When all the Good Men are Gone: Sex Ratio and Domestic Violence in Post-Genocide Rwanda

Giulia La Mattina *

January 2012

Abstract

This paper studies the effect of the Rwandan genocide on match quality in the marriage market, as measured by the incidence of domestic violence. The genocide changed the population structure of Rwanda by decreasing the sex ratio. In addition, those living in urban areas with an educated background were more likely to be killed during the mass slaying, which resulted in a loss of human capital (De Walque and Verwimp, 2010). I use data from the 2005 Rwanda Demographic and Health Survey and I employ an empirical strategy similar to differences-in-differences to study how the demographic changes caused by the genocide affected domestic violence and other measures of match quality. I find that women who got married after the genocide in provinces where the sex ratio decreased more were more likely to become victims of intimate partner violence. I also find that they married less educated husbands and were less likely to have the final say on household purchases and to use contraceptive methods. The results are consistent with a one-sided spousal search model, where women lower their reservation values as a consequence of the scarcity of men and the deterioration of the quality of potential husbands caused by the genocide.

JEL Codes: J12, O12

Keywords: Conflict, domestic violence, marriage, match quality, sex ratio.

---

1 Introduction

In 1994, between April 6 and July 17, about 800,000 of Rwanda's population of seven million were killed in a genocide, that left the population with 70 percent women[1]. Women have been considered a key force in the reconstruction of the country after the genocide, and Rwanda has become one of the world's leading examples of how empowering women can renew post-conflict economies and reduce poverty[2].

However, the change in the structure of the population caused by the genocide deeply affected the marriage market. The sex ratio, the relative number of men and women, dramatically decreased for three reasons: more men than women were killed during the three months of violence; male groups of ex-soldiers and genocide perpetrators fled to neighboring countries, and thousands of men were imprisoned for crimes related to the genocide[3]. In addition, De Walque and Verwimp (2010) find that those in urban areas and with more educated backgrounds were more likely to be killed during the genocide. These facts indicate that the genocide created a scarcity of men and a deterioration of the pool of potential husbands for women of marriageable age.

This paper investigates how the genocide affected match quality for the unions that formed after the genocide. With the help of a simple one-sided spousal search model I analyze four different mechanisms through which the genocide could affect the quality of the matches formed after the genocide. The decrease in the arrival rate of marriage proposals caused by the reduction in the number of men available for marriage reduces the reservation quality for women. Selection in the killings and post-traumatic stress disorder both reduce the average quality of the pool of potential husbands, which in turn leads women to lower their reservation quality. Additionally, individual exposure to violence during the genocide could decrease the value of being single for women. The model predicts that women who got married after the genocide in provinces that were more affected by the ethnic violence matched on average with a lower quality husband.

In order to study the effect of the genocide on match quality I combine data from the 1991 and 2002 censuses of the Rwandan population and the 2005 wave of the Rwandan Demographic

---

[1]CNN "'Why women are economic backbone in Rwanda"' July 24, 2010
[2]The Washington Post "'Women rise in Rwanda's economic revival"', May 16, 2008
[3]http://www.jha.ac/greatlakes/b001.htm

and Health Survey (DHS)[4]. My main measure of match quality is an indicator that takes value one if the woman was ever victim of intimate partner violence. The empirical strategy employed is similar to a differences-in-differences estimation and relies on comparing women who married before and after the genocide in provinces that were differently affected by the genocide. My results indicate that women who married after the genocide in provinces where women outnumbered men more as a consequence of the mass slaying were more likely to have been victims of intimate partner violence at least once during their marriage. The results are robust to different specifications of the dependent variable and to numerous robustness checks. In addition, I use the years of schooling attained by the husband as a measure of match quality and I find that women who married after the genocide in provinces where the sex ratio decreased more married men who attained fewer years of education on average. These results support the hypothesis that women lowered their reservation quality and married on average lower quality men after the genocide, as predicted by the spousal search model. I also find that women who married after the genocide in provinces where women outnumbered men more were less likely to have the final say on daily and large purchases, and to use contraception methods.

The contribution of this paper to the literature is twofold. This study is related to the literature that studies the consequences of the Rwandan genocide at the microeconomic level. Verpoorten and Berlage (2009) studied the effect of the genocide on income mobility. Akresh et al (2011) studied the impact of localized crop failure and armed conflict on the health status of children. They found that in poor and non-poor households, boys and girls born during the conflict in regions experiencing fighting are negatively impacted with height for age z-scores 1.05 standard deviations lower. Akresh and De Walque (2010) combined two cross-sectional household surveys collected before and after the genocide to examine the impact of the genocide on educational attainment of children and found a strong negative impact of the genocide on schooling. Schindler (2010, 2011) investigated the determinants of intra-household time allocation in post-war Rwanda and the effect of the genocide on fertility. This paper adds to the literature by studying the effect of the genocide on match quality in the marriage market, as measured by the incidence of domestic violence and husband's education.

This study is also related to the recent strand of the literature that studies how the marriage market and the labor market affect domestic violence. Bloch et al. (2002) studied

---

[4]Data from the 2000 Rwandan Demographic and Health Survey are also used as robustness check whenever possible.

the relationship between dowries and domestic violence in India and showed that a woman who comes from a wealthy family is more likely to be beaten by her husband in an effort to extract higher transfers from her parents. Stevenson and Wolfers (2006) found that the introduction of unilateral divorce laws decreased domestic violence and spousal homicides in the United States. Aizer(2011) showed that reductions in the gender wage gap can account for the recent decline in domestic violence in California. This paper adds to this literature by showing that the scarcity of men along with the deterioration of the quality of potential husbands caused by the genocide increased intimate partner violence in households that formed after the genocide. These findings add to our understanding of the determinants of intimate partner violence, which is crucial to fight poverty because domestic violence has a negative effect on women and children and can contribute to create poverty traps (Aizer, 2010).

The results of this paper are important in the context of post-genocide Rwanda, where women's empowerment has been long considered the key to reconstruct the economy. The genocide had adverse consequences on the marriage prospects of younger women and increased their likelihood of being victims of domestic violence. The negative effect of intimate partner violence on the health of women and children can have long-lasting adverse consequences that go beyond the generation directly affected by the genocide.

The paper is organized as follows: section II talks about the background; section III outlines the theoretical framework; section IV describes the data; section V outlines the empirical approach and the results; section VI concludes.

2 Background

The event that triggered the massacres was the abatement of President Juvenal Habyarimana's plane on April 6, 1994. On that night, the killings of Tutsi and moderate Hutu began in the capital, Kigali city, and quickly spread throughout the country. Until the mid of May, young and adult men were the principal targets of the killings, while women, children and the elderly were often spared from death. Thousands of women were raped. By mid-May, the authorities ordered the final phase and the extermination of women and children began (des Forges, 1999). Although thousands of women were killed during the genocide, many more men were killed. This lead to a severe gender imbalance in the aftermath of the genocide, and a very high number of

widows.

