F,e)}{(1-e)} \tag{16}$$

$$\left(\frac{\partial V_\Theta}{\partial s}\right) < 0 \qquad \text{if } z'_F(F,e) < \frac{z_F(F,e)}{(1-e)} \tag{17}$$

with $z'_F(F,e) = \frac{\partial z_F(F,e)}{\partial e}$ being the change in equilibrium price (or general equilibrium effects).

PREDICTION 6. *For a sufficiently low $z'_F(F,e)$ (general equilibrium effects), the aggregate marital surplus received by all the women at equilibrium ($V^*(\Psi(e))$) is lower in marriage markets in which girls' parents have been exposed to the campaign (Φ'), relative to marriage markets in which parents are not exposed (Φ).*

Proof: See Appendix A.6. Q.E.D.

Without any further assumption on the form of the marital surplus function $z(F,e)$, the empirical estimates of the general equilibrium effects will guide the direction of the average bride price V_Θ. For instance, the average bride price will decline for a sufficiently moderate change in $z'_F(F,e)$.

4 Data and Empirical Setting

In this section, I first present a descriptive analysis of FGC and the marriage market in the context of Egypt. I then document the socio-political context of the anti-fgc radio campaign. Finally, I will provide more information on the construction of the village-level dataset of program coverage and perform several validity checks to measure the accuracy of this measurement. I will also provide brief descriptions of the other two main data sets that I will use in my main empirical analysis.

4.1 FGC and Marriage Market in Egypt

Egypt is a fascinating context in which to study the return of FGC on the marriage market. The institution of marriage in Egypt has recently attracted increasing attention in economics. Marriage is considered a major turning point among young Egyptians, and transfers at marriage are among the highest in the Middle East (Assaad, Binzel, and Gadallah, 2010). Their value can exceed seven years of the groom's income (Singerman and Ibrahim, 2003; Salem, 2015). Marriage in Egypt comes under Personal Status Law, based on the Sharia, an Islamic Law that mandates the payment of a bride price for the validation of the marriage. More importantly, the value of the bride price is largely governed by marital gender norms. Anderson, Bidner, and Sadania (2020) show that the husband's willingness to pay a higher value is largely determined by his expected authority and control over the bride.

In the meantime, the prevalence of FGC in Egypt is among the highest in the world, and the practice is strongly believed to reduce sexual desire. Recent focus groups showed that both men and women believe that FGC reduces pre-marital sex and extramarital affairs (Fahmy, El-Mouelhy, and Ragab, 2010). The prevalence of FGC stagnates in about 94% of the cohorts born between 1950 and the late 1970s and then drops to 85% for the younger cohort born after the early 1990s (Figure 6). While this decline might be thought to involve a change in norms regarding virginity, the opposite is observed. The decline in FGC is accompanied by an upsurge in virginity tests at marriage. Virginity testing is an inspection, performed by a medical practitioner, of the female genitalia to determine whether a woman has had vaginal intercourse. Hymen examination and the two-finger test are the most commonly forms of examination.[16]

Figure 6 shows the trends in FGC and premarital virginity examination over time. We can observe that for cohorts born after the end of 1970, there is a noticeable transition that reverses the trend between FGC and exams. Virginity tests were rarely performed in cohorts born before 1980 but increased from near 0 to 45% in cohorts born between 1980 and 1995.

[INSERT FIGURE 6]

[16]Both methods rely on "*no scientific merit or clinical indication the appearance of a hymen is not a reliable sign of intercourse and there is no known examination that can prove a history of vaginal intercourse*" World health organization (2019).

4.2 The 1994 Anti-FGC Radio Campaign

The decline in FGC rates seen in the cohort born after the late 1970s is believed to be the result of a concerted effort against the practice that began in 1994. The year 1994 was a turning point for FGC: the International Conference on Population and Development (ICPD), coordinated by the United Nations, took place in Cairo in 1994. Several NGOs met in preparation for the conference, and the FGC National Task Force was founded. In total, around 60 organizations, including feminist groups, human rights activists, doctors, academics, and civil society organizations, have come together to denounce the high FGC rate in Egypt (UNPF, 1994). In response to growing international pressure, the then incumbent health ministry, Ali Abdel Fattah Al-Makhzanji, decided in autumn 1994 to sponsor a radio campaign to reduce FGC (El-Shazly, 2010). The program was aimed to raise awareness of the health effects of FGC. The program "Al-Rabat El-Byout" was presented by a couple of female presenters, Sofia El-Mohandes and Gamalat el Zbady. During the show, the host answered live questions that were mailed in by women, and some episodes featured special guests, mostly doctors (Ministry of Communications, 1995). The show aired for five minutes daily in the morning, a time slot strategically chosen to reach a predominantly female audience, as mothers are the ones who make the FGC decision (Ministry of Communications, 2006) .

The show was broadcast on the radio until 2003, since radio was the main source of information at the time and was entirely state owned, and the show was broadcast on television after 2003 (Ministry of Communications, 2005). It is worth noting that at the time of broadcasting, the radio was widespread in Egypt, making a radio program the best way to reach a large audience (28TooMany, 2018).[17] Looking at the descriptive statistics from the different DHS surveys, we can see that a large portion of the women was exposed to anti-fgc messages when the program was airing. Figure 8 shows that more than 35% of women declare having heard of FGC messages the year proceeding 2000, and more than 20% the year proceeding 2003. After the program resume, women were about less than 5% to declare having heard of FGC in the radio (2005, 2008, 2014 DHS survey).

[INSERT FIGURE 8]

Extensive public policy research has examined the temporal relationship between the decline in FGC and the introduction of the program in 1994. The analysis indicates a structural change after 1994: an increasing awareness among mothers of the health risks of having their daughters cut and a significant decrease in the prevalence of FGC in cohort in age to be cut after 1994 (El-Gibaly, Ibrahim, Mensch, and Clark, 2002; Afifi et al., 2010; Fahmy, El-Mouelhy, and Ragab, 2010; Modrek and Liu, 2013; Naomi, Sylvie et al., 2020). Exposure to the anti-FGC message in the media has been

[17] For instance, 84.56% of the population in Egypt have a radio, and 63.49% listen to the radio daily (Egypt DHS 1995/2000).

documented and has been linked to a decrease in intent to cut a girl and to change beliefs about FGC (Suzuki and Meekers, 2008). Taken together, these policy change reviews point to the anti-FGC campaign as the prime candidate for the 1994 trend reversal.

4.3 Data and Descriptive Statistics

In this section, I describe source of data and the construction of the anti-FGC radio program data.

4.3.1 Anti-FGC Radio Archives and ITM Software: Village-level Coverage of the Anti-FGC Radio Campaign

The radio coverage is obtained using two datasets and is built up in several steps. The first dataset includes archives provided by the Egyptian Radio and TV Union Network (ERTU). They contain technical specifications for the existing radio stations in 1994 and the frequency at which each program was broadcast. At the time, radio stations were owned by the Egyptian government. The anti-FGC radio program was broadcast from four radio transmitters (Cairo, Sharm-El-Sheikh, Nuweiba, El-Tur). The dataset includes the latitude, longitude, height of the antenna base, antenna height, transmission power, frequency for each program, and polarization of the transmitter. In addition, I use digital topographical data about the elevation of the earth's surface provided by the Shuttle Radar Topography Mission (SRTM - NASA). With Irregular Terrain Model (ITM) software, I implemented a Longley-Rice algorithm that predicts the signal strength of the radio frequency according to the irregularity of the terrain. The high resolution of the topographic data enables a prediction of the radio coverage at a 90X90 meter. The average radio signal strength of anti-FGC radio broadcasts by village is determined using a digitized map of Egypt's administrative borders.[18] Accordingly, the final measurement is a continuous variable in the range from 0 to 100, which indicates no to full radio coverage in the village.

The average coverage of the villages in the sample is 71%. Among the villages, 14.88% had no reception. Figure 7 shows the geographic variation in radio coverage. Within villages at the same distance from a transmitter, the variation in the signal comes from differences in the elevation of the earth's surface, which intercepts the radio waves.

[INSERT FIGURE 7]

Validity and Accuracy of the Measurement. In this section, I use the available information on women's exposure to FGC-related radio content from the different waves of the Egyptian Demo-

[18] This method is used by radio and television engineers to assess broadcast signal strength and has recently been used in the economics literature on media (Olken, 2009; Enikolopov, Petrova, and Zhuravskaya, 2011; DellaVigna, Enikolopov, Mironova, Petrova, and Zhuravskaya, 2014; Yanagizawa-Drott, 2014; Adena, Enikolopov, Petrova, Santarosa, and Zhuravskaya, 2015; Durante, Pinotti, and Tesei, 2019; Gagliarducci, Onorato, Sobbrio, and Tabellini, 2020; Armand, Atwell, and Gomes, 2020).

graphics and Health Survey to assess the accuracy of the anti-FGC radio measurement. The 2000 and 2003 EDHD waves were collected at the time the campaign was broadcast on radio (1994-2003). The 2005, 2008, and 2014 waves were collected after the program was discontinued. Therefore, I expect an association between the measurement of anti-FGC radio signals and women's exposure to anti-FGC-related content on the radio in 2000-2003 but not in the other waves. In addition, DHS asks these same women if they heard about family planning on the radio, which I use as a placebo to assess that my measurement of the anti-FGC program is not an artifact of wider radio reception. To provide a robust estimate of the relationship between the anti-FGC radio coverage and women's exposure to anti-FGC content on the radio, I estimate the following equation:

$$Y_{ivc} = \Phi_1 Anti\text{-}FGCradio_{ivc} + \Phi_2 X_{ivc} + \Phi_3 \Pi_{vc} + +\Phi_4 \zeta_c + \sigma_{igt} \tag{18}$$

where Y is the variable of interest for a woman i who lives in a village v and a commune c. *Anti-FGC radio* is the anti-FGC radio coverage of village v in a commune c. X is a vector of individual covariates that control age, religion, and education of wives and husbands, number of daughters and sons, and household wealth. Π is a vector of the village v covariate that controls the latitude and longitude of the village, the population density, the distance to the nearest transmitter squared, and the radio coverage of other programs broadcast at that time (Coran, music, sports). ζ the commune is fixed effects.[19].

Figure 9 plots the estimates of equation 18 with having heard of FGC on the radio in the last year as the dependent variable. As expected, the likelihood of women declaring yes is positively and significantly associated with the anti-FGC radio measurement when asked in the 2000 and 2003 waves but not when asked in the 2005, 2008, 2014 waves. When estimating a similar equation for the probability that a woman declared having heard of family planning on the radio in the last year, the resulting coefficients are not statistically significant and are close to zero in all the EDHS waves. Although these results are not causal, they provide robust support for the accuracy of the anti-FGC measurement.

[INSERT FIGURE 9]

4.3.2 Individual Level Data

Data on Female Genital Cutting. Data on female genital cutting (FGC) are from the Egypt Demographic and Health Survey (EDHS). The EDHS are subnationally representative surveys at the individual level that were collected in several waves. For this study, I have pooled together all EDHS

[19] There are 351 communes -*"Qism"*- in Egypt

for which GPS data are available: 1992, 1995, 2000, 2003, 2005, 2008, and 2014. The total sample consists of 62,305 women who were randomly selected for the FGC module. GPS information are important when merging the EDHS data with data on radio broadcasting. Information on FGC is collected retrospectively during the woman's interview. Women are first asked if they have been cut: "Have you yourself ever been circumcised?" A major benefit of this dataset is that it allows me to identify adult women who are in age be cut before and after the program was launched. Using adult women enables me to use self-reported information about cutting rather than using mothers' responses about their daughters. This will significantly reduce concerns about misreporting as the declaration of mothers is more sensitive to the bias of social desirability and fear of legal sanctions (De Cao and Lutz, 2018; De Cao and La Mattina, 2019).

Data on bride price. I use data from the 2018 Egyptian Labor Market Survey (ELMPS-2018). The ELMPS is a large nationally representative survey with individual modules on marriage and individual socioeconomic characteristics. Each household fills out a household questionnaire and at least one individual questionnaire. The data for the household questionnaire are collected from the household head. They include information about the household members, their relationship with the head, and household demographics. The individual questionnaire is applied directly to all persons aged 15 and over, with modules on education, work, marriage, and women's status. The variable of interest is the value of the bride price received on marriage. As this information is collected retrospectively from both spouses, I affirm the accuracy of the information by excluding women who report a value other than that given by their husband (163 observations). I also correct the value with the consumer price index (source IMF). The final sample consists of 10,000 women who were married between 1985 and 2018. A key benefit of the ELMPS is that it provides accurate information about each person's place of birth and current location. This information is essential for the connection of the radio signal to the place of birth of the woman.

4.4 Trends in FGC and bride price

Using unique data specific to exposure to the anti-FGC radio program — described below in section 4.3 — I plot the evolution of FGC prevalence over time combined with a comparison of villages with high and low exposure to the program. Figure 10 shows that the prevalence of FGC is falling for cohorts in age to be cut after the introduction of the program in 1994, and this decrease is more pronounced in the highly exposed cohorts. In addition, in Figure 10 I also show the evolution of the bride price's value over time as a function of high or low exposure to the program. The graph shows that the bride price rises evenly in all cohorts, and then, at a time concurrent with the introduction to the program, the trends split. The bride price rises more sharply for cohorts with low exposure to the program. Figure 10 illustrates that there is a link between the development of FGC and the introduction of the program and that this could later have influenced the value of the bride price received on marriage.

[INSERT FIGURE 10]

5 Empirical Strategy

To understand the effects of FGC on the bride price, I will rely on the variation generated by the anti-FGC campaign. My empirical strategy is twofold. First, I examine how the campaign affected a woman's likelihood of being cut (FGC). Second, I use campaign exposure as a proxy for FGC and examine its impact on bride price. I will also discuss the main identification assumption and the extent to which other mechanisms could be at play.

5.1 Difference-in-Difference on FGC

The first empirical strategy aim at empirically testing prediction 4.

- **Prediction 4.** Parents' exposure to anti-FGC health information decreases the probability that they will cut their daughter.

5.1.1 Econometric Specification

My main empirical strategy is a difference-in-difference specification exploiting the plausible exogenous variation generated by differential exposure to the anti-FGC radio campaign across birth villages and across cohorts, *à la* to Duflo (2001). The first source of variation captures the different intensity of exposure to treatment using anti-FGC radio coverage in the place of birth. The second source of variation is defined by the woman's year of birth. Women are cut between the ages of 5 and 15 years. Therefore, all women born in 1979 or earlier were 15 or older in 1994 and did not benefit from the program. That is because their parent's decision to cut would have already been made. Women born after 1979 were younger than 15 and therefore could benefit from the program. The difference-in-difference specification is

$$Y_{ivkt} = \lambda_1(Treat_v \times Post_k) + \alpha_v + \alpha_k + \alpha_t + \xi_{ivkt}, \tag{19}$$

where i denotes a woman, v her birth-village[20], k her birth-year and t the year of marriage. The outcome of interest, Y_{iva}, consists of an indicator of whether the woman declares being cut or the

[20] Birth-Village are available in ELMPS only, not in the Egyptian Demographic and Health Survey.

value of the bride price she received at marriage. $Treat_v$ is the continuous measure of program intensity as measured by anti-FGC radio signal coverage at the birth-village level. $Post_i$ is a dummy variable that takes the value of one if the woman belongs to the young cohort who was below age 15 at the time of the campaign and zero if she belongs to the control group (older than age 15 at the time of the campaign). I substitute the village of birth fixed effect α_v for the main effect of the campaign ($Treat_v$) and α_k the year of birth fixed effect for the main effect of cohort ($Post_i$). Including the fixed effects accounts for the unobserved persistent heterogeneity across villages of birth and unobserved shocks that are common to all women belonging to the same age cohort. The coefficient of interest is λ_1, and the conceptual framework predicts it having a negative sign. λ_1 is the differential effect of the treatment λ_1 and tells us how different the probability of a woman being cut should have been in the young cohort in absence of the treatment.

The reasoning behind defining the age risk relative to age 15 is based on the fact that cutting is always done before 15. This definition is advantageous for two main reasons. First, it allows me to meet the identifying assumptions, as the pre-treatment group cannot be affected by the treatment, and is convenient to transpose later in our analysis of the bride price. However, even if this strategy doesn't pose a threat to the causal identification, it might be an underestimation of the magnitude of the effect. The reason is that in the post-treatment group, a significant share of women would have been already cut and couldn't benefit from the treatment. In other words, the treatment group includes a partially treated group. In a second strategy, I use information on age at cutting and construct a measure that allows us to better grasp the magnitude of the treatment. I define the control group as all the women that had been cut by 1994 and the cohort at risk as all the women that hadn't been cut.

5.1.2 Identifying Assumptions

Though the difference-in-differences specification accounts for many potential identification concerns, λ_1 will still be biased if women in more intensively treated villages experience non-linear differential time trends. To establish if trends are parallel prior to the treatment, I estimate a regression model that includes treatment leads and lags. This event study analysis allows both treated and control groups to be compared at multiple time points in the pre-treatment and post-treatment period.

The econometric specification discussed in Section 5 is generalized to an interaction terms analysis that estimates cohort-by-cohort contrasts. To do so, I estimate the following equation:

$$Y_{ivtm} = c_1 + \beta_1 \sum_{m=1}^{45} Treat_v \times P_m \mathbb{1}[t = m] + \beta_2 X_{ivk} + \alpha_{1,v} + \alpha_{2,k} + \epsilon_{iva} \tag{20}$$

The dependent variable Y_{ivtm} is the outcome variable for a woman i, in village v, at age t, and at event-time m. $Treat_v$ is the anti-FGC radio coverage in the village v where woman i is born. This treatment variable did not change during the time the program was broadcast, and thus is a time-invariant variable. It is interacted with event-year dummies, $\mathbb{1}[t = m]$, that measure women's age relative to 1994 to investigate the dynamic impact of the program. The campaign operates for women whose age in 1994 $m < 15$ (leads) and did not for women whose age in 1994 $m >= 15$ (lags). The omitted category is t = -1, which means that the dynamic impact of being exposed to the campaign is estimated with respect to one year prior to a woman being at risk of being cut (older than 15). Therefore, each estimate of β_1 provides the change in outcomes in treated villages relative to non-treated villages for woman who were of age t in 1994, as measured from one year before the campaign starts. However, when estimating dynamic treatment effects using a two-way fixed effect (TWFE), in the presence of a heterogeneous treatment effect, the coefficients on the leads and lags of the treatment variable might place negative weights on the average treatment effects for certain groups and periods.[21] As I am using a continuous measure of the exposure and because some cohorts will be more intensively exposed than others, the treatment can have a heterogeneous effect. Although this is unlikely to generate a strong bias, as I always have a "pure" control group either not exposed at all villages or not at risk of being cut, I will use the estimator proposed by de Chaisemartin and D'Haultfoeuille (2020) to account for this potential bias.

5.2 Difference-in-Difference on Bride Price

The second step of my main empirical analysis is the estimate the effect of the exposure to anti-FGC on the bride price value. Guided by the theoretical predictions, I will proceed in two steps to empirically test the predictions 5 and 6.

Prediction 5 of the model predicts that in the presence of a general equilibrium (GE) effect, the equilibrium bride price that cut women receive upon marriage should be higher in treated villages.

- **Prediction 5.** The marital surplus and bride price received by cut women at equilibrium ($V_1^*(\Psi)$) are higher in marriage markets in which girls' parents have been exposed to the campaign (Φ_T), relative to marriage markets in which parents are not exposed (Φ).

Prediction 6 predicts that if GE effects are not too strong, the average bride price in a treated village should be lower than in an untreated village.

- **Prediction 6.** For a sufficiently low $z'_F(F, e)$ (general equilibrium effects), the aggregate marital surplus received by all the women at equilibrium ($V^*(\Psi)$) is lower in marriage markets in

[21] See De Chaisemartin and d'Haultfoeuille (2020); Callaway, Goodman-Bacon, and Sant'Anna (2021); Borusyak, Jaravel, and Spiess (2021); Sun and Abraham (2021); Goodman-Bacon (2021).

which girls' parent's have been exposed to the campaign (Φ_T), relative to marriage markets in which parents are not exposed (Φ).

5.2.1 Estimating General Equilibrium Effects

To discuss the presence of GE empirically, I take advantage of the structure of the marriage market and the timing at which different cohorts engage in marriage.