De Walque and Verwimp analyzed the distribution of excess mortality in 1994 using data from the siblings' mortality module of the 2000 Rwanda Demographic and Health Survey and found that the genocide dramatically affected the population composition of Rwanda. Adults, especially males, and individuals with an urban or educated background were more likely to die. Their research indicates that the genocide represented a huge negative shock for the human capital in Rwanda, since the more educated and urban groups of the population were more likely to be victims.

A few studies have investigated the effect of the genocide on the marriage market. Jayaraman et al. (2009) studied the effect of the genocide on age at marriage and age at first birth using data from the 2005 DHS. They found that women living in clusters accounting for a larger proportion of sibling deaths in 1994 married at an older age and had children later compared to those living in clusters accounting for a lower proportion of sibling deaths. The authors suggest that this result could be driven by the disruption of social networks for women living in areas highly affected by the genocide or by a shortage of men. Schindler (2010) analyzed the effect of the genocide on time allocation within the household using data from the *Enquête Intégrale sur les Conditions de Vie de Ménage.* She found that local marriage markets, proxied by sex ratios at the province and cohort level had an impact on the division of labor. Schindler and Bruck (2011) investigated the effect of the genocide on fertility using the 1992, 2000 and 2005 waves of the Rwanda DHS. They found that fertility increased for the women who lost a son in the year of the genocide, suggesting a replacement effect.

A simple comparison of marriage rates for men and women in the 1991 and 2002 genocide provides helpful insights to our understanding of the impact of the genocide on the marriage market. Graphs 1-6 compare the fraction of single, married and widowed women and men in the 1991 and the 2002 censuses of Rwandan population. For women aged 20-25 the probability of being married is slightly shifted down in 2002 compared to 1991. Starting from age 25, the chances of being married are much lower in 2002 than in 1991. Two trends contribute to the decline in the marriage rate of women after the genocide: the increase in the fraction of women who is single and the large increase in the number of widows, even among women who were supposedly very young at the time of the genocide.

For women aged about 22-24 the probability of being single was not different in 2002 than in 1991. This suggests that younger women were the least affected by the change in the marriage market. This could be because the men shortage resulting from the genocide was less significant for their cohort. Another possible explanation is that men prefer to marry younger women, who are potentially able to give birth to more children. Starting from age 24, the fraction of never married women is higher in 2002 compared to 1991. This could be because the fraction of men killed during the genocide was higher among the pool of potential husbands for these women, or because older women suffer most from the decrease in the demand for women. The graphs suggest that marriage prospects were diminished for women in the post-genocide years. As far as men are concerned, marriage rates among below age 28 were higher in 2002 than in 1991, while the probability of being single decreased. This suggests that marriage prospects improved for young men after the genocide.

Following Abramitzky et al., we then use province-level data from the 1991 and 2002 censuses and apply a differences-in-differences approach. Specifically, we estimate:

$$Y_{p,t} = \alpha + \beta \Delta SR_{p,t} * PG_t + \gamma PG_t + \delta_p + \epsilon \tag{1}$$

where $Y_{p,t}$ is the percentage of women of a particular marital status (married or single) in province p at time t. δ_p is a province dummy that captures time-invariant province level factors. PG_t is a post-genocide dummy that equals one if the observation $Y_{p,t}$ comes from the 2002 census and zero otherwise. $\Delta SR_{p,t}$ is the absolute level of the change in the sex ratio that occurred in province p between 1991 and 2002[5]. Since the sex ratio decreased in all provinces, the higher $\Delta SR_{p,t}$ the more the sex ratio decreased between 1991 and 2002. Equation 1 is estimated using an ordinary least square model.

The results showed in Table 1 indicate that the fraction of never married women increased and the percentage of married women decreased after the genocide in provinces with a higher change in the sex ratio. This effect was statistically significant for women aged 25-29 and for women aged 30-39 but not for women aged 20-25. Women age 25-29 were the most affected by the decline in the sex ratio.

[5]The sex ratio is computed as described later in the paper

3 Theoretical framework

The impact of the genocide on domestic violence can be interpreted in the framework of a simple one-sided search model (Mortensen, 1970). Consider a single woman who is willing to marry and is searching for a husband. Her information concerning the nature of existing single men is imperfect but she knows the quality distribution of the potential husbands. The quality of the potential husbands depends on numerous variables, such as their wage, educational level, how caring they are, and their propensity towards domestic violence. The higher a man's wage and educational attainment, the higher his quality as potential husband. The higher the man's propensity to domestic violence, the lower his quality as potential husband. In each period, the woman receives a marriage offer from a man with probability λ. Each man is characterized by quality q, drawn from a distribution F. If a marriage proposal arrives, the woman decides whether to accept it. If the woman rejects the offer the process repeats in the next period. The best strategy for a woman is to select a reservation quality q_R before an offer is received. As in standard in optimal stopping problems, the woman accepts a marriage proposal if and only if the offer quality exceeds her reservation level.

A woman's reservation quality depends on the average quality of the pool of potential husbands $\bar{q}$, the arrival rate of marriage proposals λ, and the value of being single b.

$$q_R = f(\bar{q}, \lambda, b) \tag{2}$$

After an increase in the average quality of potential husbands, women become more selective and increase their reservation quality. An increase in the arrival rate of marriage proposals would also lead women to raise their standards. Similarly, an increase in the value of being single would make women more choosy by increasing the value of their outside option.

This paper considers four possible mechanisms through which the genocide could affect women's reservation quality in the context of a one-sided spousal search model:

1. **Scarcity of men** The relative number of men to women decreased after the genocide for various reasons: more men were killed than women; male genocide perpetrators and former soldiers fled to neighboring countries, and many more men than women were imprisoned for crimes related to the genocide. The sex ratio is a key determinant of the marriage

prospects and distribution of the gains from marriage between men and women (Becker, 1981). A decrease in the sex ratio reduces the chances that a woman receives a marriage proposal in every period.

2. **Deterioration of the quality of men**. There is a concern that during the mass slaying the more violent men had a higher probability of surviving. Moreover, recent research by Verwimp and De Walque (2009) showed that young, educated men living in urban areas were the most likely to die. It could be the case that the men living in Rwanda after the genocide were positively selected with respect to their propensity towards violence. This would decrease the average quality of potential partners.

3. **Post-traumatic stress disorder for men.** Genocide survivors could suffer from post-traumentic stress disorder and become more prone to violence. If men were more prone to violence after the genocide, the average quality of potential grooms $\bar{q}$ would decrease.

4. **A decrease in the value of being single.** During the genocide women were often victims of rape. The increased vulnerability of women could lead them to value protection from men more after the genocide. The value of being single would decrease[6].

In summary, the genocide reduced the average quality of potential grooms, the arrival rate of marriage proposals and the value of being single. The model implies that women of marriageable age chose a lower reservation quality after the genocide and that the quality of the realized matches decreased. Holding all other variables that affect husband's quality constant, the model predicts that women who married after the genocide were more likely to be abused by their husbands and to marry men with lower educational attainment.