In the pre-treatment cohort, all women were older than 15 years at the time of broadcast. Therefore, even if their parents had been exposed to the messages, it would be too late for them to change their decision about circumcision. In other words, the treatment could not induce a compositional change in this specific cohort. However, within this cohort, a significant proportion of women were not yet married. Therefore, the bride price a husband must pay for them will be determined after exposure in a local marriage market where the younger cohort is exposed. In this younger cohort, the composition of cut women would have decreased, conditional on the treatment being successful. Therefore, in the presence of a general equilibrium effects, unmarried women in the pretreatment cohort should, on average, benefit from the shortage of cut women in the younger cohort.

To capture the GE effect on the bride price, I exploit two sources of variation: within the pool of marriage and within village variation. This strategy allows me to capture differences in the time-invariant characteristics of different villages and locally invariant characteristics of different marriage timing for women. The first source of variation comes from the timing of the marriage. Already married women in 1994 could not be affected by a change in the equilibrium bride price whereas women that were not yet married could. The second source of variation comes from the intensity to which villages were exposed to anti-FGC radio messages. I estimate the following specification for the subsample of pretreated women:

$$BridePrice_{ivkt} = \beta_1(Treat_v \times unmarr_t^{in1994}) + \alpha_k + \alpha_v + \alpha_t + \xi_{ivkt} \tag{21}$$

where i denotes a woman, v her village of birth, k her year of birth, and t the year of marriage. The outcome of interest, $BridePrice_{ivk}$, is the value of the bride price she receives at marriage. $Post_i$ is a dummy variable that takes the value of one if the woman was not married yet in 1994 and zero if she was. $Treat_v$ is the continuous measure of program intensity as measured by anti-FGC radio signal coverage at the birth-village level. I substitute the village of birth fixed effect α_v for the main effect of the campaign ($Treat_v$) and α_t the year of marriage fixed effect for the main effect of marriage timing $unmarr_t^{in1994}$).

The coefficient of interest is β_1, and the model predicts $\beta_1 > 0$. For all unmarried women, the bride price should be higher than for married women, considering that the bride price increases over time.

However, this difference is likely to increase in highly exposed villages. β_1 captures the difference in these differences and can be interpreted as the effect of the campaign.

5.2.2 Econometric Specification for the bride price

In the presence of GE, the treatment effect will be biased upward when comparing the bride price in the pre-treatment and post-treatment cohorts in each village. This is because the average bride price in the pretreatment group is higher than it would have been without treatment, leading to a violation of the Stable Unit Treatment Value (SUTVA) assumption. To account for this spillover effect on the control cohort, I estimate the following specification:

$$
\begin{aligned}
BridePrice_{ivkt} = \lambda_1(Treat_v \times Post_k^{0-15}) + \lambda_2(Treat_v \times Pre_k^{15-35} \times notmarr_t^{in1994}) \\
+\alpha_v + \alpha_k + \alpha_t + \xi_{ivkt},
\end{aligned} \tag{22}
$$

where i denotes a woman, v her village of birth, k her year of birth, and t the year of marriage.The outcome of interest, $BridePrice_{ivk}$, is the value of the bride price she receives at marriage. $Treat_v$ is the continuous measure of program intensity as measured by anti-FGC radio signal coverage at the birth-village level. $Post_k^{0-15}$ is a dummy variable that takes the value of one if the woman was age zero to 15 in 1994. Pre_k^{15-35} is a dummy variable that takes the value of one if the woman was age 15 to 35 in 1994. $notmarr_t^{in1994}$ is a dummy variable that takes the value one if the woman was not married yet in 1994. I substitute the village of birth fixed effect α_v for the main effect of the campaign ($Treat_v$), the year of birth fixed effect (α_k) for the main effect of the cohort, and α_t the year of marriage fixed effect for the main effect of marriage timing $unmarr_t^{in1994}$). The empirical strategy is similar to a triple-differences where $notmarr_t^{in1994}$ doesn't vary across cohort group. I provide a detailed explanation in section B.2.

The main coefficient of interest is λ_1. The conceptual framework predicts that $\lambda_2 > 0$ and $\lambda_1 < 0$ for a sufficiently low value of λ_2. As bride price levels in Egypt were increasing during this period, λ_1 should be interpreted as how much higher the bride price should have been for the young cohort in absence of the treatment.

5.2.3 Identifying Assumptions

The augmented difference-in-differences specification accounts for many potential identification concerns and externalities on the pre-treatment group. A key identification assumption for λ_1 to be unbiased is that conditional on capturing externalities on unmarried women in the pre-treatment periods, women in more intensively treated villages don't experience non-linear differential time trends. To establish if trends are parallel prior to the treatment, I estimate a generalized equation 22 to an event study. The econometric specification describing the event study is similar to the specification described in 20 where the dependent variable is the bride price. Additionally, to account for the indirect effect, the specification controls for the term $\lambda_2(Treat_v \times Pre_k^{15-35} \times notmarr_t^{in1994})$ described in Section 5.2.2.

6 Main Results

In this section, I present the main finding: exposure to the anti-FGC campaign during childhood reduces the likelihood of being cut and decreases the bride price received at marriage. I then discuss the main mechanism behind the variation in bride price. I provide a discussion that substantiates that the decline in bride price can be attributed to variation in the bride's cutting status.

6.1 Was the campaign effective in reducing FGC?

Difference-in-Differences. Table 1 reports the first set of results: the difference-in-differences estimates of the impact of anti-FGC radio messages on FGC for women exposed at age risk of being cut relative to women not at risk. Consistent with the prediction of the model, I find that being exposed to anti-FGC messages decreases the likelihood of being cut by 8-13 percentage points (pp). More precisely, Table 1 shows a significant negative effect for the interaction between the post indicator and the intensity, moving from the lowest to the highest coverage of the anti-FGC messages in the village. In columns (1) and (2), the indicator post (at risk) is a binary variable coded one if the respondent is younger than age 15 in 1994 and zero if she was above age 15. Point estimates indicate that the intensity of the treatment (village coverage of anti-FGC messages) leads to 8.1-8.5 pp decline in FGC when comparing women below age 15 in 1994 to women younger than age 15. Results are statistically significant (p-value < 0.001). This decline translates into a decrease of 8.5 to 9 percent in FGC relative to the mean sample (0.95).

In columns (3) and (4), the indicator post (at risk) is binary variable coded one if the respondent hasn't been cut by 1994 and zero if she has been cut by 1994. Consistently, point estimates are higher and indicate that the intensity of the treatment (village coverage of anti-FGC messages) leads to a 12-13 pp decline in FGC, which translates into a decrease of 12.7 to 13.6 percent in FGC relative to the mean sample (0.95). Results are statistically significant (p-value < 0.001). Column (2), respectively (4), reports the results of the estimated specification reported in column (1), respectively (3), where in addition to including village and cohort fixed effects, a dummy for religion (Muslim) is included. Results are robust to the inclusion of the additional control.

[INSERT TABLE 1]

Event-Study. Figure 11 shows the β_1 coefficient corresponding to the estimates for equation 20. There are several takeaways from these figures. First, the coefficients for FGC and bride price are very close to zero throughout the pre-treatment period. This shows that at any point in time before treatment, the difference in outcome between women in villages receiving treatment and women in villages not receiving treatment is very close to zero. Second, not only are these differences small in point estimate, but their standard errors are also very small. This implies that these are very precisely estimated zero differences between individuals in the two groups of women before the beginning of the campaign. Second, we can see that treatment starts to generate a difference in FGC among women younger than 15 at the time the campaign launched. These differences in FGC are smaller in the cohort age 11 or younger when the campaign was launched, which corresponds to the modal age of cutting and bigger for cohorts younger than age 11. This is because, on average, more women in each cohort will benefit from the campaign, which increases the magnitude of the effect. For similar reasons, and as expected, the effect of the program is an increasing function of women's date of birth. Additionally, I estimate my results using the estimator proposed by De Chaisemartin and d'Haultfoeuille (2020) which is robust to a heterogeneous treatment effect over time and across groups. Figure B.3 shows the β_1 coefficient corresponding to the estimates for equation 20 with this estimator. Results are similar in magnitude and significance to the results obtained by TWFE. These figures show that the identification strategy is reasonable and that the program had the expected impact on FGC.

[INSERT FIGURE 11]

6.2 What is the effect of Anti-FGC radio messages on the bride price?

As predicted by the model, the effect of the exposure to anti-FGC radio messages would have a different effect depending on the presence and the strength, of the general equilibrium effects. Hence, I will start by discussing this later point. Then, I will turn to the analysis of the main effect of the treatment on the average bride price.

6.2.1 Price effect on pre-treatment cohort

In this section, I discuss the second set of results: the price effect of exposure to anti-FGC messages on the bride price of unmarried women in the pre-treatment cohort. The first testable assumption is that in the presence of price effects (GE), the difference in the bride price of unmarried women in 1994 relative to married women in 1994 should increase with the intensity of the exposure in the village. That is because, as we show in Section 6.1, these villages experienced a decline in the share of cut women in the younger (treated) cohort. Hence, holding constant the composition of the supply side of cut women, as this cohort cannot experience a change in FGC (they are too old), they should, on average, benefit from the competition effect. The second testable assumption is that, in the presence of a price effect, the premium in the bride price should be a decreasing function of women's age in 1994. That is because younger women within the pre-treatment group are more likely, on average, to compete in the same marriage pool as the younger cohort.

[INSERT TABLE 2]

Table 2 reports the results on the difference-in-differences estimates of the impact of the anti-FGC radio messages on the bride price for women exposed when *not* at risk of being cut. The reported results are the estimates of equation 21 which compares the difference in the bride price of unmarried women in 1994 to the bride price of married women in 1994, an compares villages with increasing intensity of exposure (village coverage of the anti-FGC messages) among women ages 15 to 35 in 1994. Consistently, I find that unmarried women in 1994 experience an increase in their bride price relative to unmarried women. Point estimates in column (1) indicate that these difference-in-differences represent an increase of 23 log points (25%) for the cohort ages 17 in 1994. Column (2) reports an increase of 6.4 log points (6.6%) for the cohort ages 17 to 20 in 1994. Finally column (3) reports that the magnitude of this increase is 1.7 log points (1.6%) among the cohort ages 17 to 26 in 1994. For these estimates, we cannot reject the null hypothesis. This is not surprising as the sample size is relatively small (128 observations). However, even if imprecisely estimated, both the direction of these effects and the change in magnitude across cohorts are consistent with what we should observe in the presence of the price effect on the bride price. Taken together, these results indicate the presence of a general equilibrium effects that allows me to substantiate that the bride price of cut women increases in villages where the share of cut women decreases.

[INSERT FIGURE 12]

6.2.2 Did the campaign reduce average bride price in treated villages?

Difference-in-Differences in bride price. Table 3 reports the third set of results: the difference-in-differences estimates of the impact of anti-FGC radio messages on the bride price of women exposed at age risk of being cut (younger than 15 in 1994) relative to women not at risk (older than 15 in 1994). Consistent with the prediction of the model, I find that being exposed to the anti-FGC messages decreases the bride price value received at marriage. More precisely, estimates in columns (1) and (2) show a significant negative decline of 21-22 log of the bride price value for the interaction between the post indicator and the intensity, moving from the lowest to the highest coverage of the anti-FGC messages in the village. The bride price is measured as the deflated value of the bride price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function.

Column (1) reports the estimates of equation 19, and column (2) reports estimates of equation 22 where the triple interaction term between belonging to the pre-treatment group (ages 15-35 in 1994) with the intensity of the exposure in the birth-village and being unmarried in 1994 is added. Not accounting for this price effect on the pre-treatment group represents a violation of the stable unit treatment value assumption (SUTVA) and could contribute to threatening the causal interpretation of the results. I find that the naive estimates of the difference-in-differences (equation 19) are slightly higher than the augmented estimates (equation 22) that account for the price effects. However, this difference is marginal (24.94% to 24.29%) as the magnitude of the price effects for the entire pre-treatment sample is relatively small and represents only an increase of 1.8 log points. Both estimates are statistically significant (p-value<0.05).

Additionally, I investigate the effect of the treatment on the bride price at the extensive margin. More precisely, columns (3) and (4) report estimates of equations 19 and 22 on a dependent variable coded one when a bride price is paid. Point estimates indicate that the exposure to the anti-FGC radio messages had an effect of -0.001 pp to 0.001 pp on the probability of paying a bride price when comparing women exposed at age risk to women not at age risk. The estimates are not statistically significant, with p-value=0.814 and, respectively, p-value=0.729.

Finally, I dedicate an entire section in Appendix B.2 to discussing the robustness of these results. I consider the alternative logarithmic transformation of the bride price as the dependent variable and alternative threshold that defines the payment of a bride price at the extensive margin. I also estimate Equation 22 with different pre-treatment cohorts accounted for in the triple interaction term.

[INSERT TABLE 3]

Event-Study. Figure 13 shows the β_1 coefficient corresponding to estimates for equation 20 where I additionally control for the triple interaction between belonging to the pre-treatment group (ages 15-35 in 1994) with the intensity of the exposure in the birth-village and being unmarried in 1994. There are several takeaways from these figures. First, the coefficients for the bride price are very close to zero throughout the pre-treatment period. This shows that at any point in time before treatment, the difference in outcome between women in villages receiving treatment and women in villages not receiving treatment is very close to zero.

Second, not only are these differences small in point estimate, but their standard errors are also small. This implies that these are very precisely estimated zero differences. Second, we can see that treatment starts to generate a difference in the bride price value among women younger than 15 at the time the campaign launched. These declines in the bride price are increasing as women are younger in 1994. That is because, as we saw from the dynamic effect of the treatment on FGC (Figure 11), on average, more women in each cohort will benefit from the campaign and not get cut, which increases the magnitude of the effect. Additionally, I estimate my results using the estimator proposed by De Chaisemartin and d'Haultfoeuille (2020) which is robust to the heterogeneous treatment effect over time and across groups. Figure B.3 shows the β_1 coefficient corresponding to estimates in equation 20 with this estimator. Results are similar in magnitude and significance to the results obtained by TWFE. These figures show that the identification strategy is reasonable and that the program had the expected impact on FGC.

[INSERT FIGURE 13]

6.3 Taking Stock

What are the main takeaways from the preceding analysis? Taken together, these results first show that exposure to anti-FGC radio messages leads to a decline in FGC and a decline in the bride price. Second, they have provided empirical evidence that substantiate the causal identification of these effects. In other words, the exposure to anti-FGC radio messages decreases the average share of cut women in the treated cohort relative to the untreated cohort and has caused a decline in the average bride price paid at marriage in the treated cohort relative to the untreated. This paper claims that this decline is driven by a composition change, that is, as the share of cut women declines in the marriage market and fewer women get paid a high bride price, which leads to a decline in the average bride price. I label this explanation as *supply side* factors. However, competing stories can explain the decline in the bride price, such as changes in prevailing norms or preferences. That is, exposure to anti-FGC messages may have triggered a change in norms surrounding marriage payments or, more broadly, norms surrounding marriage. Similarly, one may worry that exposure to anti-FGC messages changed preferences and led to a decline in the demand for chastity in the marriage market. I group all these explanations as *demand side* factors.

I argue that the decline in the bride price that I estimate is driven by *supply-side* factors,[22] the reason being that the demand-side factors are incompatible with the results on an increase in the bride price of unmarried women in the placebo cohort. For this specific group of women, above age 15 and unmarried in 1994, the treatment cannot affect FGC but can affect their marriage market outcomes. Hence, in the presence of only demand-side factors, these women should also witness a decline in the bride price on average. However, I observe the opposite: an increase in their average bride price. Similarly, if the decline was driven by a change in norms surrounding the bride price

[22] This is consistent with the model assumptions that the FGC is a desirable attribute in the marriage market and that the information campaign shifts parents' health cost distribution but not their preferences for FGC.

payment, I should have observed a decline in the practice of paying a bride price (extensive margin), whereas this effect is absent in the data. Finally, I corroborate these finding with additional results in Appendix B.3.

7 Additional Results

7.1 Female genital cutting: a marker of chasisty at marriage?

A key question remains: what is the intrinsic function performed by the practice that can explain why cut women generate marriage market returns? To answer this question, I analyze the behavioral response to parents' exposure to the campaign. Existing literature has suggested that FGC was a technology to restrict female sexuality (see Section 2). To further investigate this channel, I explore the relationship between FGC and the pre-marital virginity examination and age at marriage. The intuition is that if a demand for virginity persists in the marriage market, parents for whom the perceived health cost associated with FGC increases will substitute toward *relative less* costly practices that serve the same purpose.

7.1.1 Female genital cutting and pre-marital virginity examination

I explore the effect of FGC on pre-marital virginity examinations, which I estimate using an instrumental variables approach, two-stage least squares (2SLS). The first stage consists of estimating equation 19 with whether the respondent is cut as the outcome. The second stage regresses the predicted value of FGC (respondent is cut) on whether the respondent had a pre-marital virginity examination. If the instrument satisfies the exclusion restriction, the 2SLS estimate identifies the causal effect of FGC on pre-martial virginity testing and can be interpreted as the local average treatment effect of being cut for the women who didn't get cut because of the treatment (compliers). The exclusion restriction would be violated if the treatment had an impact on virginity testing beyond its effect on FGC. I carefully ruled out this threat in Section 6.3.

Table 4 reports the results of the IV estimates of the effect of FGC on the virginity examination. Consistent with my hypothesis, I find a very strong substitution between the practice of FGC and the pre-martial virginity examination. Point estimates indicate that cut women are 5.8-6.9 pp less likely to have a virginity examination. More specifically, column (1) reports the 2SLS estimates of the effect of FGC on having a virginity examination before or after marriage. The effect is substantial: the estimated impact represents a decline of 73.53% in the probability of having a virginity examination when cut, relative to the sample mean (0.08). Specification in column (2) controls for respondent religion and finds a robust effect. Similarly, column (3) reports the estimated effect of FGC on the probability of having a premarital virginity testing, excluding an examination that happens within the two months after the marriage or both before and after. While virginity testing is done by families before marriage to provide evidence of a bride's virginity, tests that perform post-marriage consummation are more often demanded by the husband in case of doubt concerning the bride's virginity. Results are striking: being cut decreases the probability of having a virginity examination before marriage by 91.87% relative to the mean sample (0.07). All results are statistically significant (p<0.001). The Kleibergen and Paap F statistic for the first stage is large (198-201), which allows me to reject the null hypothesis of a weak instrument. Taken together, these results suggest that raising awareness about FGC led parents to not only forgo the practice but also to substitute toward less costly practices that constitute a marker of female chastity.

[INSERT TABLE 4]

7.1.2 Female genital cutting and age at marriage

In this section, I explore the effect of FGC on respondents' age at marriage. Marriage timing, and especially early marriages, are strongly influenced by economic conditions but also by cultural norms. For instance, the existing literature has documented that from both the supply side and the demand side, early marriage serves to preserve female virginity and restrict female sexuality (Anukriti and Dasgupta, 2017). Therefore, I estimate the effect of FGC on respondents' timing of marriage using an instrumental variable strategy. The first stage consists of estimating equation 19 with whether the respondent is cut as the outcome. The second stage regresses the predicted value of FGC (respondent is cut) on woman's age at marriage.

Table 5 reports the results of the IV estimates of the effect of FGC on age at marriage. I find that being cut delays the timing of marriage. Point estimates indicate that being cut delays the timing of marriage by 0.86-0.88 years. More specifically, column (1) reports the 2SLS estimates of the effect of FGC on the age at marriage and finds that the estimated impact represents an increase of 4.49% in the age at marriage relative to the sample mean (19.8 years old). The specification in column (2) controls for respondent religion and finds a robust effect. Estimates are statistically significant (p<0.10) and the Kleibergen and Paap F statistic for the first stage is large (209-213). To better understand the effect of FGC on the timing at marriage, I estimate the effect of FGC on the probability of being married after a specific age. Column (3) to (5) reports the estimated effect of FGC on the probability of being married after 15, 18 and respectively 22 years old. Point estimates indicate that being cut increases the probability of being married after 15 years old by 7.3pp which represents an increase of 8.83 percent relative to the mean sample (0.88). The effect is statistically significant (p<0.05) and the Kleibergen and Paap F statistic for the first stage is large (209). However, while the effect of FGC on the probability of being married after 18, respectively 22 years old, is positive (4pp and 0.9pp), the effect is not statistically significant (p=0.409 and p=0.854).

[INSERT TABLE 5]

As a generalization of this exercise, I estimate the effect of FGC on the probability of being married after different ages from 10 to 24. Figure B.4 plots the estimated coefficient for each regression with the associated standard errors. Being cut has a statistically significant effect on delaying marriages after age 14, 15 and 16 years old with point estimates ranging from 5pp to 8pp. However, the effect of FGC on delaying marriage after the age 17 to 24 is statistically insignificant and shrinks to being close to zero for later marriages. These results indicate that FGC delays the timing of marriage, with this effect being concentrated near the age of puberty. This suggests that the accomplices, parents who renounced the practice of FGC after being exposed to anti-FGC messages, compensate by reducing the window in which their daughters reach puberty and are not yet married.

7.2 Testing Predictions 1-3

In addition, I employ different approaches to further study the underlying relationship between FGC and the marriage market and their consistency with the model's predictions. I test the first three predictions of the model. First, I test predictions 1 and 2 using the three data-sets for Egypt: EDHS, ELMPS and the village-level data-set for the coverage of anti-FGC messages. Finally, I test the prediction 3 using new additional cross-country data for Africa.

7.2.1 Female Genital Cutting and Matching on the Marriage Market

In this section, I further explore the relationship between FGC and whom women marries in the marriage market. The theoretical prediction that this section aims at substantiating is the following:

- **Prediction 1.** The unique stable equilibrium is characterized by a positive assortative matching in FGC and wealth.

To test this prediction, I use various indicators of husband's wealth that are available in the EDHS. First, I will focus on direct indicators of husband's wealth, using wives' response to whether the husband earns more than they do. In addition, as the information on relative earning is collected only among working women, I will use information about the husband's educational level to create an indicator of whether the husband is more educated than the wife. Since education is a strong predictor of wealth, one would expect FGC to observe the same effect on the husband's relative wealth as on the spouse's relative educational attainment. I explore the effect of FGC on relative wealth and education using an instrumental variable approach, the two-stage least squares method

(2SLS). The first stage consists of estimating equation 19 with whether the respondent is cut as the outcome. The second stage regresses the predicted value of FGC (respondent is cut) on our indicators of husband's wealth.

Table 6 reports the results of the IV estimates of the effect of FGC on husband's wealth. Consistent with my hypothesis, I find a very strong complementary between the practice of FGC and husband's wealth. Point estimates indicate that cut women are 28-30pp more likely to marry a richer husband. More specifically, column (1) reports the 2SLS estimates of the effect of FGC on having a husband that earns more than them. The magnitude of the effect is important: the estimated impact represents an increase of 65% in the probability of marrying a richer husband, relative to the sample mean (0.43).[23] Specification in column (2) controls for respondent religion and finds robust effect. Both results are statistically significant (p<0.001). The Kleibergen and Paap F statistic is large (91-93), which allows me to reject the null hypothesis of a weak instrument. Additionally, point estimates indicate that cut women are 31-32pp more likely to marry more educated men. More precisely, column (3) reports that being cut increases the probability of being married to a more educated 78.65% relative to the mean sample (0.41).[24] These results is robust to controlling for respondent religion, column (4). Both results are statistically significant (p<0.001). The Kleibergen and Paap F statistic is large (212-216). Taken together, these results support the predication that FGC increases husband's wealth.

[INSERT TABLE 6]

7.2.2 Bride Price and Female Genital Cutting

In this section, I further explore the relationship between FGC and the bride price. The theoretical prediction that this section aims at substantiating is the following:

- **Prediction 2.** Cut women command a higher bride price payment at marriage relative to uncut women.

To test this prediction, I use an alternative strategy and exploit two main sources of variation.

First source of variation. I take advantage of the significant variation in FGC prevalence within-villages, within-cohorts and within year of marriage to test whether FGC increases the bride price value at marriage. I use the five waves of the EDHS pooled together to create an indicator of the share of cut women in a women's age cohort (group of five years) and village. Overall, the pooled DHS contains information on FGC for more than 60,000 women, allowing our measurement of FGC

[23] 43 percent of women say they earn less, 5.5 percent say they earn more, 17 percent say they earn about the same, the rest say either their partner has no income or doesn't know about it.

[24] 41 percent of women are less educated than their husbands, 34 percent of women and their husbands are both uneducated and 24 percent have the same level of education.

prevalence to be based on an average of 10 observations per cluster, where a cluster is a cohort village group. I estimate the following equation:

$$BridePrice_{ivkt} = \eta_1 FGC_{vk(i)} + \eta_q + \eta_k + \eta_t + \epsilon_{iqat}, \tag{23}$$

where $BridePrice_{ivkt}$ is the value of the bride price received by a woman $\boldsymbol{i}$, born in a village $\boldsymbol{v}$, at year $\boldsymbol{k}$, and married at year $\boldsymbol{t}$. $FGC_{vk(i)}$ is FGC prevalence in her village and age cohort. η_v η_k η_t are village of birth, cohort of birth, and year of marriage fixed effect. η_v is the village of birth fixed effect to control for time-invariant local unobservable characteristics, such as geographic, economic, and cultural factors. η_k is the year of birth fixed effect to account for cohort effects. Finally, η_t is the year of marriage fixed effect to account for time-variant shocks to the marriage market.

Second source of variation. Additionally, I take advantage of the segregate nature of marriage markets in Egypt. An interesting feature in the Egyptian context is that marriages are rarely exogamous, despite the fact that multiple religious communities lived together. Less than 1% of the marriages in our sample are exogamous, defined as a marriage between a Muslim and Coptic person. However, FGC is common across different religious communities. Therefore, this provides an opportunity to exploit differences in women's age cohort and village prevalence of FGC to conduct a simple placebo test. The idea is the following: FGC is a practice among Muslims and Coptic women. However, both communities marry in two separate marriage markets, and the bride price is only paid among Muslim communities. Hence, there is a testable assumption: if equation 23 identifies the effect of FGC on the marriage market, a Muslim woman's bride price should not be influenced by the prevalence of FGC among Coptic women of her cohort and village. However, if the η_1 coefficient of equation 23 is driven by unobservable confounders, such as, for example, traditional norms in the village that affect both FGC and the bride price, then the prevalence of FGC among Copts and Muslims should have similar effects on the bride price. I construct an indicator that measures for a woman the prevalence of FGC among Coptic women $FGC(Coptic)_{vk(i)}$ in her age cohort and village, and the analogous indicator of the prevalence of FGC among Muslim women belonging to her age cohort and village $FGC(Muslim)_{vk(i)}$. I then estimate equation 23 where I regress $FGC(Muslim)_{vk(i)}$ or $FGC(Coptic)_{vk(i)}$ on the value of the bride price.

Results. Table 7 reports the results of estimates for equation 22. As expected, the coefficient η_1 is positive and statistically significant when regressing $FGC_{vk(i)}$ or $FGC(Muslim)_{vk(i)}$ on the bride price value but negative and statistically insignificant when regressing $FGC(Coptic)_{vk(i)}$. Point estimates reported in column (1) show that a 10 percent increase in the prevalence of FGC in women's birth-cohort and birth-village is associated with a 4.8 log points (6.2%) increase in the bride price value received at marriage. Column (2) uses the measure of prevalence of FGC in women's birth-cohort and birth-village measured among Muslim women and finds a 6 log points (8.3%) increase in the bride price value received at marriage. The difference in magnitude of the effects suggests that measurement errors might be working against the first measure of FGC prevalence, which doesn't distinguish between communities and lead to attenuation bias. Finally, column (3) reports the results of the estimates for equation 23 where I regress $FGC(Coptic)_{vk(i)}$ on the bride price. The coefficient suggests that a 10% increase in the prevalence of FGC in women's birth-cohort and birth-village within Coptic communities is associated with a decline of 1.6 log points (1.7%) in the bride price value received at marriage. These estimates are not statistically significant (p-value=0.412). This suggests that the positive association between FGC prevalence and the bride price is unlikely to be driven by unobservable confounders. If that were the case, we would likely observe an association going in the same direction, for both measures of FGC, as these villages and cohorts are arguably similar in norms. However, the results suggest that FGC prevalence matters only in the marriage market.

Additionally, columns (4) to (6) report the results of estimates for equation 23 on a dependent value that indicates whether a bride price was paid at marriage. Results indicate that $FGC_{vk(i)}$, $FGC(Muslim)_{vk(i)}$, and, respectively, $FGC(Coptic)_{vk(i)}$ have a small and not statistically predictive power regarding whether the bride price was paid at marriage. Point estimates indicate that a 10% increase in FGC prevalence, for, respectively, the three measures of FGC, is associated with an increase of 1.4 pp, 0.1 pp, and, respectively, a decline of 0.8 pp. These insignificant relationships between the practice of FGC and the custom of paying a bride price provide additional evidence suggesting that FGC is associated with an increase in the marriage market price and not unobservable *traditional* norms surrounding gender or marriage. Taken together, these results suggest that FGC is a strong predictor of the value of the bride price.

[INSERT TABLE 7]

7.2.3 Prevalence of FGC across Africa: Does the bride price provide incentives to cut?

In this section, I provide empirical evidence for Prediction 3.

- **Prediction 3.** The probability of a daughter being cut is higher among ethnic groups that engage in bride price payments.

To do so, I investigate if the contemporary practice of FGC is explained by the practice of bride price. I exploit the heterogeneity in marriage payments across ethnic groups in different countries of Africa.

Data on contemporary practice of FGC. I pool different DHS waves for 16 African countries that elicit information about FGC and respondents' ethnicity. The information on FGC is obtained by asking the respondent whether or not they have been circumcised. I will only use information from adults who are self-reporting and not from mothers who are reporting for their daughters, as the latter may be particularly susceptible to social desirability bias. In total, 57 waves of the DHS are pooled together, and the year of the survey range from 1993 to 2018. Table B.8 provides a list of countries and survey years.

Data on historical practice of bride price. The Ethnographic Atlas is a worldwide ethnic-level database compiled by George Peter Murdock and contains pre-industrial information for 1,265 ethnic groups. Information on cultural practice includes whether the ethnic group practices the custom of bride price, along with information on various customs and norms related to marriage and gender. I match the individual dataset containing information on FGC with the Murdock ethnographic atlas using available ethnicity information. The final sample consists of a total of more than 400,000 women for whom both information on whether they are cut and the cultural practice of bride price in their ethnic group are available.

Source of variation. I exploit the heterogeneity across ethnic groups and within countries to test whether women from ethnic groups that subscribe to the bride price practice have a higher likelihood of being cut. I estimate the following specification:

$$FGC_{iec} = \lambda BridePrice_e + X_{iec} + \theta_e + \kappa_c + \xi iec \tag{24}$$

where *FGC* takes the value of one if a woman *i* belonging to an ethnic group *e* and living in a country *c* declares being cut and zero otherwise. *BridePrice* is a dummy variable that takes the value of one if the ethnic group practices the bride price. *X* is a vector of individual covariates controlling for the woman's age, education, a set of religion dummies, a dummy for urban residence, and an index of household wealth. θ is a set covariate controlling for ethnographic characteristics such as marriage patterns (stem families, monogamy) and subsistence activities: dependence on gathering, hunting, fishing, agriculture, and animal husbandry. κ is countries' fixed effects. I estimate this specification with standard errors clustered at the ethnic group level to allow for serial correlation in the error terms across women in the same area.

Results. Table 8 reports the results of the estimates for equation 24. Consistent with the theoretical model, belonging to an ethnic group that subscribes to the bride price custom is associated with a higher likelihood of being cut. Columns 1-4 display the coefficient of the main variable of interest (bride price) for four specifications where controls are added subsequently. All specifications include the country-fixed effect. The estimates range from a 7.3 to 9.3 pp increase in the likelihood of being cut if the ethnic group subscribes to the bride price custom, which represents an increase of 13% to 16% relative to the mean sample. The results without controls (column 1) are robust to the inclusion of individual covariates (column 2) and ethno-group information on marital patterns (column 3) and ethno-group information on subsistence activities.

Interpretation of λ requires consideration because of potential endogeneity bias. First, it should be noted that endogeneity bias arising from reverse causality is less likely to be an issue in this context, since the bride price practice would be predetermined for the spread of female genital cutting in sub-Saharan Africa (La Ferrara, Corno, and Voena, 2020).[25] Second, the results in columns 3-4 mitigate concerns about unobservable confounders at the ethnicity level. When controlling for a wide range of marriage customs and subsistence activities that could be correlated with both female genital cutting and bride price, the coefficient λ remains similar in magnitude and significance. Finally, our data could suffer from measurement errors that cause attenuation bias. In this case, the coefficient λ would be biased toward zero and should be interpreted as the lower bound.

With this in mind, these results provide robust evidence that belonging to an ethnic group that practices the bride price is positively associated with the likelihood of being cut.

[INSERT TABLE 8]

8 Conclusion

This paper shows that FGC has an important impact on women's marriage market outcomes. In most developing countries, it is customary for the bride's parents to receive large financial transfers from the groom upon marriage, namely the bride price. Meanwhile, from its origins in Pharaonic times to present-day practice, FGC is believed to promote female chastity, a valuable but unobservable trait in marriage. Therefore, FGC could generate marriage markets returns and affect the value of the bride price received upon marriage.

To explore this question, I start by developing a general equilibrium model of parental decision to circumcise their daughters and show that FGC is considered premarital in a context where circumcision can allow parents to signal desirable but unobservable traits such as chastity Investment acts and get the marital gains on the marriage market. I test the model's predictions on Egyptian data and use a difference-in-difference approach to identify the impact of FGC on bride price. I use within-cohort and within-village variation when parents of women were exposed to an anti-FGC campaign radio broadcast in 1994. I exploit the within-cohort and within-village variation in women's parents' exposure to an anti-FGC campaign radio broadcast in 1994. Village-level coverage of the campaign

[25] The custom of bride price dates back to 3000 BC whereas female genital cutting would have spread across the African continent with the African slave trade in the 15th century.

is obtained using Irregular Terrain Model (ITM) software and archive information on radio transmitters.

I find that cohorts fully exposed to the campaign are 13% less likely to be clipped and receive a 20% lower bride price at the wedding. Examining the mechanisms, I find additional evidence that FGC increases matching quality in the marriage market. Finally, consistent with the model, I find that the practice of bride price is associated with a higher likelihood of being cut across Africa. Importantly, the paper document that reducing FGC through a health awareness campaign has a cost. Parents who have renounced the practice of FGC have switched to alternative practices such as premarital virginity testing and earlier marriages. Therefore, this paper emphasizes the importance of understanding the economic role of FGC in order to design successful strategies aimed at eradicating this practice.

Figures and Tables

Figures

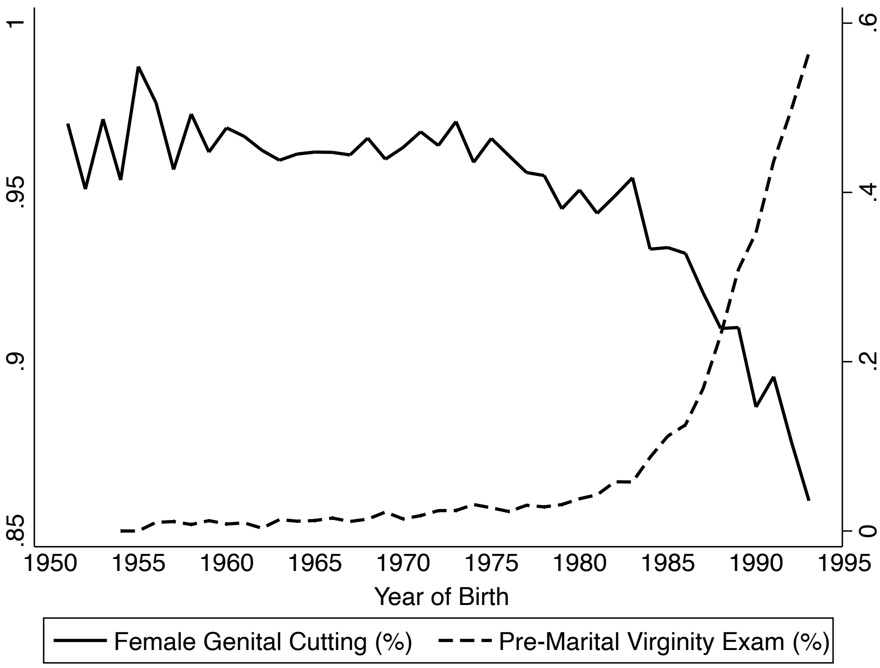


Figure 6: Female Genital Cutting and Pre-Marital Virginity Exam

Note. Figure 6 plots the raw trends over cohorts of female genital cutting (full line) and pre-marital virginity exam (dashed line). The left y-axis reports the prevalence of FGC by cohort in percentages. The right y-axis reports pre-marital virginity examination by cohort in percentages. Both statistics are weighted by population weight. The x-axis reports the corresponding cohort.
Source: Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together.

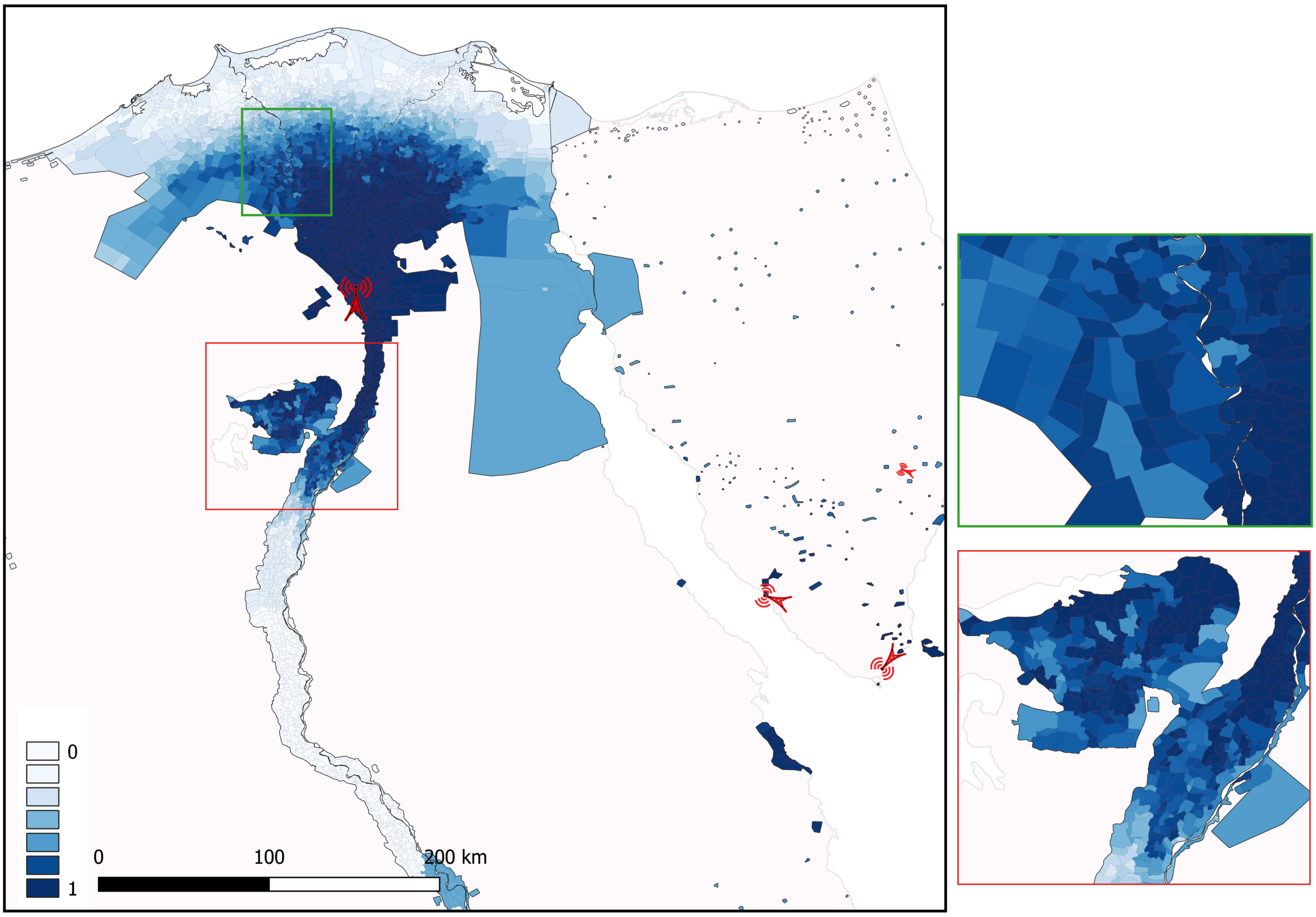


Figure 7: Map of radio coverage of health awareness messages on FGC broadcast in Egypt in 1994.

Note. Figure 7 shows the radio coverage of the program broadcasting health awareness information about female genital cutting (FGC) in 1994 in Egypt. The geographical desegregation is at the village level, and the measure represents the share of the village area with sufficient radio reception based on the Longley-Rice propagation model. There are 2,458 villages. *Source*: Author's calculations using Irregular Terrain Model (ITM) software named RF-Toolkit, archives from the Egyptian Radio and Televion Union (ERTU), and digital topographical data about the elevation of the earth's surface provided by the Shuttle Radar Topography Mission (SRTM - NASA).