The effect of the genocide on age at marriage and the probability of getting married for women depends on which of the mechanisms described above dominates. A decrease in the value of being single makes women less choosy and therefore more likely to accept a marriage offer and marry at a younger age. In principle, a decrease in the arrival rate of marriage proposals has an ambiguous effect on age at marriage: less frequent marriage proposals should delay marriage, but women have lower standards and marry earlier. If the quality distribution is log-concave women wait longer before getting married. The decrease in the average quality of potential

---

[6]In a model with random matching and endogenous separation the genocide would lead to an increase in the threshold needed for separation.

husbands has no effect on age at marriage as women adjust their reservation quality.

As far as the probability of getting married is concerned, a decrease in the value of being single would improve the chances of getting married. The decrease in the arrival rate of marriage proposals reduces the probability of finding a spouse. A change in the average quality of potential husbands should leave the probability of getting married unchanged.

4   Data

The main data of interest come from the 2005 Demographic and Health survey in Rwanda. This is one cross-section of a nationally representative household survey that collected detailed information on health and nutrition. The survey contained a core questionnaire and a module about domestic violence. About 10,900 people between 15 and 63 years old received the core questionnaire, and 3,880 women between 15 and 49 years old received the domestic violence module. Multiple women in the household received the core questionnaire, but only one woman in each household was selected to receive the domestic violence module. In this way the interviewers could assure women that no one else in the household knew what had been discussed in the domestic violence module.

The sample for my main analysis consists of women who received the domestic violence module and had been in only one union at the time of the interview. Since the survey provides information only about the timing of a woman's first marriage and identifying the time of marriage is crucial in my empirical strategy, I exclude from the sample women who had been in more than one union at the time of the interview. I also exclude women who were separated or divorced and women who married in the four months during which the genocide occurred[7]. This leaves me with 1,698 women.

Women were asked about the details of the relationship with their current or former partner. Regarding intimate partner violence, they were asked if they had ever been victim of some aggressive behaviors, such as pushing, shaking, throwing something, slapping, twisting an arm, striking with a fist or with something that could hurt, kicking or dragging, trying to strangle or burn, threatening with a knife, gun, or other type of weapon, and attacking with a knife, gun, or other type of weapon. In addition, women were asked if they had ever been

---

[7]April, May, June and July of year 1994.

victims of sexual violence by their current or former partner. Women who reported having been victimized by their partners at least once were also asked how many times the violence had happened in the past year. I construct a variable that takes value one if a woman has ever been the victim of any form of violence by her current or former partner and zero otherwise.

The husbands of a subsample of women were interviewed as well in a separate interview. Five items on the core questionnaire of the DHS measured the extent to which men thought that husbands were justified for beating their wives. In particular, men were asked if a certain behavior of the woman could justify domestic violence, such as going out without telling the husband, neglecting the children, arguing with husband, refusing to have sex with husband or burning the food. I construct a dummy variable that measures the attitude of men towards domestic violence and takes value one if the man thinks that husbands are justified for beating their wives for at least one reason.

Table 1, 2 and 3 contain summary statistics for the variables used in the sample. On average, women who married after the genocide were less likely to have been victimized by their husbands. There are two possible reasons for this. First, women who married after the genocide have been in their marriage for 14 years less on average than women who married before the genocide. It could be the case that some women who married after the genocide had not been in their marriage long enough for the first episode of violence to occur. It is therefore important to control for years since marriage when I analyze the effect of the genocide on domestic violence by comparing women who married after the genocide to women who married before. Second, women who married after the genocide were on average younger. It could be the case that younger cohorts have a more modern view of gender roles and are less tolerant of domestic violence. As a consequence we I control for cohort fixed effects when I study the effect of the genocide on domestic violence.

The second source of data is the Rwandan Census of Population administered in 1991 and 2002[8]. I use the census data to construct the following variables:

- **Sex ratio.** I construct a measure of the sex ratio among *non-institutionalized* individuals. I define the sex ratio as the number of men age 20-44 over the number of women age 15-39

---

[8]Minnesota Population Center. *Integrated Public Use Microdata Series, International: Version 6:1* Machine-readable database]. Minneapolis: University of Minnesota, 2011. Original source: Rwanda National Institute of Statistics.

living in a certain province in a given census year. In the census more than 70% of the population married someone from the same province of origin. The definition takes into account that the average age difference between husband and wife is 5 years.

- **Fraction of literate men in the province.** This variable represents the percentage of men age 20-44 who are literate in the province in a given census year.

- **Male employment in formal sector.** This variable represents the male employment rate in the formal sector in a province in a given census year. It is a ratio of the men age 20-44 who are employers or employees over all the men age 20-44 in the active population.

The fraction of literate men in the province and male employment in formal sector are measures of the quality of the pool of potential husbands. Table 4 shows the sex ratios among non-institutionalized individuals at the province level in 1991 and 2002. In 1991 the sex ratio was lower than one in all provinces with the exception of the capital, Kigali city. The capital attracts primarily young men who move there for work reasons and students. In 2002, the sex ratio among non-institutionalized men was lower than one in all provinces, and in seven provinces out of 11 it dropped below 0.6. Table 4 also shows the correlation between the sex ratio in 2002 and measures of participation in the genocide at the province level reported by Friedman (2011). The correlation between the numbers of perpetrators from gacaca and the sex ratio in 2002 is -0.515. The sex ratio in 2002 was lower in provinces where more people were accused of crimes related to the genocide[9].

4.1 The effect of the genocide on match quality.

I study the effect of the genocide on match quality for unions that formed after the genocide. The first measure of match quality that I use is the incidence of intimate partner violence. I test the hypothesis that women who married after the genocide in provinces where the sex ratio decreased more were more likely to be victimized by their husbands. Previous studies have shown the impact of sex ratios on female labor force participation (Angrist, 2002), educational attainment

---

[9]The sex ratio outside of the city in 1991 might appear surprisingly low. The sex ratio is higher in levels in 1991 and 2002 when I measure it as the ratio of the number of males aged 15 to 44 to the number of females aged 15 to 44 (see Table A1 in the Appendix). However, the magnitude of the change in the sex ratio between 1991 and 2002 computed using this alternative measure is very similar to the one reported in Table 5. The ratio of the number of males aged 20 to 44 to the number of females aged 15 to 39 remains my preferred specification because it takes into account the average age difference between husband and wife.

of men and women (Lafortune, 2010), marriage and fertility (Brainerd, 2007; Kvasnicka and Bethmann, 2007) and assortative matching (Abramitzky et al., 2010). A couple of recent studies analyzed the effect of the change in the sex ratio caused by the Rwandan genocide on the division of labor within the household (Schindler, 2010) and on fertility (Schindler, 2011).