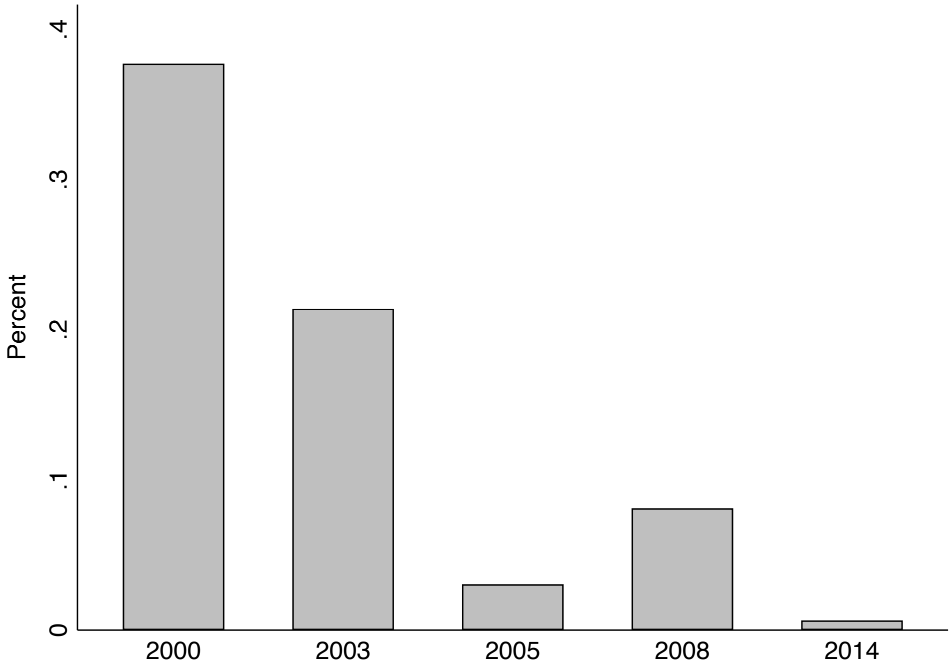
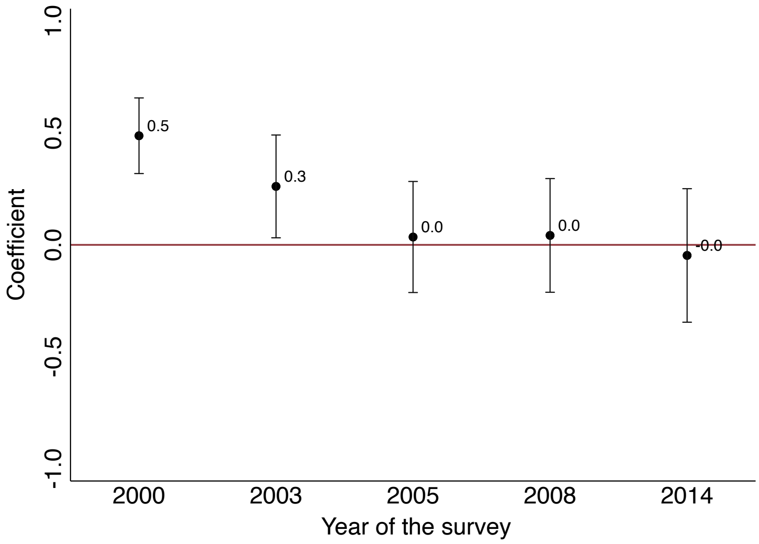


Figure 8: Have you heard of FGC messages on the radio in the last year

Note. Figure 8 shows the raw distribution across the different EDHS waves of the percentage of women declaring having heard of FGC messages on the radio in the last year. The y-axis reports the prevalence of women declaring having heard of FGC messages on the radio in the last year. The x-axis reports the corresponding year of the survey for which the information was collected.
Source: Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together.

(a) Have you heard of FGC messages on the radio in the last year



(b) Have you heard of Family Planning messages on the radio in the last year

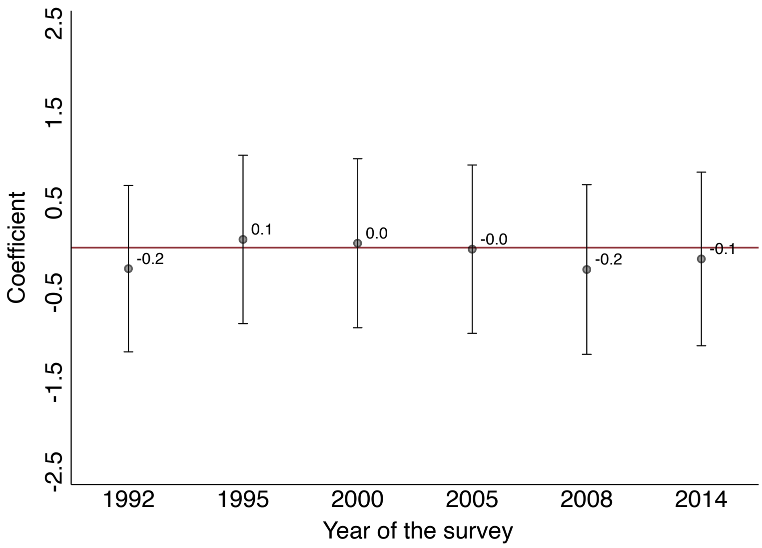
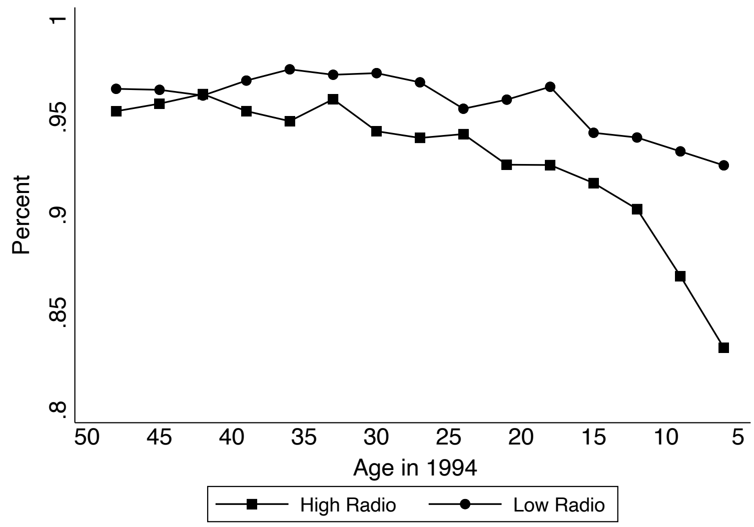


Figure 9: Coefficients of the anti-FGC messages coverage on woman's probability of having heard of FGC or family planning on the radio in the last year.

Note. Figure 9 plots the coefficients of coverage of anti-FGC messages on a woman's probability of having heard of FGC (a) or family planning (b) on the radio in the last year. Each coefficient results from a regression with the dependent variable measured in a different year. All regression specifications control for women's age, education, village latitude and longitude, population density, and distance to nearest transmitter, and include municipalities (Qism) fixed effects. The capped vertical bars show 95% confidence intervals calculated using robust standard errors clustered at the village level.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

(a) Trends in Female Genital Cutting, by high and low exposure.



(b) Trends in Bride Price, by high and low exposure.

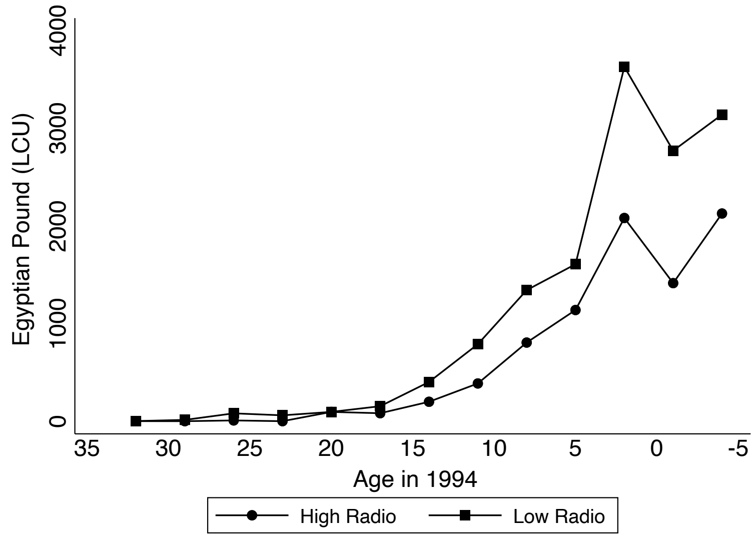


Figure 10: Trends: Female Genital Cutting and Bride Price

Note. Figure 10 plots the raw trends over cohorts of female genital cutting (a) and bride price (b) by high and low exposure. The y-axis (a) reports the prevalence of FGC by cohort, and the y-axis (b) reports the bride price by cohort. Both sets of statistics are measured as a three-year moving average in villages with high exposure (square) and low exposure (circle). The x-axis reports the cohort corresponding to the statistic of interest. High exposure is defined as villages with 80% to full coverage of the anti-FGC health awareness messages. Low exposure is defined as villages with lower than 80% to zero coverage. Bride price value is deflated by the consumer price index of the year of marriage and measured in Egyptian pounds (LCU). Female genital cutting is a prevalence in percentages and is weighted by population weight.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

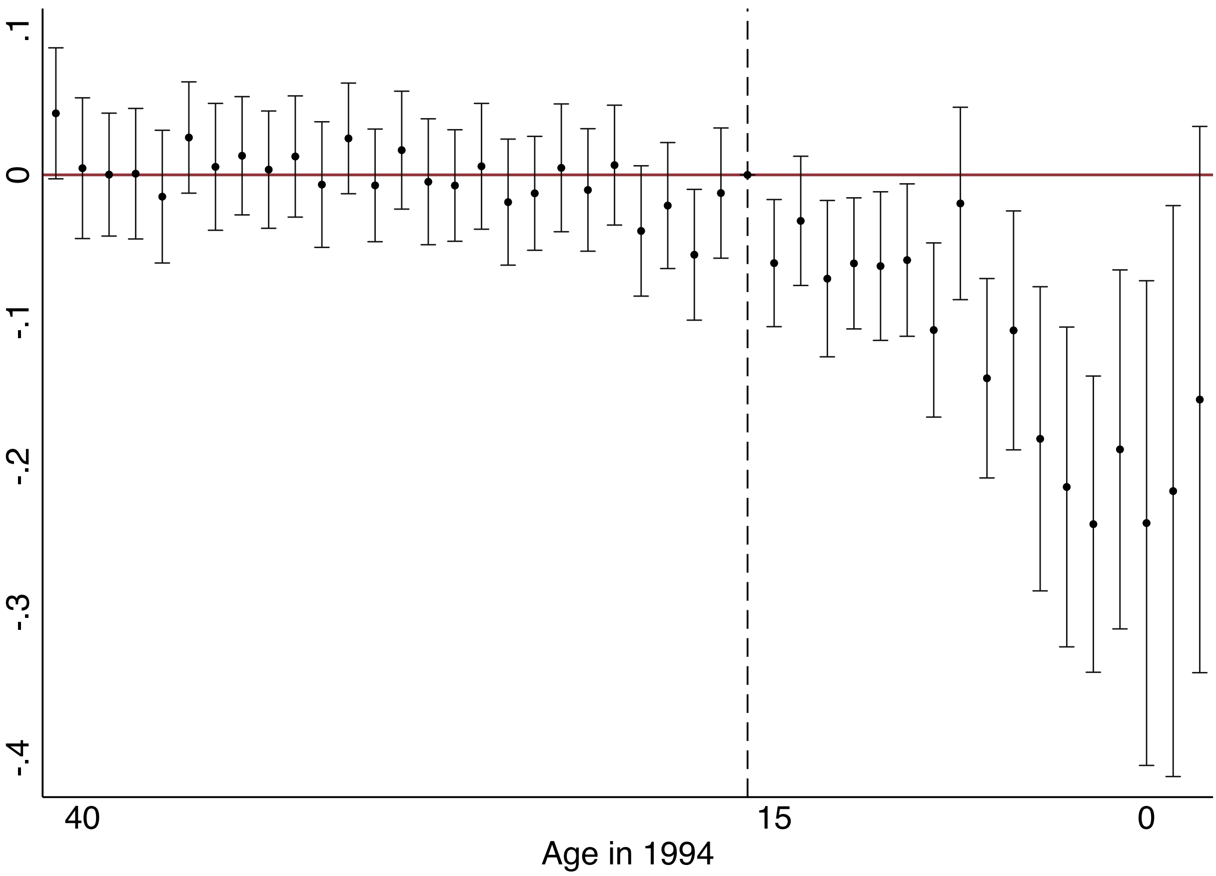


Figure 11: Estimates of the treatment effect on respondent probability of being cut by cohort (female genital cutting).

Note. Figure 11 reports the coefficient of β_1 from equation 20. The y-axis reports the estimated coefficient of the interaction between being born in a one-year cohort and the village coverage of the anti-FGC health awareness messages broadcast on the radio in 1994 in their birth-village on FGC (respondent is cut). The event is defined as being in the cohort at age risk of getting cut (age 15 in 1994). The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the village level. The x-axis reports women's age relative to the year 1994. The sample consists of women born between 1955 and 2000 and 2,024 villages.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

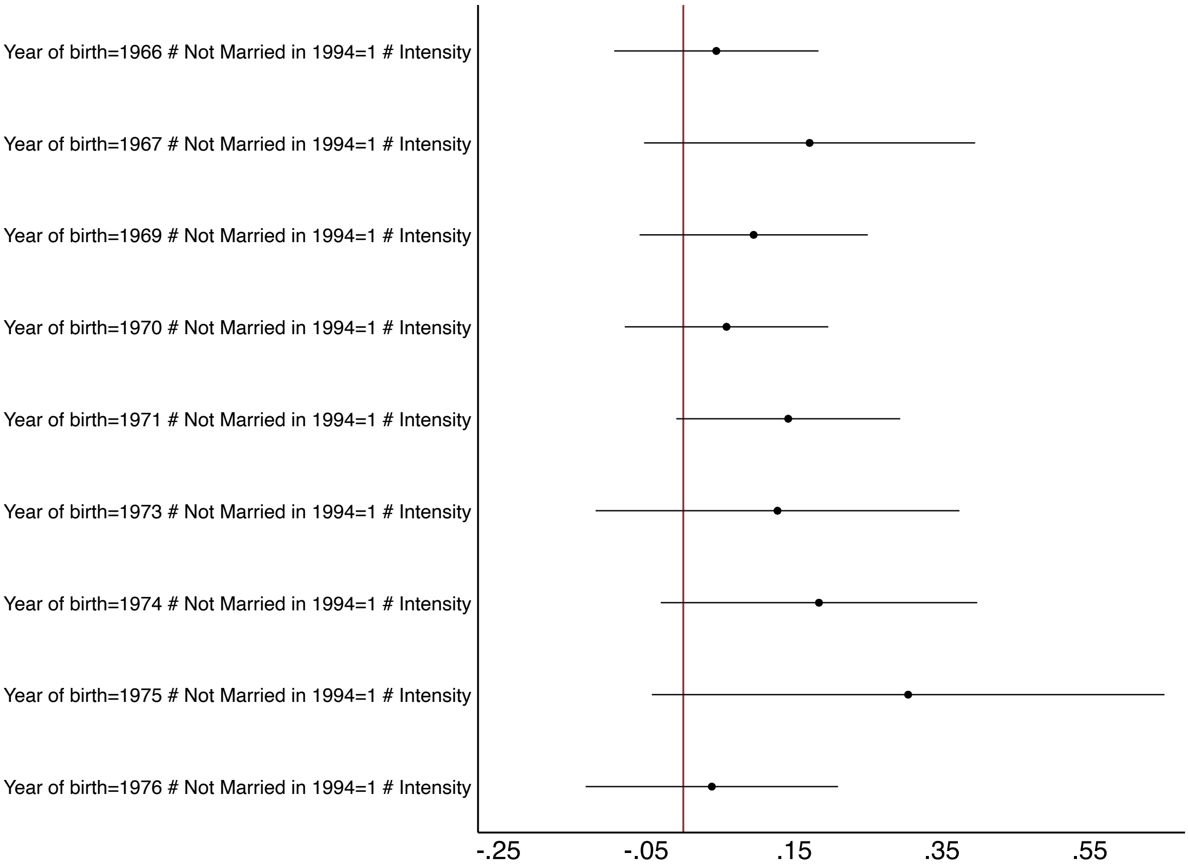


Figure 12: Estimates of the treatment effect on bride price of un-married women age 15-30 in 1994.

Note. Figure 12 reports the coefficient of β_1 from equation 21. The x-axis reports the estimated coefficient of the interaction between an indicator of not being married in 1994 and the village coverage of the anti-FGC health awareness messages broadcast by cohort. The bride price is measured as the deflated value paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the village level. The y-axis reports the year of birth. The sample consists of women born between 1966 and 1976 and 516 villages.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section n 4.3.

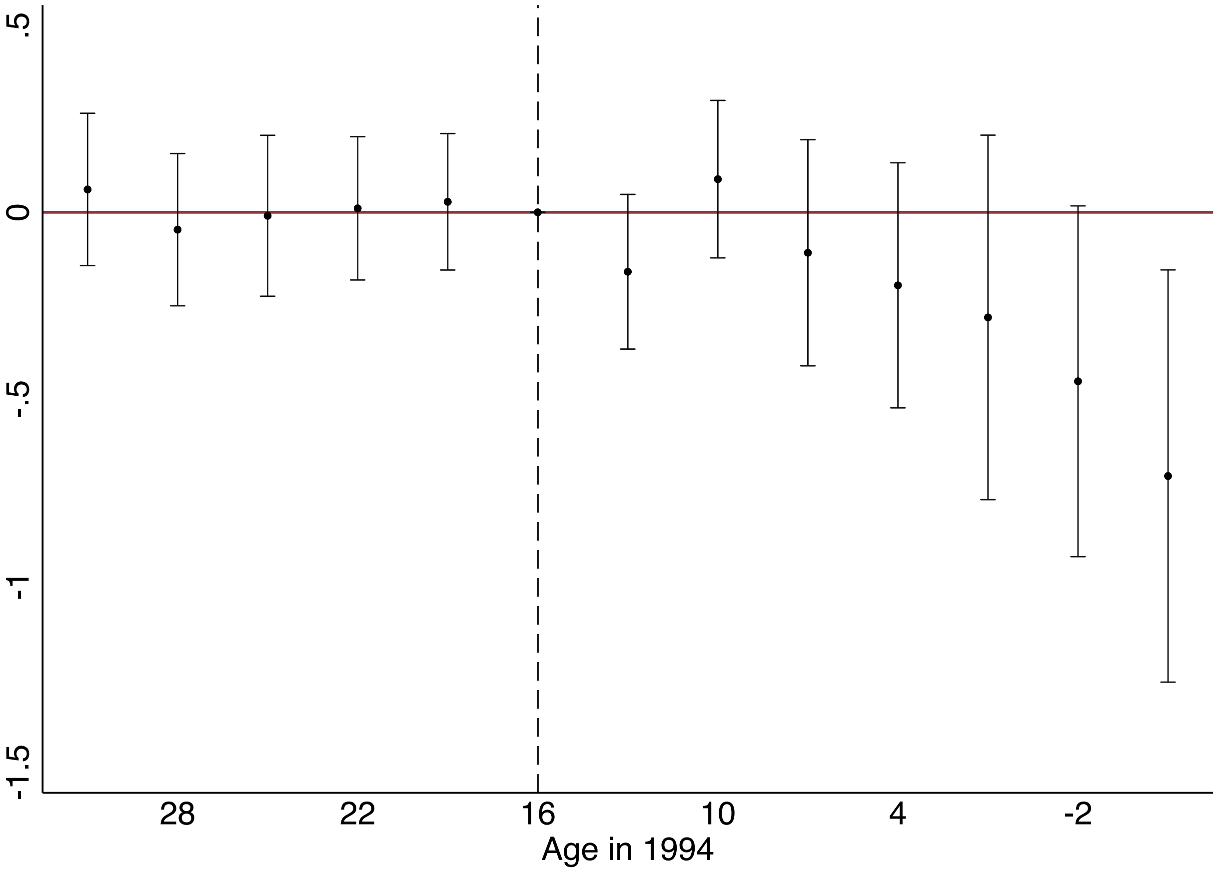
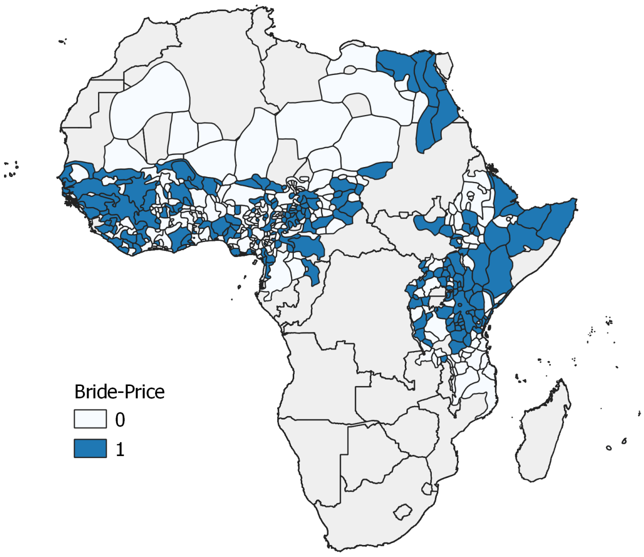


Figure 13: Estimates of the treatment effect on respondent bride price by cohort.