In general, studying the effect of a change in the sex ratio on marriage and family outcomes is difficult because the sex ratio may not be endogenous and the variation in the data is usually very low. Previous research has overcome this problem by using shocks in military mortality (Abramitzky et al., 2010; Brainerd, 2007), the fact that immigrants to the United States in the first half of the 20th century were mostly males together with a preference for endogamy among second-generation immigrants (Angrist, 2002; Lafortune, 2010; Schmierer, 2011), and higher incarceration rates for African American in the United States (Charles and Luoh, 2010; Mechoulan, 2011). I utilize the variation created by the genocide over time and across provinces in Rwanda to study how changes in local marriage market conditions affected the probability that a woman becomes a victim of domestic violence.

Consider the specification:

$$Y_{i,p,t} = \alpha + \beta SR_{p,1991} * (1 - PG_t) + \beta SR_{p,2002} * PG_t + \gamma PG_t + \delta_p + \pi X_{p,t} + \sigma X_i + \eta_c + \epsilon \quad (3)$$

where i is a woman, p is a province, t is the year of the marriage, c is the cohort of the woman. δ_p is a province dummy that captures time-invariant province-level factors such as local attitudes towards women and legal enforcement. PG_t is a post-genocide dummy variable that equals one if the marriage happened after the genocide. The independent variable of interest is the province-level sex ratio, $SR_{p,t}$. $X_{p,t}$ are province-level controls and X_i are household-level controls. The sex ratio varies across provinces and over time of marriage. Since there are 11 provinces and time is defined as before or after the genocide, the main variable of interest varies across 22 groups. Given the small number of groups, clustering the standard error using the common procedure would lead to an underestimate of the standard errors. To overcome this problem, I estimate the standard errors using the Donald-Lang (2004) two-step procedure.

Similarly to Abramitzky et al. (2010), the sex ratio is not measured at the time of the wedding but rather at the census year closest to the wedding. Marriages in the period from 1969 to March 1994 use the 1991 sex ratio, and marriages in the period from August 1994 to

2005 use the 2002 sex ratio. There may be a concern that the observed sex ratio is subject to measurement error. During and after the genocide the country experienced large outflows of people, but the majority of the refugees returned to Rwanda in 1996[10]. (Gourevitch, 1999). To address this issue, I exclude all the women who married during the genocide (between March and July 1994). As a robustness check I also ran the regression without including the households that formed in 1994, 1995 and 1996.

$X_{p,t}$ includes the percent of literate men aged 20-44 in the province at the time of the wedding and the fraction of the male aged 20-44 who are employed in the formal sector. These variables are created using Census data and, similarly to the sex ratio, they are not measured at the time of the wedding, but rather at the census year closest to the wedding. These variables measure the quality of the pool of potential husbands in the province and time varying economic conditions at the province level.

X_i includes characteristics of the woman, such as age at marriage, years of education, whether she is currently working and her occupation. X_i also includes years of education and occupation of the husband[11], an indicator for whether the marriage is informal, a dummy that equals one if the household lives in an urban area and zero otherwise, years since marriage entered as a cubic and dummies for quintiles of the distribution of a wealth index.

I estimate equation 3 with a linear probability model. The results reported in Table 6 confirm the prediction of the spousal search model: women who married after the genocide in provinces where the sex ratio decreased more are more likely to be victims of domestic violence. The size of the effect is significantly large: the coefficient estimate in column 4 says that a one standard deviation decrease in the sex ratio increases the probability that a woman is victim of domestic violence at least once in their life by 65 percent. This in equivalent to a 23 percentage points decrease in the probability of being victim of intimate partner violence.

Age at marriage has a negative effect on the probability of being a victim of intimate partner violence: a one standard deviation increase in woman's age at marriage decreases the probability that she is abused by her husband by 14 percent; this is equivalent to a decrease

---

[10]Following unrest in the eastern region of the Democratic Republic of Congo, more than 600,000 refugees returned to Rwanda in November 1996. This massive wave of repatriation was followed at the end of December 1996 by the return of another 500,000 from Tanzania (World Bank, 2003).

[11]Interestingly, all the husbands in the sample are currently working. Rwanda is a rural economy and virtually nobody is unemployed.

in 5 percentage points. Being in an informal marriage increases the probability of domestic violence by 6.5 percent. Religion and wealth do not have any effect on the probability of intimate partner violence. The woman's education is negatively correlated with domestic violence, but the coefficient estimate is not statistically significant. Husband's education reduces the probability of domestic violence: an increase by one standard deviation in the husband's years of schooling reduces the probability of domestic violence by 10 percent, which is equivalent to a decrease of 3.5 percentage points. Living in an urban area reduces domestic violence but the result is not statistically significant at the standard level. The inclusion of the percent of literate men at the province level does not change the effect of the sex ratio on the probability of domestic violence. The coefficient on the sex ratio becomes less negative and the estimate becomes less significant when I add male employment in the formal sector. However, the effect of the sex ratio is still negative and statistically significant at the 10 percent level[12].

I perform various robustness checks to test how the results change when I modify the sample. The results are reported in Table 7. As a first check, I exclude all the marriages that formed in the years 1994, 1995 and 1996. As explained above, there is a concern that the measure of sex ratio used in this paper measures with error the marriage market during these period. The results reported in column (1) show that the effect of the sex ratio is larger when I dropped the unions formed in the years 1994-1996 and still statistically significant. As a second check, I keep in the sample women who were divorced or separated. The results were very similar to the baseline specification. As a third check, I dropped the households who moved to the current *place of residence* after getting married. I am worried that the sex ratio in the province of residence is a very imprecise measure of the sex ratio the women in these households faced when they got married if they actually got married in another province. The data do not allow to select and drop the women who moved to the current province of residence after getting married; they only allow to select and drop those who moved to the current *place of residence*, where it is not clear if the current place of residence refers to the province, the city, or the house. The effect of the sex ratio on domestic violence is significantly bigger in size for this sample and still statistically significant.

In columns (4) of Table 7 I include in the regression a measure of direct exposure to the

---

[12]The results are robust to using a sex ratio defined as the ratio of the number of males aged 15 to 44 to the number of females aged 15 to 44, though the coefficient on the sex ratio is slightly less precisely estimated. The descriptive statistics for this alternative measure of the sex ratio are reported in the Appendix.

genocide. Following Schindler (2011) I use information about siblings' mortality and construct an indicator variable that takes value one if the woman lost a sibling in 1994 - the year of the genocide. I use this variable as a proxy for individual exposure for the genocide[13]. I interact this indicator with a dummy for getting married after the genocide. I test whether individual exposure to the genocide makes women more vulnerable to domestic violence. As mentioned before, one mechanism through which the genocide could affect domestic violence is by decreasing the value of being single. As a result of the extreme violence experienced during the mass slaying, women might value protection more after the genocide and thus lower their reservation value for a groom.