Note. Figure 13 reports the coefficient of the β_1 from equation 20. The y-axis reports the estimated coefficient of the interaction between being born in a three-year cohort and the village coverage of the anti-FGC health awareness messages broadcast on the radio in 1994 in their birth-village on respondent bride price. Estimates control for the triple interaction between belonging to the pre-treatment group (ages 15-35 in 1994) with the intensity of the exposure in the birth-village and being unmarried in 1994. The bride price is measured as the deflated value paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The event is defined as being in the cohort at age risk of getting cut (age 15 in 1994). The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the village level. The x-axis reports women's age relative to the year 1994. The sample consists of women born between 1955 and 2000 and 2,024 villages.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

(a) Bride Price by ethnic groups in Africa.



(b) Female Genital Cutting by ethnic groups in Africa.

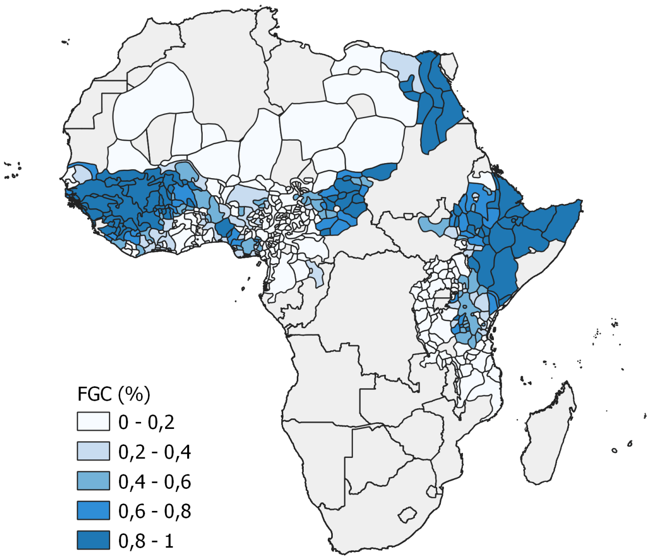


Figure 14: Bride Price and Female Genital Cutting

Note. Figure 14 is a map of (a) the practice of the bride price and (b) the share of respondents declaring being cut by ethnic group. Ethnic groups are delimited using the Ethnographic Atlas of Murdock. In subfigure (a), ethnic groups paying the bride price at marriage are represented in blue; ethnic groups that don't are represented in white. In subfigure (b), the prevalence of FGC is measured in percentages. Ethnic groups with the highest prevalence of FGC are shown in dark blue, and ethnic groups with the lowest prevalence of FGC are shown in white. In both figures, grey areas represent the ethnic groups in which the information is not available. *Source:* Author's calculations. Ethnic group data on FGC are drawn from 57 waves of DHS, which include 17 African countries and range from 1993 to 2018, pooled together. TableB.8 provides a list of countries and survey years. Ethnic-group-level data on bride price are drawn from the Ethnographic Atlas is a worldwide ethnic-level database compiled by George Peter Murdock. Detailed information about these data and the matching process are provided in Section 7.2.3.

Tables

Table 1: Female Genital Cutting and Anti-FGC Radio Messages

Dependent Variable	Respondent is Cut (FGC)			
	(1)	(2)	(3)	(4)
Panel a. Control group: aged 15 to 35 in 1994				
Intensity X Post	-0.081***	-0.081***		
	(0.011)	(0.011)		
	[0.000]	[0.000]		
Panel b. Control group: Have been cut in 1994				
Intensity X Post			-0.118***	-0.118***
			(0.017)	(0.017)
			[0.000]	[0.000]
Observations	58,127	58,127	58,127	58,127
Village FE	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y
Religion controls	N	Y	N	Y
Mean Dep. Var.	0.96	0.96	0.96	0.96
Relative Change	-8.43	-8.43	-12.26	-12.26
Clusters	2104	2104	2104	2104

Note. Table 1 reports the estimated coefficients for the equation 19. Results are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the respondent probability of being cut. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at risk of being cut and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Panel A defines being at risk of being cut as being younger than age 15 in 1994. Panel B defines being at risk of being cut as not having been cut in 1994. Panel B additionally includes an indicator for not having been cut in 1994. All specifications include village of birth fixed effects and year of birth fixed effects. Religion controls is an indicator variable that equals 1 if the woman is Muslim. The sample includes women born between 1965 and 1999. The dependent variable is measured as a binary variable coded one if the respondent declares being cut. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculation. Detailed information about these data is provided in Section 4.3.

Table 2: Bride-Price and Anti-FGC Radio Messages for pre-treatment women

Dependent Variable	Bride-Price Value (IHS)		
Panel: age in 1994	15 - 17	15 - 20	15 - 26
	(1)	(2)	(3)
Intensity X Un-Married	0.230	0.064	0.017
	(0.343)	(0.077)	(0.054)
	[0.506]	[0.408]	[0.759]
Observations	128	611	1,994
Village FE	Y	Y	Y
Cohort FE	Y	Y	Y
Year of Marriage FE	Y	Y	Y
Cohort	15-17	15-20	15-26
Mean Dep. Var.	0.95	0.84	0.77
Relative Change (%)	25.88	6.62	1.66
Clusters	50	182	415

Note. Table 2 reports the estimated coefficients for the equation 21. Results are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the bride price at marriage within pre-treatment group (women ages 15 to 35 in 1994). Difference-in-differences estimates exploit the interaction between being unmarried in 1994 and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Column (1) reports the estimated coefficients within the group of women ages 15 to 17 in 1994. Column (2) reports the estimated coefficients within the group of women ages 15 to 20 in 1994. Column (3) reports the estimated coefficients within the group of women ages 15 to 26 in 1994. All specifications include village of birth fixed effects, year of birth fixed effects, and year of marriage fixed effects. The dependent variable is measured as the deflated value of the bride price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table 3: Bride Price and Anti-FGC Radio Messages

Dependent Variable	Bride-Price			
	Intensive margin		Extensive margin	
	Bride-Price Value (IHS)		Bride-Price is Paid	
	(1)	(2)	(3)	(4)
Intensity X Post	-0.223**	-0.217**	0.001	-0.001
	(0.108)	(0.111)	(0.002)	(0.002)
	[0.039]	[0.050]	[0.814]	[0.729]
Intensity X Un-married X Pre		0.018		-0.004
		(0.081)		(0.003)
		[0.825]		[0.222]
Observations	12,741	12,741	12,741	12,741
Village FE	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y
Mean Dep. Var.	1.53	1.53	0.62	0.62
Relative Change (%)	-24.94	-24.29	0.08	-0.12
Clusters	1033	1033	1033	1033

Note. Table 3 reports the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the bride price at marriage. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at age risk of being cut (younger than age 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Columns (1) and (3) report the estimated coefficients for equation 18. Columns (2) and (4) report the estimated coefficients for equation 21 and control for the triple interaction between belonging to the pre-treatment group (ages 15-35 in 1994) with the intensity of the exposure in the birth-village and being unmarried in 1994. All specifications include village of birth fixed effects, year of birth fixed effects, and year of marriage fixed effects. The sample includes women born between 1965 and 1999. The dependent variable in columns (1) and (2) is measured as the deflated value of the bride price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The dependent variable in columns (3) and (4) is a binary variable coded one if a bride price was paid at marriage. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1,033 clusters. Significant at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table 4: Pre-Marital Virginity Testing and Female Genital Cutting (IV-Estimates)

Dependent Variable	Had a Virginity Examination			
	Pre and/or Post Marriage		Pre Marriage	
	(1)	(2)	(3)	(4)
Panel A. Second Stage (2SL2)				
Respondent is cut (FGC)	-0.058**	-0.058**	-0.069***	-0.068***
	(0.023)	(0.023)	(0.022)	(0.022)
	[0.012]	[0.012]	[0.002]	[0.002]
Panel B. First Stage. Dep. Variable: Respondent is cut				
Intensity X Post	-0.149***	-0.149***	-0.146***	-0.146***
	(0.019)	(0.019)	(0.019)	(0.019)
	[0.000]	[0.000]	[0.000]	[0.000]
Kleibergen-Paap rk Wald F	198	201.9	196.9	200.9
Observations	36,357	36,357	36,171	36,171
R-squared	-0.000	0.004	-0.001	0.003
Village FE	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y
Religion Controls	N	Y	N	Y
Mean Dep. Var.	0.08	0.08	0.07	0.07
Relative Change (%)	-73.53	-73.46	-91.87	-91.64
Clusters	1887	1887	1887	1887

Note. Table 4 reports two-stage least squares (2SLS) estimates, where the exposure to anti-FGC radio messages is used as an instrument for whether respondent is cut. The first-stage estimates are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the respondent probability of being cut. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at risk of being cut (not cut in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages) and an indicator of being at risk of being cut as described by the equation 19. The second-stage estimates regress the predicted value of whether the respondent is cut on whether the respondent had a virginity examination. The dependent variable in column (1) and column (2) is an indicator of whether the respondent had a vriginity examinatiton pre and/or post marriage. The dependent variable in column (3) and (4) is an indicator of whether the respondent had a virginity examination before the marriage. The Kleibergen and Paap F statistic for weak instruments are provided. All specifications include village fixed effects and year of birth fixed effect. The sample includes women born between 1965 and 1999. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table 5: Age at Marriage and Female Genital Cutting (IV-Estimates)

Dependent Variable	Age at Marriage		Married after age		
			15	18	21
	(1)	(2)	(3)	(4)	(5)
Panel A. Second Stage (2SL2)					
Respondent is cut (FGC)	0.864*	0.888*	0.073**	0.047	0.009
	(0.504)	(0.505)	(0.036)	(0.057)	(0.050)
	[0.087]	[0.079]	[0.043]	[0.409]	[0.854]
Panel B. First Stage. Dep. Variable: Respondent is cut					
Intensity X Post	-0.117***	-0.118***	-0.117***	-0.117***	-0.117***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Kleibergen-Paap rk Wald F	209.2	213.8	209.2	209.2	209.2
Observations	57,975	57,975	57,975	57,975	57,975
Village FE	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y
Religion Controls	N	Y	N	N	N
Mean Dep. Var.	19.27	19.27	0.83	0.53	0.26
Relative Change	4.49	4.61	8.83	8.88	3.58
Clusters	2104	2104	2104	2104	2104

Note. Table 5 reports two-stage least squares (2SLS) estimates, where the exposure to anti-FGC radio messages is used as an instrument for whether respondent is cut. The first-stage estimates are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the respondent probability of being cut. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at risk of being cut (not cut in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages) and an indicator of being at risk of being cut as described by the equation 19. The second-stage regresses the predicted value of whether the respondent is cut on her age at marriage. The dependent variable in column (1) and column (2) is respondent age at marriage. The dependent variable in column (3) is an indicator of whether the respondent was married after 15. The dependent variable in column (4) is an indicator of whether the respondent was married after 18. The dependent variable in column (5) is an indicator of whether the respondent was married after 21. The Kleibergen and Paap F statistic for weak instruments are provided. All specifications include village fixed effects and year of birth fixed effect. The sample includes women born between 1965 and 1999. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008 and 2014 pooled together. Village data on radio coverage of health awarness messages about FGC are built from author's calculation. Detailed information in these data are provided in section 4.3.

Table 6: Marriage Market Outcomes and Female Genital Cutting (IV-Estimates)

Dependent Variable	Husband earns more		Husband is more educated	
	(1)	(2)	(3)	(4)
Panel A. Second Stage (2SL2)				
Respondent is cut (FGC)	0.283***	0.303***	0.319***	0.321***
	(0.082)	(0.084)	(0.053)	(0.053)
	[0.001]	[0.000]	[0.000]	[0.000]
Panel B. First Stage. Dep. Variable: Respondent is cut				
Intensity X Post	-0.126**	-0.134***	-0.115***	-0.116***
	(0.051)	(0.051)	(0.017)	(0.017)
	[0.014]	[0.008]	[0.000]	[0.000]
Kleibergen-Paap rk Wald F	93.02	91.81	212.4	216.8
Observations	7,068	7,068	57,974	57,974
Village FE	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y
Religion Controls	N	Y	N	Y
Mean Dep. Var.	0.43	0.43	0.41	0.41
Relative Change	65.80	70.43	78.65	79.19
Clusters	1119	1119	2104	2104

Note. Table 4 reports two-stage least squares (2SLS) estimates, where the exposure to anti-FGC radio messages is used as an instrument for whether respondent is cut. The first-stage estimates are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the respondent probability of being cut. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at risk of being cut (not cut in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages) and an indicator of being at risk of being cut as described by the equation 19. The second-stage estimates regress the predicted value of whether the respondent is cut on indicators of husband's wealth. The dependent variable in column (1) and column (2) is an indicator that takes the value 1 if the husband earns more than the respondent. The dependent variable in column (3) and (4) is an indicator of whether the husband is more educated than the respondent. The Kleibergen and Paap F statistic for weak instruments are provided. All specifications include village fixed effects and year of birth fixed effect. The sample includes women born between 1965 and 1999. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table 7: Bride Price and Female Genital Cutting

Dependent Variable	Bride-Price					
	Intensive Margins			Extensive Margins		
	Bride Price (IHS)			Bride-Price is paid		
	(1)	(2)	(3)	(4)	(5)	(6)
FGC	0.488***			-0.014		
	(0.186)			(0.015)		
	[0.009]			[0.333]		
FGC (Muslim)		0.609***			0.001	
		(0.195)			(0.005)	
		[0.002]			[0.902]	
FGC (Copte)			-0.163			-0.008
			(0.198)			(0.007)
			[0.412]			[0.248]
Observations	12,403	12,244	7,455	12,403	12,244	7,455
Village FE	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y	Y	Y
Mean Dep. Var.	1.53	1.53	1.76	0.62	0.62	0.65
Relative Change (%)	62.85	83.84	-17.68	-2.33	0.11	-1.27
Clusters	1008	1000	604	1008	1000	604

Note. Table 7 reports the estimated coefficients for the equation 23. This table regresses an indicator of the prevalence of FGC in a woman's three-year birth cohort and birth-village, on the bride price. The dependent variable in columns (1-3) is measured as the deflated value of the bride price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The dependent variable in columns (4-6) is a binary variable coded one if a bride price was paid at marriage. FGC (Muslim) is measured as the prevalence of FGC in a woman's three-year birth cohort and birth-village among Muslim women. FGC (Copte) is measured as the prevalence of FGC in a woman's three-year birth cohort and birth-village among Coptic women. All specifications include village of birth fixed effects, year of birth fixed effects, and year of marriage fixed effects. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. Number of clusters are reported for each specification. Significant at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Individual data on bride price are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village-level data on FGC prevalence are obtained from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Detailed information on these data and the matching process are provided in Section 7.2.2.

Table 8: Female Genital Cutting and Bride Price across Africa

Dependent Variable	Respondent is cut (Female Genital Cutting)			
	(1)	(2)	(3)	(4)
Bride-Price	0.0730*	0.0854**	0.0936**	0.0936**
	(0.0403)	(0.0389)	(0.0386)	(0.0386)
	[0.071]	[0.029]	[0.016]	[0.016]
Observations	433,703	433,664	433,664	433,664
R-squared	0.390	0.416	0.418	0.418
Country FE	Y	Y	Y	Y
Individual Controls	N	Y	Y	Y
Ethno-marriage Controls	N	N	Y	Y
Ethno-Agri Controls	N	N	Y	Y
Mean Dep. Var.	0.56	0.56	0.56	0.56
Relative Change (%)	13.15	15.38	16.85	16.85
Clusters	382	382	382	382

Note. Table 8 reports the estimated coefficients for the equation 24. This table regresses an indicator of the historical practice of paying a bride price in the respondent's ethnic group on a dependent variable indicating whether the respondent is cut. Individual controls consist of the respondent's age, level of education, a set of religion dummies, a dummy for urban residence, and an index of the respondent household's wealth. Ethno-marriage controls consist of indicators for the ethnic group marriage patterns and include the practice of stem families and monogamy. Ethno-Agri controls are information on the ethnic group subsistence activities and include the dependence on gathering, hunting, fishing, agriculture, and animal husbandry. All specifications include country fixed effects. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the Ethnographic Atlas ethnicity level. There are 382 clusters. Significant at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Individual data on FGC are drawn from 57 waves of DHS that include 17 African countries and range from 1993 to 2018, pooled together. Table B.8 provides a list of countries and survey years. Ethnic-group-level data are drawn from the Ethnographic Atlas in a worldwide ethnic-level database compiled by George Peter Murdock. Detailed information on these data and the matching process are provided in Section 7.2.3.

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A Theoretical Appendix

The first two sub-section proves that the marriage market is characterized by positive assortative matching and that cut women receives a higher marital surplus than un-cut women at equilibrium.

A.1 Proof of Prediction 1

On the marriage market, each spouse choose the partner that maximizes their utility from the marriage, taking into account the reservation utility of the other partner:

$$V_J = \max_I \{z(i,j) - U_I\} \tag{25}$$

$$U_I = \max_J \{z(i,j) - V_J\} \tag{26}$$

The problem 25 can be re-written such that a woman with attribute F_1 and payoff V(1), as well as a woman with attribute F_0 and payoff V(0), are going to choose between a partner with wealth ω or ω' such that:

$$U(\omega)' = z_\omega(F,\omega) \tag{27}$$

$$U(\omega) = \max\{[z(1,\omega) - V_1; [z(0,\omega) - V_0]\} \tag{28}$$

From 28 at equilibrium the return to cutting is given by:

$$V_1 - V_0 = z(1,\omega^*) - z(0,\omega^*) \equiv z_F(F,\omega^*) \tag{29}$$

From this results we can show that the equilibrium assignment is characterized by positive assortative matching. Result 29 tells us that the bride price any man has to pay for a cut woman is equal to

$$V_1 = z(1,\omega^*) - z(0,\omega^*) + V_0 \tag{30}$$

and pays V_0 to an un-cut woman. Hence, from 28 and 29, we know that the pay-off of any man is

$$U(\omega) = \begin{cases} z(1,\omega) - (z(1,\omega^*) - z(0,\omega^*) + V_0) & \text{if} \quad \text{he marries a cut woman} \\ z(0,\omega) - V_0 & \text{if} \quad \text{he marries an un-cut woman} \end{cases} \tag{31}$$

To demonstrate that the marriage market is characterized by positive assortative matching lets consider each pair of marriages.

Case a. Marriage between a man with a lower wealth than ω^* and a cut woman. Let's consider any man with wealth $\omega < \omega^*$, his pay-off is:

$$U(\omega) = \begin{cases} z(1,\omega) - z(1,\omega^*) + z(0,\omega^*) - V_0 & \text{if} \quad \text{he marries a cut woman} \\ z(0,\omega) - V_0 & \text{if} \quad \text{he marries an un-cut woman} \end{cases} \tag{32}$$

It follows that man with wealth ω:

$$\text{Marries a cut woman} \qquad \text{if} \quad z(1,\omega) - (z(1,\omega^*) - z(0,\omega^*) + V_0) \geqslant z(0,\omega) - V_0 \tag{33}$$

$$\text{Marries a un-cut woman} \qquad \text{if} \quad z(1,\omega) - (z(1,\omega^*) - z(0,\omega^*) + V_0) \leqslant z(0,\omega) - V_0 \tag{34}$$

From 33, we obtain the following condition: A marriage between a man poorer than ω^* and a cut woman is possible if and only if:

$$z(1,\omega) + z(0,\omega^*) \geqslant z(1,\omega^*) + z(0,\omega) \tag{35}$$

However, super-modularity of the household output function implies that for any $\omega < \omega$

$$z(1,\omega) + z(0,\omega) = z(1,\omega) + z(0,\omega) \tag{36}$$

Hence, equation 36 implies that 35 can never hold. A marriage between a man with a lower wealth than ω^* and a cut woman is impossible.

Case b. Marriage between a man with a lower wealth than ω^* and an un-cut woman. Similarly, from 34, we obtain the following condition: a marriage between a man poorer than ω^* and an un-cut woman is possible if and only if:

$$z(1,\omega) + z(0,\omega^*) \leqslant z(1,\omega^*) + z(0,\omega) \tag{37}$$

Equation 36 implies that 37 hold for any man with wealth $\omega < \omega^*$. A marriage between a man with a lower wealth than ω^* and an un-cut woman is always possible.

Case c. Marriage between a man with a higher wealth than ω^* and an un-cut woman. Now let's consider any man with wealth $\omega' > \omega^*$, his pay-off is:

$$U(\omega'') = \begin{cases} z(1,\omega'') - z(1,\omega^*) + z(0,\omega^*) - V_0 & \text{if} \quad \text{he marries a cut woman} \\ z(0,\omega'') - V_0 & \text{if} \quad \text{he marries an un-cut woman} \end{cases} \tag{38}$$

It follows that man with wealth ω'':

$$\text{Marries a cut woman} \qquad \text{if} \quad z(1,\omega'') - (z(1,\omega^*) - z(0,\omega^*) + V_0) \geqslant z(0,\omega'') - V_0 \tag{39}$$

$$\text{Marries a un-cut woman} \qquad \text{if} \quad z(1,\omega'') - (z(1,\omega^*) - z(0,\omega^*) + V_0) \leqslant z(0,\omega'') - V_0 \tag{40}$$

From 39, we obtain the following condition: a marriage between a man richer than ω^* and a cut woman is possible if and only if:

$$z(1,\omega'') + z(0,\omega^*) \geqslant z(1,\omega^*) + z(0,\omega) \tag{41}$$

Equation 36 implies that 41 hold for any man with wealth $\omega'' > \omega^*$. A marriage between a man with a higher wealth than ω^* and a cut woman is always possible.

Case d. Marriage between a man with a higher wealth than ω^* and an un-cut woman. Similarly, from 40, we obtain the following condition: a marriage between a man greater wealth than ω^* and an un-cut woman is possible if and only if:

$$z(1,\omega'') + z(0,\omega^*) \leqslant z(1,\omega^*) + z(0,\omega'') \tag{42}$$

Equation 36 implies that 42 can never hold, and a marriage between a man with a greater wealth than ω^* and an un-cut woman is impossible. Hence, at equilibrium the only stable assignment A is the following:

$$\forall\, \omega' < \omega^* \begin{cases} \textit{A marriage between } \omega' \textit{ and } F = 1 \textit{ is impossible} \\ \textit{A marriage between } \omega' \textit{ and } F = 0 \textit{ is possible} \end{cases} \tag{43}$$

$$\forall\, \omega'' > \omega^* \begin{cases} \textit{A marriage between } \omega'' \textit{ and } F = 1 \textit{ is possible} \\ \textit{A marriage between } \omega'' \textit{ and } F = 0 \textit{ is impossible} \end{cases} \tag{44}$$

The equilibrium assignment is such that cut women always marry richer men and un-cut women marry poorer men. Result 43 and 44 proves that the marriage market is characterized by positive assortative matching. For a more formal proof of existence and uniqueness, see the online appendix of Chiappori, Iyigun, and Weiss (2009).

A.2 Proof of Prediction 2

Result 29 tells us that the marital surplus any man has to pay for a cut woman is equal to

$$V_1 = z(1, \omega^*) - z(0, \omega^*) + V_0 \tag{45}$$

and pays V_0 to an un-cut woman. The marital surplus of an cut woman is always higher than the martial surplus of an un-cut woman if and only if:

$$z(1, \omega) - z(0, \omega) > 0\, \forall\, \omega \in [0, 1] \tag{46}$$

The marital surplus of an cut woman is always lower than the martial surplus of an un-cut woman if and only if:

$$z(1, \omega) - z(0, \omega) < 0\, \forall\, \omega \in [0, 1] \tag{47}$$

Equation 46 can be re-write such that:

$$sign\,(z(1, \omega) - z(0, \omega)) = sign\,(z_F(F, \omega))\,, \forall\, \omega \in [0, 1] \tag{48}$$

Since $z(F,\omega)$ is strictly increasing in each attribute, it implies that:

$$z_F(F,\omega) > 0, \forall\, \omega \in [0,1] \tag{49}$$

$$z_w(F,\omega) > 0, \forall\, \omega \in [0,1] \tag{50}$$

Hence,

$$z(1,\omega) - z(0,\omega) > 0,\ \forall\, \omega \in [0,1] \tag{51}$$

Result 49 and 48 proves that at equilibrium cut women always receive a higher share of surplus than un-cut women

A.3 Proof of Prediction 3

The equilibrium threshold of perceived health cost is define by

$$\alpha_i \leq \alpha^*_{I_e} \equiv \frac{\Delta V}{1+r}(I_e\frac{1-\gamma}{\gamma}+1)$$

Hence we can derive two different value of this threshold depending on the value I_e takes:

$$\alpha^*_{I_e=1} = \frac{\Delta V_i}{1+r}(\frac{1-\gamma}{\gamma}+1) \qquad \text{under bride price when } I_e = 1 \tag{52}$$

$$\alpha^*_{I_e=0} = \frac{\Delta V_i}{1+r}+1 \qquad \text{without bride price when } I_e = 10 \tag{53}$$

As long as parents are imperfectly altruistic: $\gamma > 0$:

$$\alpha^*_{I_e=1} > \alpha^*_{I_e=0} \tag{54}$$

Since $G(\alpha)$ is a cumulative distribution and $G'(\alpha) = g(\alpha) > 0$, $G(\alpha)$ is strictly increasing, it follows that :

$$G(\alpha^*_{I_e=1}) > G(\alpha^*_{I_e=0}) \qquad \text{for} \alpha^*_{I_e=1} > \alpha^*_{I_e=0} \tag{55}$$

Result 55 proofs that the probability for parent's to cut their daughter is higher in ethnic groups that practice the bride price custom.

A.4 Proof of Prediction 4

The effect of the campaign on the probability to be cut is given by the following partial derivative:

$$\frac{\partial P_{I_e}(F_i = 1)}{\partial s} = \frac{\partial G(\alpha_i < \alpha^*_{I_e}|s)}{\partial s}$$

recall that

$$G(\alpha_i|s) = \frac{1}{\sqrt{2\pi\widehat{\sigma}^2}} \int_{-\infty}^{\alpha^*_{I_e}} e^{-\frac{1}{2}\frac{(\alpha_i - \widehat{\mu})^2}{\widehat{\sigma}^2}} d\alpha_i$$

and

$$\alpha^*_{I_e} = \frac{\Delta V_i}{1+r}(I_e \frac{1-\gamma}{\gamma} + 1)$$

Which gives:

$$\frac{\partial G(\alpha_i < \alpha^*_{I_e}|s)}{\partial s} = \frac{\partial}{\partial s}\frac{1}{\sqrt{2\pi\widehat{\sigma}^2}} \int_{-\infty}^{\alpha^*_{I_e}} e^{-\frac{1}{2}\frac{(\alpha_i - \widehat{\mu})^2}{\widehat{\sigma}^2}} d\alpha_i$$

with

$$\widehat{\mu} \equiv \mathbb{E}[\alpha_i|s] = \frac{\tau_{\alpha_i}\mu_{\alpha_i} + \tau_\eta s}{\tau_{\alpha_i} + \tau_\eta}$$

For simplification let us denote

$$z(\alpha, s) = \frac{(\alpha_i - \widehat{\mu})^2}{\widehat{\sigma}^2}$$

Using the Leibniz rule we an re-write

$$\frac{\partial G(\alpha_i < \alpha^*_{I_e}|s)}{\partial s} = \frac{1}{\sqrt{2\pi\widehat{\sigma}^2}} \int_{-\infty}^{\alpha^*_{I_e}} -\frac{1}{2}\frac{\partial z(s)}{\partial s} e^{-\frac{1}{2}z(\alpha_i,s)} d\alpha \qquad (56)$$

Note that we have :

$$\frac{\partial z(\alpha_i, s)}{\partial s} = \frac{\tau_\eta(\alpha_i - \tau_{\alpha_i}\mu_{\alpha_i} - s)}{\widehat{\sigma}^2(\tau_{\alpha_i} + \tau_\eta)}$$

$$\frac{\partial z(\alpha_i, s)}{\partial \alpha_i} = -\frac{(\alpha_i - \tau_{\alpha_i}\mu_{\alpha_i} - s)}{\widehat{\sigma}^2(\tau_{\alpha_i} + \tau_\eta)}$$

which implies that

$$\frac{\partial z(\alpha_i, s)}{\partial s} = -\frac{1}{\tau_\eta} \frac{\partial z(\alpha_i, s)}{\partial \alpha_i} \tag{57}$$

Plugging equation 57 in equation 56, we can re-write

$$\frac{\partial G(\alpha_i < \alpha^*_{I_e} | s)}{\partial s} = \frac{1}{\sqrt{2\pi\widehat{\sigma}^2}} \int_{-\infty}^{\alpha^*_{I_e}} -\frac{1}{\tau_\eta} \frac{\partial z(s)}{\partial \alpha_i} e^{-\frac{1}{2}z(\alpha,s)} d\alpha_i$$

$$= -\frac{1}{\tau_\eta} \frac{1}{\sqrt{2\pi\widehat{\sigma}^2}} e^{-\frac{1}{2}z(\alpha^*_{I_e},s)} d\alpha_i = -\frac{g(\alpha^*_{I_e})}{\tau_\eta}$$

$$\frac{\partial G(\alpha_i < \alpha^*_{I_e} | s)}{\partial s} = -\frac{g(\alpha^*_{I_e})}{\tau_\eta} < 0 \tag{58}$$

Result 58 proves that the probability of cutting decrease with the signal of the campaign.

A.5 Proof of prediction 5

Since the population of un-cut women is given from the household decision problem, it follows that $e \equiv \sum_{i=1}^{M} (F_i = 0)$ is now endogenously determined in the model and can be written as a function of s:

$$e(\alpha, s) = \sum_{i=1}^{M} (F_i = 0) = 1 - G(\alpha_i < \alpha^*_{I_e} | s) \tag{59}$$

By the implicit function theorem (IFT) and the chain rule we have that the effect of parents exposure to the campaign on the equilibrium bride price is:

$$\frac{\partial V_1\left(\Psi(e)\right)}{\partial s} = \frac{\partial V_1\left(\Psi(e)\right)}{\partial \Psi} \frac{\partial \Psi(e)}{\partial e} \frac{\partial e}{\partial s} \tag{60}$$

The third part of the derivative describes the change in the population of un-cut women such that:

$$\frac{\partial e}{\partial s} = 1 - \frac{\partial G(\alpha_i < \alpha^*_{I_e} | s)}{\partial s} = 1 - \frac{g(\alpha^*_{I_e})}{\tau_\eta} > 0 \tag{61}$$

The second part of the derivative is the change in the equilibrium assignment, which is simply a linear shift proportional to the change in the population of uncut women such that:

$$\frac{\partial \Psi(e)}{\partial e} = 1 > 0 \tag{62}$$

Finally, the first part of the derivative is the change in the marriage marital surplus received by cut women at equilibrium when the equilibrium assignment changes, and is such that:

$$\frac{\partial V_1\left(\Psi(e)\right)}{\partial \Psi} = \frac{z(1,e) - z(0,e) + V_0}{\partial e} = \frac{z(1,e') - z(0,e') - z(1,e) - z(0,e)}{\Delta e} > 0 \,\forall\, e' > e \tag{63}$$

Since the total effect of parents exposure to the campaign on the equilibrium is the product of 61, 62, 63, that are all positive, we have:

$$\frac{\partial V_1\left(\Psi(e)\right)}{\partial s} = \frac{\partial V_1\left(\Psi(e)\right)}{\partial \Psi}\frac{\partial \Psi(e)}{\partial e}\frac{\partial e}{\partial s} > 0 \tag{64}$$

Result 64 proves that the marital surplus and bride price received by cut women at equilibrium is higher in marriage markets where girls parent's have been exposed to the campaign, relative to in marriage market not exposed.

A.6 Proof of prediction 6

Let's define the aggregate bride price payment in a given marriage market Θ can be expressed as:

$$V_\Theta = eV_0 + (1-e)V_1 \tag{65}$$

and can be re-write as:

$$V_\Theta = (1-e)\left[z(1,e) - z(0,e)\right] = (1-e)\, z_f(F,e) \tag{66}$$

The effect of parent's exposure to the campaign on the aggregate bride price in a given marriage market is given by:

$$sign\left(\frac{\partial V_\Theta}{\partial s}\right) = sign\left(-\frac{\partial e}{\partial s}(z_f(F,e)) + \frac{\partial z_f(F,e)}{\partial s}(1-e)\right) \tag{67}$$

The second part of the derivative is positive and captures the increase in the value of marital surplus received by cut women at equilibrium, as in equation 64, weighted by the population of cut women.

The first term of the derivative is negative and describe a situation where the increase in population of un-cut women leads to more women receiving V0 at marriages and hence, the aggregate marriages payment decline.

Recall that from 63 and 64:

$$\frac{\partial z_f(F,e)}{\partial s} = \frac{\partial V_1\left(\Psi(e)\right)}{\partial s} = \frac{\partial V_1\left(\Psi(e)\right)}{\partial \Psi}\frac{\partial \Psi(e)}{\partial e}\frac{\partial e}{\partial s} \tag{68}$$

Hence, 67 can be re-write:

$$sign\left(\frac{\partial V_\Theta}{\partial s}\right) = sign\left(-\frac{\partial e}{\partial s}(z_f(F,e)) + \frac{\partial V_1\left(\Psi(e)\right)}{\partial \Psi}\frac{\partial \Psi(e)}{\partial e}\frac{\partial e}{\partial s}(1-e)\right) \tag{69}$$

$$sign\left(\frac{\partial V_\Theta}{\partial s}\right) = sign\left(-\frac{\partial e}{\partial s}(z_f(F,e)) + \frac{\partial z_f(F,e)}{\partial e}\frac{\partial e}{\partial s}(1-e)\right) \tag{70}$$

$$sign\left(\frac{\partial V_\Theta}{\partial s}\right) = sign\left(-(z_f(F,e)) + \frac{\partial z_f(F,e)}{\partial e}(1-e)\right) \tag{71}$$

We obtain the following identity:

$$\left(\frac{\partial V_\Theta}{\partial s}\right) > 0 \qquad \text{if } (1-e)\, z_F'(F,e) > z_F(F,e) \tag{72}$$

$$\left(\frac{\partial V_\Theta}{\partial s}\right) < 0 \qquad \text{if } (1-e)\, z_F'(F,e) < z_F(F,e) \tag{73}$$

that we can re-write

$$\left(\frac{\partial V_\Theta}{\partial s}\right) > 0 \qquad \text{if } z_F'(F,e) > \frac{z_F(F,e)}{(1-e)} \tag{74}$$

$$\left(\frac{\partial V_\Theta}{\partial s}\right) < 0 \qquad \text{if } z_F'(F,e) < \frac{z_F(F,e)}{(1-e)} \tag{75}$$

with $z_F'(F,e) = \frac{\partial z_F(F,e)}{\partial e}$ being the change in equilibrium price (general equilibrium effects). We can see that the sign of the derivative directly depends on the strenght of this effect.

Result 74 and 75 proves that for a sufficiently low $z_F'(F,e)$ (general equilibrium effects), the aggregate marital surplus received by ll the women at equilibrium ($V^*\left(\Psi(e)\right)$) is lower in marriage markets where girls parent's have been exposed to the campaign (Φ'), relative to in marriage market not exposed (Φ).

B Empirical Appendix

B.1 Econometric Specification for the bride price

In the presence of GE, the treatment effect will be biased upward when comparing the bride price in the pre-treatment and post-treatment cohorts in each village. This is because the average bride price in the pretreatment group is higher than it would have been without treatment, leading to a violation of the Stable Unit Treatment Value (SUTVA) assumption. To account for this spillover effect on the control cohort, I estimate the following specification:

$$BridePrice_{ivkt} = \lambda_1(Treat_v \times Post_k^{0-15}) + \lambda_2(Treat_v \times Pre_k^{15-35} \times notmarr_t^{in1994}) \\ +\alpha_v + \alpha_k + \alpha_t + \xi_{ivkt},$$

I have argue that these strategy is similar to a tripple difference-in-differences where the coefficient of $notmarr_t^{in1994}$ wouldn't vary accross the $Post_k^{0-15}$ and Pre_k^{15-35} group. In a tripple-difference strategy, to measure differential effects of being exposed to the radio messages between women at risk to be cut (young group) and women only benefiting from the externalities (old group), we would focus on two tripple interaction: $(Treat_v \times notmarr_t^{in1994} \times Post_k^{0-15})$ and $(Treat_v \times notmarr_t^{in1994} \times Pre_k^{15-35})$. Since $notmarr_t^{in1994}$ is always equal to one in the young group, the tripple term $\lambda_1(Treat_v \times notmarr_t^{in1994} \times Post_k^{0-15})$ becomes $\lambda_1(Treat_v \times Post_k^{0-15})$. $(Post_k^{0-15} \times notmarr_t^{in1994})$ would account for differential trends between un-married and married women, but in our case is reduced to level difference between un-married and married within the old group and is capture by year of marriage fixed effect. Similarly, $\lambda_3(Treat_v \times notmarr_t^{in1994})$ would account for a non random distribution of intensity of treatment in village with different population of un-married women. In my case, this variation will be only within the old cohort and be capture by village fixed effect. Hence, the tripple-difference that captures differential treatement effect for our two groups of interest will become equation 22.

B.2 Robustness on the main results

In this section, I discuss some additional analyzes that confirm the robustness of the main resultsp-resented in Section 6.

Log transformation of the bride price. I provide additional evidence for the robustness of the main findings for the effect of exposure to anti-FGC messages on the value of the bride price received at marriage. In the main estimates, the bride price ismeasured as the deflated value paid at marriage and transformed using an inverse hyperbolic sinefunction (IHS). I additionally consider alternative log transformations, such as the logarithm of thedeflated value of the bride price paid at marriage $+1$, to accommodate for the zero values. Similarly, Iconsider the dependent variable as the log of the bride price $+0.1$ or $+0.01$. Finally, I estimate the mainestimates where I measure the bride price in level. Table B.2 report the results of these estimates. Theresults are all robust and similar to the main result in Table 3 in terms of significance and magnitude.

Extensive margin. Additionally, in the main analysis, I examined the effect of exposure to anti-FGC radio messages on the likelihood of paying a bride price at marriage (extensive margin). Topro-vide more substance to these results, I considered various thresholds that define whether or not abride price is paid. First, I define a bride price that is paid if the value is non-zero. Second when thevalue is above 5 LCU and third when the value is above 10 LCU. Since the payment of a bride priceis mandatory for the marriage contract to be valid, this exercise aims to consider cases where a tokenor symbolic payment is made. The results are given in Table B.3. Considering these different thresholdsdoes not affect the significance and magnitude of the results presented in the main Table 3.

Accounting for general equilibrium effects. In the augmented specification for the difference-in-differences effect of anti-FGC messages on bride price, I included an indicator aimed at capturingthe GE effect affecting the pre-treatment period. This indicator is a triple interaction for not being married in 1994, the intensity of exposure at the village level (radio coverage of the program), andan indicator of being in the pretreatment cohort (15-33 in 1994) as described by Equation 22. Because the magnitude of these effects is sensitively different for younger women in the pretreatment cohort,I redefine a different triple indicator for different pre-treatment cohorts. I estimate the augmenteddifference-in-differences (equation 22 with the triple interaction for being unmarried in 1994, the intensity of exposure at the village level (radio coverage of the program), and an indicator of being aged16 to 21 in 1994. I repeat this exercise considering the pretreatment group of the triple interaction asbeing aged 16-23 years in 1994. I do this consecutively by including older women aged 16-25 in 1994through 16-33. The results for the coefficient of interest are similar in magnitude and significance tothe one reported as the main results (Table 3). The coefficient for the GE effect is larger when the pre-treatment group of the triple interaction is younger than when it includes older women, consistentwith what we previously described in section 6.2.1.