I estimate the following specification:

$$Y_{i,p,t} = \alpha + \beta SR_{p,t} + \gamma PG_t + \lambda Sib_{Death1994} + \theta Sib_{Death1994} * PG_t + \delta_p + \pi X_{p,t} + \sigma X_i + \eta_c + \epsilon \quad (4)$$

Where $SR_{p,t} = SR_{p,1991} * (1 - PG_t) + \beta SR_{p,2002} * PG_t$ as in equation 3. The loss of a sibling in 1994 does not affect the probability that a woman becomes a victim of domestic violence. If anything, there seems to be a *negative* effect: direct exposure to the genocide decreases the likelihood that a woman is victimized by her husband, although the result is not statistically significant. The effect of the sex ratio is robust to controlling for the death of a sibling in 1994[14].

In results not reported, I estimated the impact of the sex ratio on the number of episodes of domestic violence that happened in the year before the survey using a negative binomial model. I found that women who married after the genocide in provinces where the sex ratio decreased had been victims of intimate partner violence more frequently in the year before the survey. Although the coefficient estimates are not statistically significant in all the specifications, the size of the estimated coefficient is consistently negative across different regressions. I also estimated the effect of the sex ratio on the probability of being a victim of moderate, severe and sexual violence separately. The effect of the sex ratio on the three types of violence is always

---

[13]See Schindler (2011) for detailed explanation about this variable and De Walque and Verwimp for detailed explanation about the siblings' mortality module and the distribution of excess mortality among siblings in the Rwanda Demographic and Health Survey.

[14]I tried to use various measures to proxy for direct exposure to the genocide, such as the death of a brother in 1994, the death of a sister in 1994 and the death of a younger sibling in 1994, but the results were not statistically significant. I also studied the effect of individual exposure to the genocide, as measured by having lost a sibling in 1994, on the probability of domestic violence without controlling for the sex ratio. The results were not statistically significant.

negative although marginally insignificant[15].

4.2   Other measures of match quality

The second measure of match quality that I use is the educational attainment of husbands. I estimate equation 3 with the ordinary least square methods using as dependent variable husbands' years of schooling and woman's age at marriage. The results are reported in Table 8. I find that women who married after the genocide in provinces where the sex ratio decreased more married less educated husbands. A one standard deviation decrease in the sex ratio decreased the educational attainment of husbands by about half a year of schooling, which represent a 12 percent decrease. The effect is larger for women with at least primary education. For age at marriage, the results indicate that women married later after the genocide in provinces where the sex ratio decreased more, but this effect is not statistically significant. However, previous research found that the genocide delayed age at first marriage and age at first birth for women (Jayaraman et al. 2009).

To further explore the effect of the sex ratio on relationships within the household, I estimate equation 3 using as dependent variable: 1) a dummy that takes value one if the woman has the final say on daily purchases and zero otherwise; 2) a dummy that takes value one if the woman has the final say on large purchases and zero otherwise; 3) a dummy variable that takes value one if the woman is currently using any contraceptive method; 4) a dummy variable that takes value equal to one if the husband of the woman thinks that husbands are justified for beating their wives. The results of the regression are reported in Table 9.

I find that women who married after the genocide in provinces where the sex ratio decreased more were less likely to have the final say on daily and large purchases and to use contraception. These results suggest that the decline in match quality left women with less decision-making power. The decrease in the use of contraception after the genocide could also be due to a replacement effect: Schindler(2011) found that the demand for children increased for the women who lost a child in 1994. These results are also interesting because previous research showed that income in the hands of a mother has a bigger effect on her family's health than income under the control of a father (Thomas, 1990) and that the ability to optimally time

---

[15]The results are available upon request.

births with modern birth control methods results in improved outcomes for children (Do and Phung, 2010).

I also find that women who married after the genocide in provinces where men were more scarce were more likely to be married to a man who thinks that husbands are justified for beating their wives. This result is consistent with a decrease in the quality of the match for the woman. However, the result is not statistically significant.

4.3 Other mechanisms

The results reported in Tables 6 and 7 show that the genocide increased domestic violence for women who married after the genocide in provinces where more violence occurred. The results are consistent with a decrease in the quality of the matches formed after the genocide, as predicted by the spousal search model. In this section I discuss whether the results are also consistent with two other mechanisms: post-traumatic stress disorder for women and a "bargaining power" effect.

There is a concern that women who were directly affected by the genocide, and in particular women who were victims of sexual violence, may tolerate more violence in their marriage. As a result, we would observe more domestic violence in provinces where the sex ratio decreased more, as killings and mass rape were also more intense in these areas. While this mechanism would help explain cross-sectional variation in the incidence of domestic violence, it cannot explain the results of Tables 6 and 7, because the effect of direct exposure to violence should equally affect marriages formed before and after the genocide. In addition, I find no effect of direct exposure to the genocide, as measured by the death of a sibling in 1994, on intimate partner violence.

The decrease in the sex ratio improves the outside options of married men leading them to extract more marital surplus. This could result in more domestic violence in provinces where fewer men are available even if the quality of men did not change. However, it is difficult to argue that the change in the outside options differentially affected marriages that formed after the genocide. The increase in the number of never married women should be a threat on the stability of all unions and therefore equally alter the bargaining power in marriages that formed before and after the genocide. Moreover, I find that women who married after the genocide

17

in provinces where the sex ratio decreased more were married to less educated husbands. This result supports the hypothesis that the genocide lead women to marry men of inferior quality.

5   Conclusion

This paper studied the effect of changes in the population structure caused by the 1994 Rwandan genocide on match quality in the marriage market, as measured by the incidence of domestic violence and by husband's education. I find that women who married after the genocide in provinces where the sex ratio decreased more were more likely to become victims of intimate partner violence. The size of the effect is big: a one standard deviation decrease in the sex ratio increased the probability that a woman is victimized by her partner by 23 percentage points. Women who married after the genocide in provinces where men were scarcer married men with lower educational attainment on average. A one standard deviation decrease in the sex ratio decreased husband's years of schooling by 13 percent. The effect is larger for more educated women. In addition, I find some evidence that the decrease in the sex ratio left women with less decision-making power within the household.

The findings of this paper show that the scarcity of the men and the deterioration of the quality of potential husbands due to the loss of human capital caused by the genocide lead to a decrease in the quality of the matches formed after the genocide. These results, which are consistent with the predictions of a spousal search model, shed new light on the long-term consequences of the Rwandan genocide at the household level.

References

[1] Abramitzky, Ran; Delavande, Adeline and Vasconcelos, Luis Infante (2011), "Marrying Up: the Role of Sex Ratio in Assortative Matching" American Economic Journal: Applied Economics, Vol. 3, No. 3 pp. 124-57

[2] Aizer, Anna "The gender wage gap and domestic violence" American Economic Review, forthcoming

[3] Aizer, Anna "Poverty, Violence and Health" Journal of Human Resources, forthcoming.

[4] Akresh, R., Verwimp P. and Tom Bundervoet, "'Civil War, Crop Failure, and Child Stunting in Rwanda"', Economic Development and Cultural Change, 2011, 59(4): 777-810.

[5] Akresh, R. and de Walque D., "'Armed Conflict and Schooling: Evidence from the 1994 Rwandan Genocide"' (2010)

[6] Angrist, Joshua. (2002), "How Do Sex Ratios Affect Marriage and Labor Markets: Evidence from America's Second Generation." Quarterly Journal of Economics, 117: 997-1038.

[7] Berlage, Lode and Marijke Verpoorten "Economic Mobility in Rural Rwanda: A Study of the Effects of War and Genocide at the Household Level" Journal of African Economies, Voulme 16, Number 3

[8] Bloch, F. and Rao, V. (2002), "Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India", American Economic Review Vol. 92, No. , pp. 1029-1043

[9] Brainerd, Elizabeth. (2007). "Uncounted Costs of World War II: The Effect of Changing Sex Ratios on Marriage and Fertility of Russian Women." Mimeo

[10] Charles, K. K. and Ming Ching Luoh "Male Incarceration, the Marriage Market, and Female Outcomes" The Review of Economics and Statistics, August 2010, Vol. 92, No. 3, Pages 614-627

[11] Des Forges, Alison (1999) Leave None to Tell the Story: Genocide in Rwanda. New York: Human Rights Watch.

[12] Do, Q.-T. and T. D. Phung (2010). The importance of being wanted. American Economic Journal: Applied Economics 4, 236.

[13] Donald, S. and Lang, K., "Inference with Differences in Differences and Other Panel Data" Review of Economics and Statistics, 89 (May 2007): 221-33.

[14] Gourevitch, Philip (1999), We Wish to Inform You That Tomorrow We Will Be Killed With Our Families, Picador.

[15] Friedman, Willa "Local Economic Conditions and Participation in the Rwandan Genocide", 2011
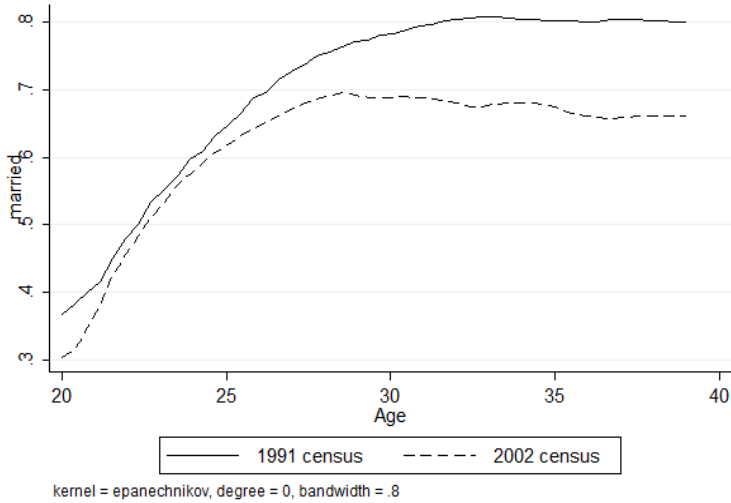
[16] Jayaraman J., Gebreselassie T., and Chandrasekhar S. "Effect of Conflict on Age at Marriage and Age at First Birth in Rwanda" Popul Res Policy Rev (2009)

[17] Lafortune, Jeanne "Making Yourself Attractive: Pre-Marital Investments and the Returns to Education in the Marriage Market", 2009

[18] Mechoulan, S. "The External Effects of Black-Male Incarceration on Black Females" Journal of Labor Economics (2011).

[19] Mortensen, Dale T. (1970) "Job Search, the Duration of Unemployment, and the Phillips Curve" The American Economic Review , Vol. 60, No. 5, pp. 847-862

[20] Schindler, Kati. (2010) "Who Does What in a Household after Genocide?: Evidence from Rwanda," Discussion Papers of DIW Berlin 1072, DIW Berlin, German Institute for Economic Research.

[21] Schindler, K. and Brück T., (2011). "The Effects of Conflict on Fertility in Rwanda," HiCN Working Papers 102, Households in Conflict Network.

[22] Schmierer, Daniel, (2011) "Marriage Market Sex Ratios and Household Investment in Children"

[23] Verwimp P. and Damien de Walque, 2010. "The Demographic and Socio-economic Distribution of Excess Mortality during the 1994 Genocide in Rwanda," Journal of African Economies, Oxford University Press, vol. 19(2), pages 141-162, March.

[24] Stevenson, B. and Wolfers J. "Bargaining in the Shadow of the Law: Divorce Laws and Family Distress", Quarterly Journal of Economics 121(1), February 2006

[25] Thomas, Duncan "Intra-Household Resource Allocation: An Inferential Approach" The Journal of Human Resources , Vol. 25, No. 4 (Autumn, 1990), pp. 635-664

Graph 1 Women age 15-39 Probability of being single over age

kernel = epanechnikov, degree = 0, bandwidth = .74
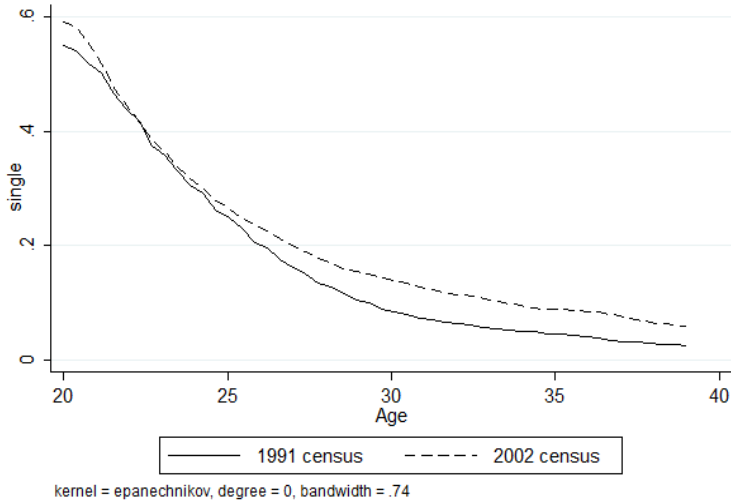
Graph 2 Women age 15-39 Probability of being married over age

kernel = epanechnikov, degree = 0, bandwidth = .8

Graph 3 Women age 15-39 Probability of being a widow over age

kernel = epanechnikov, degree = 0, bandwidth = 1.53
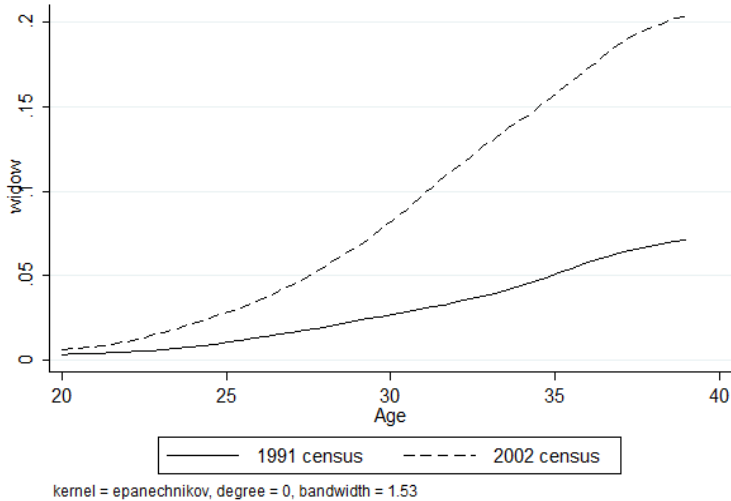
Graph 4 Men age 20-44 Probability of being single over age