B.3 Alternative Mechanisms

In this section, I conduct a simple exercise that allows me to discuss how changing the norms related to FGC and marriage may not drive the decline in bride price that I have discussed as the main finding (Table 3).

I take advantage of the fact that in the control group (ages 16 to 33) a significant proportion ofthe women were not yet married. This implies that these women were exposed to the same radiomessages as the treatment group (ages 15 to 0 in 1994) even though they were not yet married. Themain difference between these women is that in the control group, all women were no longer at riskof being circumcised. This implies that if the program contained information that could have affectedbride price by a mechanism other than changing the FGC, the unmarried women in the control groupwould have been similarly affected. This would create level differences between the exposed villageand the unexposed village and would be captured by the fixed village effect.

Furthermore, since the proportion of unmarried women in the control group decreases as I consider older women in the control group, this provides me with an opportunity to test empirically towhat extent this alternative explanation might drive the main effect. The intuition is the following:when the proportion of unmarried women in the control group is high, more women would havebeen exposed to messages prior to marriage decisions being made. Hence the difference in bride pricebetween the treatment cohort and the pre-treatment cohort should decrease (as for the pre-treatmentcohort, more women have been exposed to). As the proportion of unmarried women in the controlgroup decreases, more women would have been unaffected, in the sense that they were marriedprior to being exposed to the messages. Hence, the difference in bride price between the treatment group and the pre-treatment group should increase (as fewer women in the pre-treatment group wouldhave been exposed to the messages prior to marriage).

I estimate the main difference in-difference on the bride price (equation 19)) using women aged16-21 in 1994 as a control group, 89 per cent of whom were not married in 1994. Then, I estimate thesame specification with women aged 16-23 in 1994 and among whom the proportion of unmarriedwomen in 1994 is lower (63 per cent). I repeat the exercise with substantially including older cohortsin the control group, up to the last cohort 16-31 where 18 per cent of the women in 1994 were notmarried yet. I report the results of this exercise in Table B.5. I also perform the same exercise when Iestimate the augmented difference in the difference described in equation 22 and report the results in Table B.4. The magnitude of the main coefficient remains similar and does not increase when olderwomen (fewer unmarried women) are included in the control group. These results indicate that thecampaign is unlikely to affect the bride prices through any mechanism other than changing the FGC.

B.4 Figures Appendix

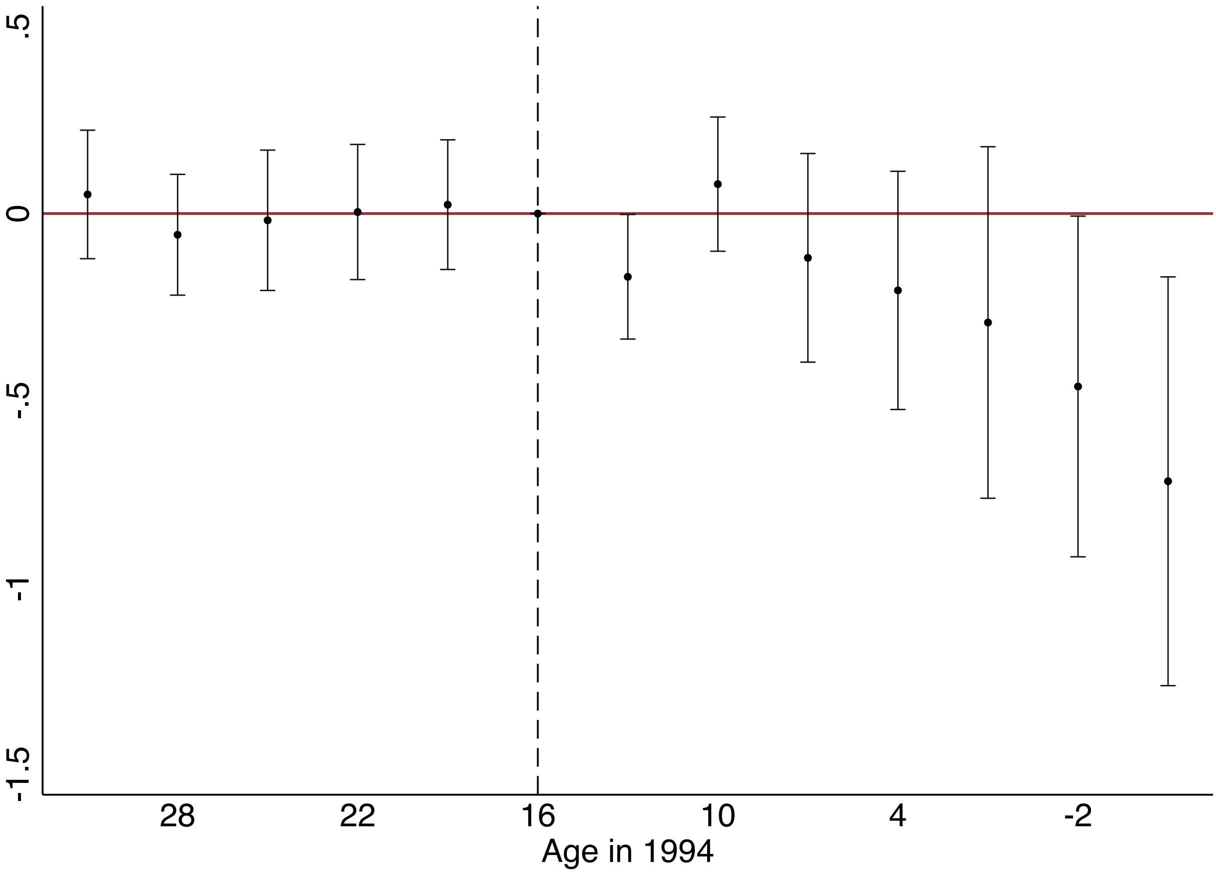

Figure B.1: Estimates of the treatment effect on respondent bride price by cohort.

Note. Figure 13 reports the coefficient of the β_1 from equation 20. The y-axis reports the estimated coefficient of the interaction between being born in a three-year cohort and the village coverage of the anti-FGC health awareness messages broadcast on the radio in 1994 in their birth-village on respondent bride price. The bride price is measured as the deflated value paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The event is defined as being in the cohort at age risk of being cut (age 15 in 1994). The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the village level. The x-axis reports women's age relative to the year 1994. The sample consists of women born between 1955 and 1998. There are 2,024 villages.
Source:: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

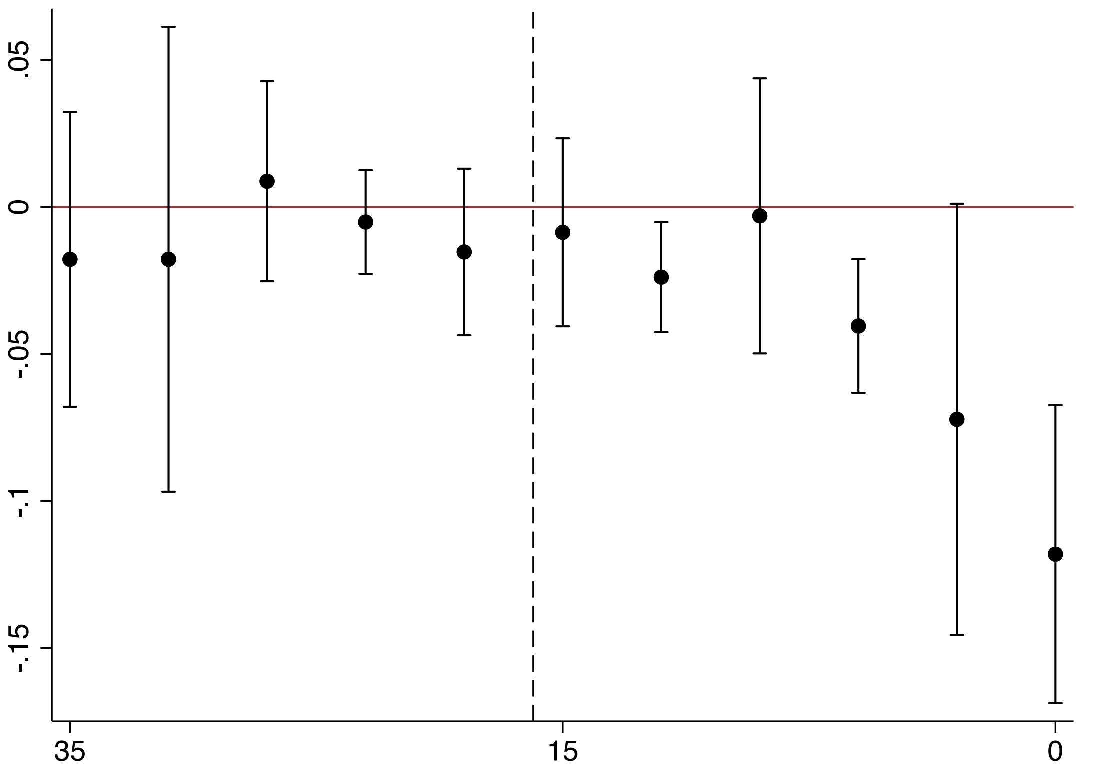

Figure B.2: Female genital cutting and Anti-FGC Radio Messages. Event-Study Robust to Heterogeneous Treatment Effects.

Note. Figure B.2 reports the coefficient of the β_1 from equation 20 estimated using de De Chaisemartin and d'Haultfoeuille (2020)'s method and implemented using the did multiplegt command available on the SSC repository. The y-axis reports the estimated coefficient of the interaction between being born in a three-year cohort and the village coverage of the anti-FGC health awareness messages broadcast on the radio in 1994 in their birth-village on whether the respondent is cut. The event is defined as being in the cohort at age risk of being cut (age 15 in 1994). The capped vertical bars show 90% confidence intervals calculated using robust cluster bootstrapped standard errors at the village level. The x-axis reports women's age relative to the year 1994. The sample consists of women born between 1955 and 2000 and 2,024 villages.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

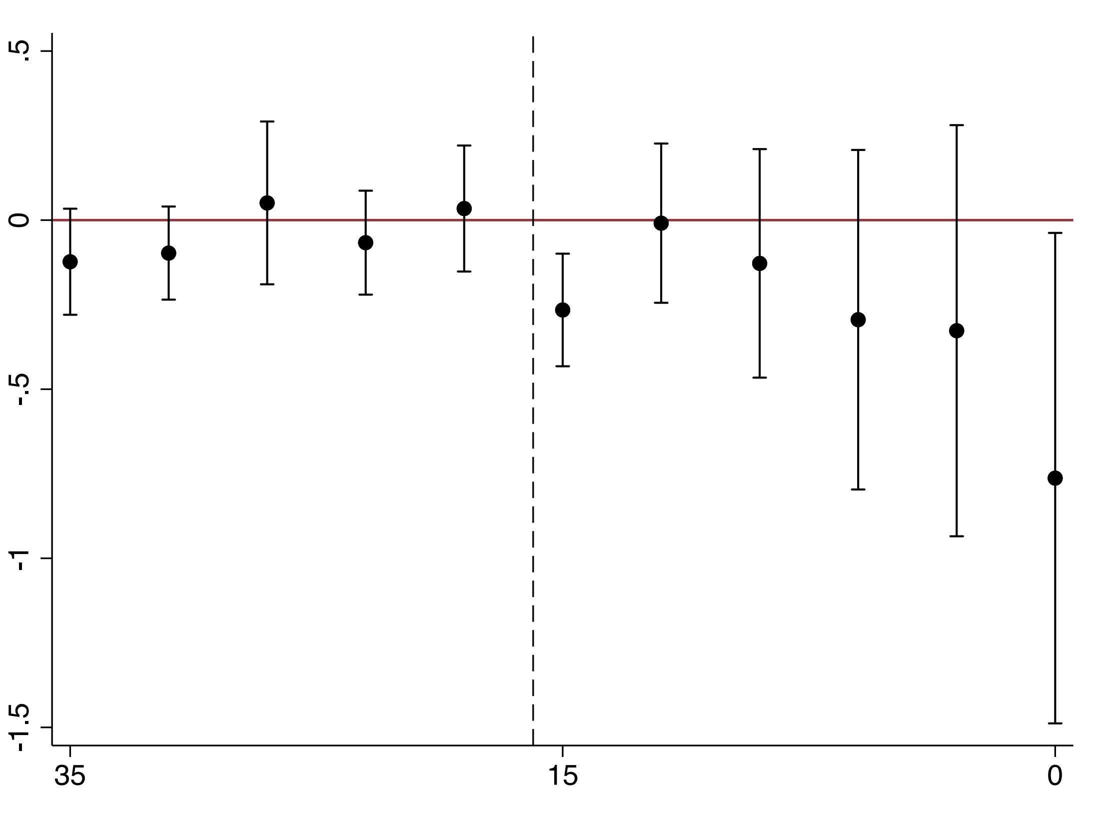

Figure B.3: Bride Price and Anti-FGC Radio Messages. Event-Study Robust to Heterogeneous Treatment Effects.

Note. Figure B.3 reports the coefficient of the β_1 from equation 20 estimated using de De Chaisemartin and d'Haultfoeuille (2020)'s method and implemented using the did multiplegt command available on the SSC repository. The y-axis reports the estimated coefficient of the interaction between being born in a three-year cohort and the village coverage of the anti-FGC health awareness messages broadcast on the radio in 1994 in their birth-village on respondent bride price. Estimates control for the triple interaction between belonging to the pre-treatment group (ages 15-35 in 1994) with the intensity of the exposure in the birth-village and being unmarried in 1994. The bride price is measured as the deflated value paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The event is defined as being in the cohort at age risk of being cut (age 15 in 1994). The capped vertical bars show 90% confidence intervals calculated using robust cluster bootstrapped standard errors at the village level. The x-axis reports women's age relative to the year 1994. The sample consists of women born between 1955 and 2000 and 2,024 villages.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

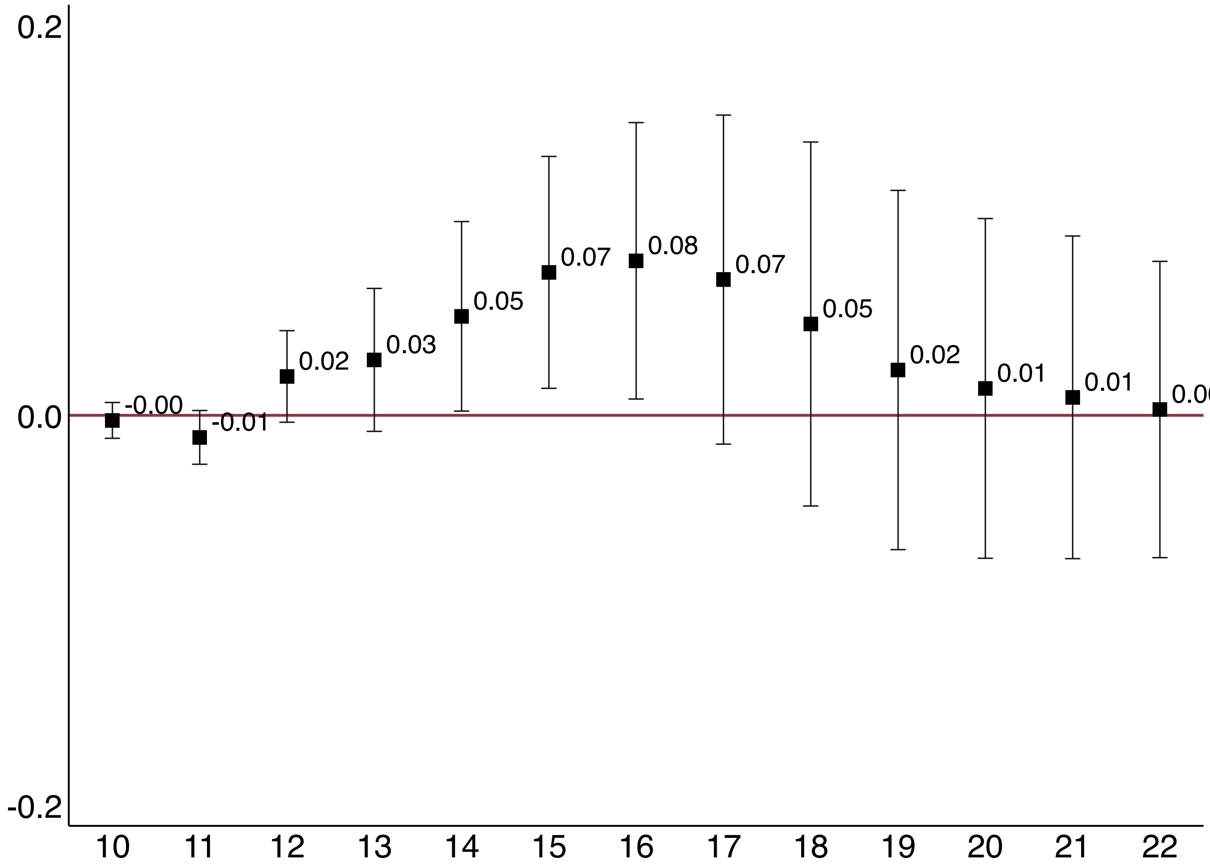

Figure B.4: Age at Marriage and Female Genital Cutting (IV-Estimates)

Note. Figure B.4 report the coefficient of instrumetal variable estimates of the effect of FGC on the probability of women being married after a specific age. The Y-axis reports each estimated coefficient of the second stage estimates where an indicator of whether the respondent is cut is regressed on indicator of whether the respodent was married before age 10 to 22. Each estimated results from a different regression. The X-axis report the age thresehold considered as dependent variable for each regression. The first-stage estimates are the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the respondent probability of being cut. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at risk of being cut (not cut in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages) and include an indicator of being at risk of being cut. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the village level. The sample consist of women born between 1955 and 1998. There are 2024 villages.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

B.5 Data Appendix

EGYPT (Arab Republic of)

L.T: UTC + 2h — **Pop:** 58.295.000 — **Radios:** 16.450.000 — **Pr.L:** Arabic — **E.C:** a/c 50, 220V — **ITU:** EGY.

EGYPTIAN RADIO & TV UNION (Gov.)
ADDR: P.O. Box 1186, Cairo. **Te:** +20 (2) 747120, 757155, 770355. **Cable:** CIBROTEV. **Tlx:** 92152.
L.P: Pres. ERTU: Amin Bassiouni. Chmn. Eng. Sector: Mahmoud M.Kishk. Chmn. Sound Prgr. Sector: Helmi El Bolok. Chmn. of TV Prgr. Sector: Abd.Salam El Nadi.