kernel = epanechnikov, degree = 0, bandwidth = .77
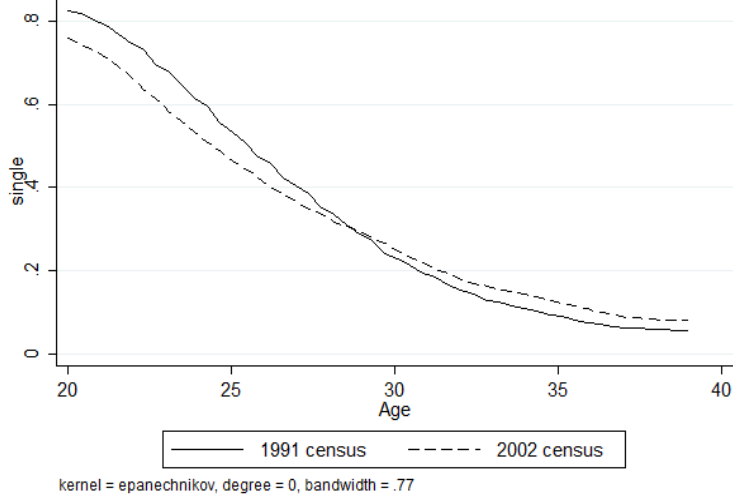
Graph 5 Men age 20-44 Probability of being married over age

kernel = epanechnikov, degree = 0, bandwidth = .78
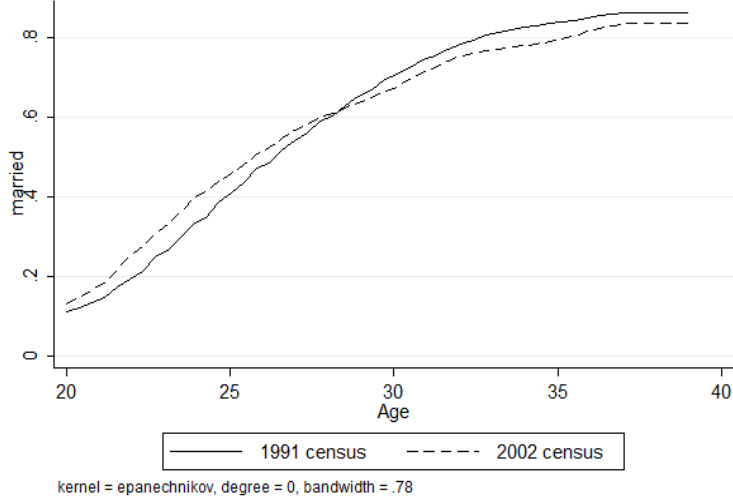
Graph 6 Men age 20-44 Probability of being a widow over age

kernel = epanechnikov, degree = 0, bandwidth = 1.63
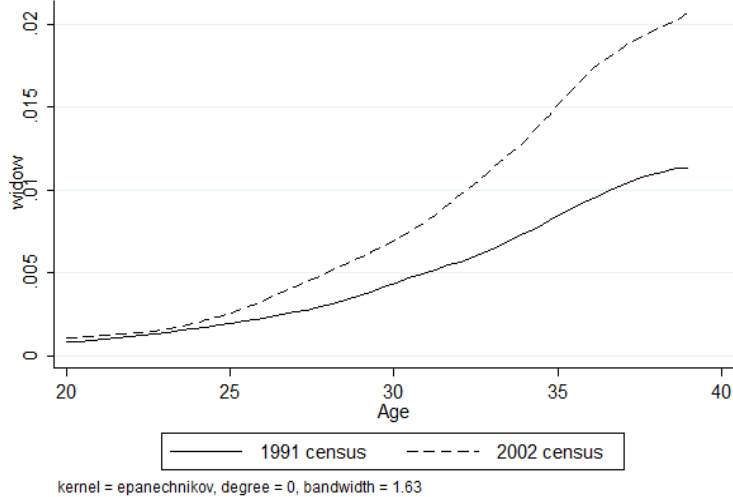
Table 1: The impact of sex ratio on women's marital status by age group

	(1)	(2)	(3)	(4)	(5)	(6)
	Married	Single	Married	Single	Married	Single
	Age	Age	Age	Age	Age	Age
	20-24	20-24	25-29	25-29	30-39	30-39
Change Sex Ratio*Post-genocide	-0.526	0.534	-0.527**	0.532***	-0.546**	0.194*
	[0.395]	[0.500]	[0.253]	[0.187]	[0.195]	[0.0983]

The dependent variable in each regression is the percentage of women in the given age group with the stated marital status, in either 1991 or 2002. The percentage of single women does not include widows.

All regressions include a post genocide dummy and province fixed effects.

The number of observations in each regression is 22. Standard errors are clustered at the province-year level. *** p<0.01, ** p<0.05, * p<0.1

Table 2. Descriptive statistics for the whole sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Ever victim of domestic violence	1698	0.354	0.478	0	1
Current use of contraception	4066	.183	.387	0	1
Woman has final say large purchases	4059	.178	.383	0	1
Woman has daily say daily purchases	4063	.325	.468	0	1
Husband thinks violence is justified	1620	.216	.412	0	1
Age at marriage	1698	20.274	3.274	11	37
Years since marriage	1698	12.332	8.427	0	35
Year since marriage squared /10	1698	22.305	25.726	0	122.5
Year since marriage cubic /100	1698	48.378	74.130	0	428.75
Cohabitating	1698	0.358	0.479	0	1
Divorced	1698	0.000	0.000	0	0
Separated	1698	0.000	0.000	0	0
Adventist	1681	0.137	0.344	0	1
Protestant	1681	0.341	0.474	0	1
Muslim	1681	0.010	0.098	0	1
Other	1681	0.016	0.126	0	1
Woman's years of education	1697	3.795	3.279	0	18
Husband's years of education	1698	4.306	3.649	0	19
urban	1698	0.131	0.337	0	1
Woman's occupation: Prof., Cler., Sales	1694	0.059	0.236	0	1
Woman's occupation: Agriculture	1694	0.690	0.463	0	1
Woman's occupation: Manual	1694	0.014	0.116	0	1
Woman's occupation: Not working	1694	0.237	0.426	0	1
Husband's occupation: Prof., Cler., Sales	1667	0.101	0.301	0	1
Husband's occupation: Agriculture	1667	0.743	0.437	0	1
Husband's occupation: Manual	1667	0.143	0.351	0	1
Husband's occupation: Army	1667	0.013	0.113	0	1
Wealth: Poorest	1698	0.205	0.404	0	1
Wealth: Poorer	1698	0.216	0.412	0	1
Wealth: Middle	1698	0.194	0.396	0	1
Wealth: Richer	1698	0.215	0.411	0	1
Wealth: Richest	1698	0.170	0.376	0	1
Year of birth 1985-1990	1698	0.025	0.157	0	1
Year of birth 1980-1984	1698	0.211	0.408	0	1
Year of birth 1975-1979	1698	0.217	0.412	0	1
Year of birth 1970-1974	1698	0.190	0.392	0	1
Year of birth 1965-1969	1698	0.123	0.329	0	1
Year of birth 1960-1964	1698	0.135	0.342	0	1
Year of birth 1955-1959	1698	0.098	0.298	0	1
Sex ratio*	1698	0.692	0.116	0.569	1.152
% Literacy men*	1698	0.673	0.049	0.613	0.867
Male employment formal sector*	1698	0.128	0.123	0.059	0.728