MW	kHz	kW	MW	kHz	kW
Cairo	558	40	Ras Gharib	1188	10
Batrah	621	1000	Alexandria	1197c	25
Tanta	621	25	Asswan	1278	10
El Kharga	702h	10	Assiut	1305	10
Asswan	702j	10	Hurghada	1314	10
Cairo	711	100	Nag Hamadi	1314	1
Qena	756j	10	Abu Simbil	1314j	1
El Fayoum	756	1	Cairo	1341	100
Abis	774	500	Bawiti	1341	10
Batra	819	1000	Idfu	1341	10
Cairo	819	50	Siwa	1341	10
Santah	864	500	Quseir	1350	10
Matruh	882	10	El Kharga	1368	10
Hurghada	918	10	El Farafra	1368	1
Bawiti	918	10	El Dakhla	1386	10
Salum	936	10	Luxor	1386j	10
Assiut	981a	10	Ras Gharib	1422	10
Baris	981	1	Salum	1422i	10
Abu Simbil	981	1	Sohag	1476j	10
El Arish	1008a	100	El Minya	1476a	10
El Farafra	1008	1	El Tur	1485f	1
Beni Suef	1008	1	El Arish	1503e	25
Shalatin	1044	7	Quseir	1575	10
Cairo	1071b	60	Idfu	1584j	10
El Minya	1080	10	Baris	1584h	1
Luxor	1080	10	Port Said	1584g	1
Batrah	1107	600	Matruh	1593i	10
Sohag	1143	10	El Dakhla	1602h	10
Tanta	1161d	60	Nag Hamadi	1602j	10
Quena	1179	10	Siwa	1602i	10

FM (MHz)	Regional	Music	European	kW
Cairo		89.5	95.4	20
El-Arish	97.4	90.9	94.1	80
Ismalia	96.7	90.4	93.5	50
Mahalla	89.2	93.1	99.6	160

+ 31 tr's less than 20kW ERP.
General Prgr: 24h on 819/918/936/981/1008/1341kHz, 0400-2200 on 1080/1143/1179/1188/1279/1305/1314/1350/1368kHz, 1100-0700 (Fri 24h) on 882kHz.
Youth & Education Prgr: 0600-1700 on 711/918/1341/1368/1575kHz, 0600-1500 (Fri 0600-1000 & 1100-1500) on 702/1584/1602kHz, 0600-1400 on 1422/1593kHz, 0800(Fri 1100)-1600 on 1485kHz, 0600(Fri 1030)-1600 on 1314/1386kHz, 0700(Fri 1100)-1600 on 1503kHz, 0800-1400 (exc.Fri) on 981/1476kHz.
Music & Cultural Prgr: 0400-1800 & 2200-0100 on 1341kHz (Cairo) + FM.
European Prgr: 0500-2200 on 558kHz + FM.
Holy Quran Prgr: 0200-2200 on 864kHz, 0200-0600 & 2000-2200 on 918/1341/1368/1422/1575/1593/1602kHz, 0200-0500 & 2000-2200 on 756/981/1314/1386/1476/1584/1602kHz, 2000-2200 on 702kHz.
Middle East Comm. Prgr: 0400-0630 & 1100-2330 on 774kHz.
Voice of the Arabs: 24h on 621kHz, 0800-1000 & 2100-0600 on 1008kHz, 2330-0500 on 1107kHz.
Wady El Nile Prgr: 0500-0600 & 1500-1800 on 1107kHz.
Palestine Prgr: 0600-0800 & 1200-1500 on 1008/1107kHz.
Hebrew Prgr: 1500-2100 on 1008kHz.
Local Prgrs: a) 0500-0800 & 1400-2000 (Fri 0500-2000) — b) 0400-0800 & 1200-2200 — c) 0400-0700 & 1200-2200 (Fri 0400-2200) — d) 0400-0600 (Fri 1100) & 1400-1900 (Thurs 2100) — e) 0400-0700 (Fri 1100) & 1600-2000 — f) 0500-0800 (Fri 1100) & 1600-2000 — g) 0400-0800 (Fri 1100) & 1400-2200 (Thurs 2300) — h) 0400-0600, 0900-1100 (Fri), 1500-1900 — i) 1400-1800 — j) 0500-0600 (Fri 1030) & 1600-1800.

SW: Z=Abu Zaabal (G.C: 31.22E/30.16N): 100/250kW, A=Abis (G.C: 30.05E/31.10N): 250kW, M=Mokattam (G.C: 31.15E/30.03N): 50/100kW.

kHz	kHz	kHz	kHz	kHz	kHz	kHz
6230	9755	9950	11785	15115	15285	17670
9475	9770	9990	11875	15155	15335	17690
9620	9800	11560	11975	15210	15375	17745
9670	9850	11665	11980	15220	15420	17770
9700	9900	11715	12050	15255	17595	17800
9740						

RELAYS OF HOME SCES.

General Prgr.

kHz	Area	Times	Voice of the Arabs		
9620Z	NAf/SEu	0350-0700	9700Z	NAf	1800-0030
9670A	Eu	1800-2400	9850A	NAf/SEu	0300-0600
9770Z	NAf/SEu	0350-0700	11665Z	EAf/CAf	1900-0030
9800Z	Gulf	0350-2400	11980A	NAf/SEu	0600-1400
9850A	NAf/SEu	1100-2400	15285Z	Gulf	0300-0030
11665Z	ME	0350-1800	**Holy Quran Prgr.**		
11785	NAf/SEu	0700-1500	9755M	NAf/ME	0200-2200
12050A	NAm/Eu	0200-0600			
		0700-2400			
	EAf	0700-1530			
15115Z	WAf	0700-1100			
17670Z	NAf/SEu	1300-1900			

Figure B.5: List of the FM and AM frequencies broadcasted in Egypt in 1994.

Note: Figure B.5 is a registry containing information on the different programs broadcast in Egypt on the FM and AM waves in 1994. The program of interest is the Youth and Education channel.

د . محمد سيد طنطاوي

د . عبد الرحمن نور الدين

د . حسام بدراوي

● مفتي الجمهورية : يجوز سن قانون بمنع وتجريم الختان ولا يوجد نص إسلامي بضرورة ختان الأنثى !

● رغم أن الذين شاهدوا الفيلم قلة من المصريين ، إلا أن حالة من الغضب اجتاحت الناس ، البعض توقف أمام تصوير العملية ، ولكن الجزء الأكبر فضل الذهاب إلى الأصل وهو عملية الختان نفسها ، وفي كلتا الحالتين توجد مشكلة .

آخر الدراسات العلمية أثبتت أن ٧٣٪ من فتيات القاهرة تجرى لهن عملية الختان ، وأن هذه النسبة ترتفع إلى ٩٥٪ في القرى والنجوع ، وأن هناك ٣٦٠٠ عملية ختان للفتيات تجرى يوميا في مصر بينها ٤٠٪ للأطباء والباقي يجريه حلاقو الصحة وغير المتخصصين .

حلاق الصحة مات !

● بعد إذاعة فيلم الـ C.N.N :
● حلاق الصحة مات في السيدة زينب واختفى من الإمام الشافعي !

هكذا شاهد العالم ختان الفتاة كأنه على الهواء مباشرة

● في الصعيد والسودان تتم عملية إزالة كل الأعضاء الظاهرة للأنثى بعملية الختان !

١٥

Figure B.6: Egyptian newspaper about female genital cutting in 1994.

Note. The Figure B.6 is a newspaper article published in 1994 by the Egyptian press. It relates an event that happened in 1994 related to FGC. At the International Conference for Population and Development (ICPD), an activist from CNN broadcast a shocking video denouncing the practice in front of an auditorium composed of political representatives from more than 53 countries worldwide. The article was written by Bothayna al-Bialy and published in the newspaper Al-Mosawer on September 23, 1994.

B.6 Table Appendix

Table B.1: Effect of the campaign on the probability that a bride price was paid at marriage

Dependent Variable	A bride-price was paid at marriage		
	> 0 LCU	> 1 LCU	> 10 LCU
	(1)	(2)	(3)
Intensity x Post	0.001	-0.001	-0.012
	(0.002)	(0.011)	(0.014)
	[0.814]	[0.928]	[0.374]
Observations	12,741	12,741	12,741
R-squared	0.992	0.840	0.736
Village FE	Y	Y	Y
Cohort FE	Y	Y	Y
Year of Marriage FE	Y	Y	Y
Mean Dep. Var.	0.62	0.22	0.17
Relative Change (%)	0.08	-0.46	-7.21
Clusters	1033	1033	1033

Note. Table B.1 reports the estimated coefficients for the equation 19. The results are the difference-in-differences estimates of the effect of exposure to anti-FGC messages on the radio on an indicator of whether a bride price was paid at marriage. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at age risk of being cut (younger than age 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). All specifications include village of birth fixed effects, year of birth fixed effects, and year of marriage fixed effects. The sample includes women born between 1965 and 1999. The dependent variable in column (1) is an indicator coded one if a non-null bride price was paid at marriage. The dependent variable in column (2) is an indicator coded one if a bride price with a value higher than 1 Egyptian pound (LCU) was paid at marriage. The dependent variable in column (2) is an indicator coded one if a bride price with a value higher than 10 Egyptian pounds (LCU) was paid at marriage. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1,033 clusters. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table B.2: Robustness: Log Transformation

	Log Transformation of Bride-Price				
	log(y + 1)	log(y + 0.1)	log(y + 0.01)	IHS	Level
	(1)	(2)	(3)	(4)	(5)
Intensity X Post	-0.228**	-0.218*	-0.216*	-0.223**	-344.113*
	(0.110)	(0.112)	(0.112)	(0.108)	(191.771)
	[0.039]	[0.052]	[0.055]	[0.039]	[0.073]
Observations	12,741	12,741	12,741	12,741	12,741
Village FE	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y	Y
Mean Dep. Var.	1.49	-0.70	-1.60	1.53	1050.13
Relative Change (%)	-25.58	-24.35	-24.12	-24.94	-32.77
Clusters	1033	1033	1033	1033	1033

Note. Table B.2 reports the estimated coefficients for the equation 19. The results are the difference-in-differences estimates of the effect of exposure to anti-FGC messages on the radio on an indicator of whether a bride price was paid at marriage. Difference-in-differences estimates exploit the interaction between being exposed to the messages when at age risk of being cut (younger than age 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). All specifications include village of birth fixed effects, year of birth fixed effects, and year of marriage fixed effects. The sample includes women born between 1965 and 1999. The dependent variable in column (1) is measured as the logarithm of the deflated value of the bride price paid at marriage +1 to account for the zero values. The dependent variable in column (2) is measured as the logarithm of the deflated value of the bride price paid at marriage +01 to account for the zero values, and in column (3), the deflated value of the bride price +001. The dependent variable in column (4) is measured as the deflated value of the bride price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. The dependent variable in column (5) is measured as the deflated value of the bride price paid at marriage in levels. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1,033 clusters. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table B.3: Bride Price and Anti-FGC Radio Messages (Robustness on pre-treatment cohort)

Dependent Variable	Bride Price (IHS)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intensity x Post	-0.213*	-0.213**	-0.211*	-0.215**	-0.216**	-0.216**	-0.216**
	(0.109)	(0.108)	(0.109)	(0.108)	(0.109)	(0.109)	(0.109)
	[0.051]	[0.050]	[0.053]	[0.048]	[0.048]	[0.048]	[0.048]
Intensity x Un-Married x Pre	0.027	0.025	0.029	0.014	0.009	0.009	0.009
	(0.083)	(0.079)	(0.078)	(0.078)	(0.081)	(0.081)	(0.081)
	[0.742]	[0.752]	[0.714]	[0.857]	[0.909]	[0.909]	[0.909]
Observations	12,644	12,644	12,644	12,644	12,644	12,644	12,644
R-squared	0.654	0.654	0.654	0.654	0.654	0.654	0.654
Village FE	Y	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y	Y	Y	Y
Cohort Pre / Age in 1994	16-21	16-23	16-25	16-27	16-29	16-31	16-33
Mean Dep. Var.	1.31	1.31	1.31	1.31	1.31	1.31	1.31
Relative Change	-23.76	-23.71	-23.47	-23.94	-24.10	-24.10	-24.10
Clusters	1038	1038	1038	1038	1038	1038	1038

Note. Table **??** reports the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the bride price at marriage. Difference-in-Differences exploit the interaction between being exposed to the messages when at age-risk to be cut (younger than 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Columns (1) to (7) report the estimated coefficients for the equation 22 and control for the triple interaction between the intensity of the exposure in the birth-village and being un-married in 1994 and belonging to a specific pre-treatment group. The different pre-treatment group are the women aged 16 to 21 in 1994 up to women aged 16-33 in 1994. All specifications include village of birth fixed effects, year of birth fixed effects and year of marriage fixed effects. The sample include women born between 1965 and 1999. The dependent variable is measured as the deflated value of the bride-price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1033 clusters. Significant at *** p<0.01, ** p<0.05, * p<0.1.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awarness messages about FGC are built from author's calculation. Detailed information in these data are provided in section 4.3.

Table B.4: Bride Price and Anti-FGC Radio Messages (Robustness on un-married women in control group)

Dependent Variable	Bride Price (IHS)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intensity x Post	-0.220*	-0.227**	-0.220**	-0.236**	-0.210*	-0.207*	-0.219**
	(0.116)	(0.114)	(0.111)	(0.109)	(0.107)	(0.107)	(0.106)
	[0.057]	[0.046]	[0.048]	[0.031]	[0.050]	[0.053]	[0.040]
Observations	10,431	10,871	11,292	11,715	12,097	12,473	12,644
R-squared	0.644	0.645	0.647	0.650	0.652	0.653	0.654
Village FE	Y	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y	Y	Y	Y
Control group age in 1994	16 - 24	16 - 26	16 - 28	16 - 30	16 - 32	16 - 34	16 - 36
Mean Dep. Var.	1.44	1.41	1.39	1.36	1.34	1.32	1.31
Relative Change	-24.64	-25.50	-24.65	-26.64	-23.38	-22.96	-24.44
Un-married in control group	0.57	0.51	0.45	0.40	0.35	0.32	0.31
Clusters	942	966	984	1008	1018	1031	1038

Note. Table B.4 reports the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the bride price at marriage. Difference-in-Differences exploit the interaction between being exposed to the messages when at age-risk to be cut (younger than 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Columns (1) to (7) report the estimated coefficients for the equation 19. Every specification defines the control group (pre-treatment cohort) as women from different cohort. Column (1) uses a control group of women aged 16 to 24 in 1994. The next columns use a control group including subsenquially older women, until column (7) uses a control a group of women aged 16 to 36 in 1994. All specifications include village of birth fixed effects, year of birth fixed effects and year of marriage fixed effects. The sample include women born between 1965 and 1999. The dependent variable is measured as the deflated value of the bride-price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1033 clusters. Significant at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awarness messages about FGC are built from author's calculation. Detailed information in these data are provided in section 4.3.

Table B.5: Bride Price and Anti-FGC Radio Messages (Robustness on un-married women in control group, augmented specification)

Dependent Variable	Bride Price (IHS)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intensity x Post	-0.202	-0.222*	-0.215*	-0.241**	-0.203*	-0.199*	-0.216**
	(0.126)	(0.126)	(0.119)	(0.114)	(0.111)	(0.109)	(0.109)
	[0.110]	[0.078]	[0.072]	[0.035]	[0.067]	[0.069]	[0.048]
Intensity x Un-Married x Pre	0.032	0.011	0.013	-0.012	0.019	0.024	0.009
	(0.122)	(0.116)	(0.103)	(0.091)	(0.087)	(0.084)	(0.081)
	[0.793]	[0.926]	[0.900]	[0.892]	[0.823]	[0.776]	[0.909]
Observations	10,431	10,871	11,292	11,715	12,097	12,473	12,644
R-squared	0.644	0.645	0.647	0.650	0.652	0.653	0.654
Village FE	Y	Y	Y	Y	Y	Y	Y
Cohort FE	Y	Y	Y	Y	Y	Y	Y
Year of Marriage FE	Y	Y	Y	Y	Y	Y	Y
Control group age in 1994	16 - 24	16 - 26	16 - 28	16 - 30	16 - 32	16 - 34	16 - 36
Mean Dep. Var.	1.44	1.41	1.39	1.36	1.34	1.32	1.31
Relative Change	-22.38	-24.83	-23.95	-27.25	-22.57	-22.06	-24.10
un-married in control group	0.57	0.51	0.45	0.40	0.35	0.32	0.31
Clusters	942	966	984	1008	1018	1031	1038

Note. Table B.5 reports the difference-in-differences estimates of the effect of exposure to anti-FGC messages in the radio on the bride price at marriage. Difference-in-Differences exploit the interaction between being exposed to the messages when at age-risk to be cut (younger than 15 in 1994) and the intensity of the exposure in the birth-village (village coverage of the anti-FGC messages). Columns (1) to (7) report the estimated coefficients for the equation 22 and control for the triple interaction between the intensity of the exposure in the birth-village and being un-married in 1994 and belonging to the pre-treatment group. Every specification defines the control group (pre-treatment cohort) as women from different cohort. Column (1) uses a control group of women aged 16 to 24 in 1994. The next columns use a control group including subsenquially older women, until column (7) uses a control a group of women aged 16 to 36 in 1994. All specifications include village of birth fixed effects, year of birth fixed effects and year of marriage fixed effects. The sample include women born between 1965 and 1999. The dependent variable is measured as the deflated value of the bride-price paid at marriage and transformed using an inverse hyperbolic sine (IHS) function. Robust standard errors (in parentheses) and p-values (in brackets) are clustered at the village level. There are 1033 clusters. Significant at *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awarness messages about FGC are built from author's calculation. Detailed information in these data are provided in section 4.3.

Table B.6: Summary Statistics for the ELMPS sample by Low and High Exposure to Anti-FGC Radio Messages

	Low-Radio		High-Radio		T-Test Difference
	N	Mean [SE]	N	Mean [SE]	
Bride price paid to female at marriage	13014	0.303 [0.004]	13916	0.304 [0.004]	-0.001
Bride price (in logs)	12843	1.425 [0.022]	13756	1.411 [0.023]	0.014
Females married to blood relative	12992	0.240 [0.004]	13876	0.247 [0.004]	-0.007
Age of females at marriage	13008	23.900 [0.050]	13899	23.583 [0.048]	0.317***
Married females with no education	13008	0.219 [0.004]	13914	0.252 [0.004]	-0.033***
Married females with Primary education	13008	0.190 [0.003]	13914	0.199 [0.003]	-0.009*
Married females with Secondary education	13008	0.423 [0.004]	13914	0.395 [0.004]	0.029***
Married females with Higher education	13008	0.167 [0.003]	13914	0.154 [0.003]	0.013***
Married men with no education	11803	0.199 [0.004]	12357	0.229 [0.004]	-0.030***
Married men with Primary education (husband)	11803	0.194 [0.004]	12357	0.197 [0.004]	-0.003
Married men with Secondary education (husband)	11803	0.442 [0.005]	12357	0.407 [0.004]	0.035***
Married men with Higher education (husband)	11803	0.165 [0.003]	12357	0.167 [0.003]	-0.001

Note. Table B.6 provides summary statistics for the Egyptian Demographic and Health Survey by low and high exposure to anti-FGC radio messages. For each variable and group (high or low), N represents the number of observations, mean is the average value, and SE is the standard deviation. The T-Test is a test of mean differences between the two groups. The sample includes women born between 1954 and 1999.
Source: Individual data are drawn from the Egyptian Labor Market Survey (ELMPS 2018). Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table B.7: Summary Statistics for the EDHS sample by Low and High Exposure to Anti-FGC Radio Messages

	Low-Radio		High-Radio		T-Test Difference
	N	Mean [SE]	N	Mean [SE]	
Are you cut (Yes/No)	25966	0.925 [0.002]	25554	0.958 [0.001]	-0.033***
Age at which FGC performed	22326	9.650 [0.015]	22522	9.868 [0.013]	-0.217***
Married females with no education	35532	0.333 [0.003]	35986	0.333 [0.002]	-0.000
Married females with primary education	35532	0.160 [0.002]	35986	0.177 [0.002]	-0.017***
Married females with Secondary education	35532	0.401 [0.003]	35986	0.382 [0.003]	0.019***
Married females with	35532	0.105 [0.002]	35986	0.107 [0.002]	-0.002
Married men with no education	35486	0.247 [0.002]	35947	0.226 [0.002]	0.021***
Married men with no education	35486	0.207 [0.002]	35947	0.206 [0.002]	0.001
Married men with no education	35486	0.408 [0.003]	35947	0.415 [0.003]	-0.007*
Married men with no education	35486	0.138 [0.002]	35947	0.154 [0.002]	-0.015***
Age at marriage	35532	19.762 [0.023]	35986	19.392 [0.022]	0.370***
Had a virginity exam	16448	0.095 [0.002]	15738	0.067 [0.002]	0.028***
Muslim (yes/no)	29777	0.962 [0.001]	29592	0.968 [0.001]	-0.006***

Note. Table B.7 provides summary statistics for the Egyptian Demographic and Health Survey by low and high exposure to anti-FGC radio messages. For each variable and group (high or low), N represents the number of observations, mean is the average value, and SE is the standard deviation. The T-Test is a test of mean differences between the two groups. The sample includes women born between 1954 and 1999.
Source: Individual data are drawn from Egyptian Demographic and Health Survey 1992, 2000, 2003, 2005, 2008, and 2014 pooled together. Village data on radio coverage of health awareness messages about FGC are built from author's calculations. Detailed information about these data is provided in Section 4.3.

Table B.8: List of countries and survey's year included in the analysis

Country	Year of Survey
Cameroon	2004
Chad	2004; 2014
Benin	2001; 2006; 2011
Ethiopia	2000; 2005; 2016
Ghana	2003
Guinea	1999; 2005; 2012; 2018
Cote d'Ivoire	1994; 1998; 2011
Kenya	1998; 2003; 2008; 2014
Liberia	2007; 2013
Mali	1995; 2001; 2006; 2012; 2018
Niger	1998; 2006; 2012
Nigeria	1999; 2003; 2008; 2013; 2018
Uganda	2006; 2011; 2016
Egypt	1995; 2003; 2005; 200;8 2014
Tanzania	1996; 2004; 2010; 2015
Burkina Faso	1998; 2003; 2010

Note. Table B.8 Table B.5 provides a list of the countries and the corresponding survey year that are included in the analysis in Subsection 7.2.3. The sample includes the surveys where information on whether the respondent is cut (FGC) and ethnicity are available.
Source: Demographic and Health Survey.