Source: 2005 Rwanda Demographic and health Survey

*Source: 1991 and 2002 Census of Rwanda

Table 3. Descriptive statistics for those who married before the genocide

Variable	Obs	Mean	Std. Dev.	Min	Max
Ever victim of domestic violence	661	0.403	0.491	0	1
Current use of contraception	1810	.198	.398	0	1
Woman has final say large purchases	1806	.229	.421	0	1
Woman has final say daily purchases	1808	.379	.486	0	1
Husband thinks violence is justified	695	.231	.422	0	1
Age at marriage	661	19.859	3.233	11	31
Years since marriage	661	20.213	5.764	11	35
Year since marriage squared /10	661	44.172	24.326	12.1	122.5
Year since marriage cubic /100	661	103.144	82.492	13.31	428.75
Cohabitating	661	0.210	0.407	0	1
Divorced	661	0.000	0.000	0	0
Separated	661	0.000	0.000	0	0
Adventist	654	0.138	0.345	0	1
Protestant	654	0.288	0.453	0	1
Muslim	654	0.009	0.096	0	1
Other	654	0.020	0.140	0	1
Woman's years of education	661	3.327	3.403	0	17
Husband's years of education	661	3.823	3.632	0	18
urban	661	0.105	0.306	0	1
Woman's occupation: Prof., Cler., Sales	659	0.045	0.207	0	1
Woman's occupation: Agriculture	659	0.735	0.442	0	1
Woman's occupation: Manual	659	0.010	0.100	0	1
Woman's occupation: Not working	659	0.210	0.408	0	1
Husband's occupation: Prof., Cler., Sales	642	0.105	0.307	0	1
Husband's occupation: Agriculture	642	0.781	0.414	0	1
Husband's occupation: Manual	642	0.113	0.316	0	1
Husband's occupation: Army	642	0.001	0.036	0	1
Wealth: Poorest	661	0.211	0.408	0	1
Wealth: Poorer	661	0.241	0.428	0	1
Wealth: Middle	661	0.180	0.384	0	1
Wealth: Richer	661	0.213	0.410	0	1
Wealth: Richest	661	0.155	0.362	0	1
Year of birth 1985-1990	661	0.000	0.000	0	0
Year of birth 1980-1984	661	0.001	0.034	0	1
Year of birth 1975-1979	661	0.027	0.163	0	1
Year of birth 1970-1974	661	0.205	0.404	0	1
Year of birth 1965-1969	661	0.248	0.432	0	1
Year of birth 1960-1964	661	0.298	0.458	0	1
Year of birth 1955-1959	661	0.220	0.414	0	1
Sex ratio*	661	0.789	0.071	0.736	1.152
% Literacy men*	661	0.677	0.043	0.632	0.867
Male employment formal sector*	661	0.140	0.113	0.080	0.728

Source: 2005 Rwanda Demographic and health Survey
*Source: 1991 and 2002 Census of Rwanda

Table 4. Descriptive statistics for those who married after the genocide

Variable	Obs	Mean	Std. Dev.	Min	Max
Ever victim of domestic violence	1037	0.315	0.465	0	1
Current use of contraception	2256	.172	.378	0	1
Woman has final say large purchases	2253	.137	.344	0	1
Woman has final say daily purchases	2255	.281	.449	0	1
Husband thinks violence is justified	925	.204	.404	0	1
Age at marriage	1037	20.610	3.270	12	37
Years since marriage	1037	5.929	3.202	0	11
Year since marriage squared /10	1037	4.540	3.837	0	12.1
Year since marriage cubic /100	1037	3.884	4.155	0	13.31
Cohabitating	1037	0.478	0.500	0	1
Divorced	1037	0.000	0.000	0	0
Separated	1037	0.000	0.000	0	0
Adventist	1027	0.137	0.344	0	1
Protestant	1027	0.385	0.487	0	1
Muslim	1027	0.010	0.100	0	1
Other	1027	0.013	0.113	0	1
Woman's years of education	1036	4.176	3.125	0	18
Husband's years of education	1037	4.699	3.617	0	19
urban	1037	0.152	0.359	0	1
Woman's occupation: Prof., Cler., Sales	1035	0.071	0.256	0	1
Woman's occupation: Agriculture	1035	0.653	0.476	0	1
Woman's occupation: Manual	1035	0.017	0.128	0	1
Woman's occupation: Not working	1035	0.260	0.439	0	1
Husband's occupation: Prof., Cler., Sales	1025	0.097	0.296	0	
Husband's occupation: Agriculture	1025	0.713	0.453	0	1
Husband's occupation: Manual	1025	0.168	0.374	0	1
Husband's occupation: Army	1025	0.022	0.147	0	1
Wealth: Poorest	1037	0.200	0.400	0	1
Wealth: Poorer	1037	0.196	0.397	0	1
Wealth: Middle	1037	0.206	0.404	0	1
Wealth: Richer	1037	0.216	0.412	0	1
Wealth: Richest	1037	0.183	0.386	0	1
Year of birth 1985-1990	1037	0.046	0.209	0	1
Year of birth 1980-1984	1037	0.382	0.486	0	1
Year of birth 1975-1979	1037	0.370	0.483	0	1
Year of birth 1970-1974	1037	0.178	0.383	0	1
Year of birth 1965-1969	1037	0.022	0.145	0	1
Year of birth 1960-1964	1037	0.002	0.047	0	1
Year of birth 1955-1959	1037	0.000	0.000	0	0
Sex ratio*	1037	0.613	0.079	0.569	0.898
% Literacy men*	1037	0.670	0.053	0.613	0.846
Male employment formal sector*	1037	0.117	0.129	0.059	0.594

Source: 2005 Rwanda Demographic and health Survey
*Source: 1991 and 2002 Census of Rwanda

Table 5: Sex ratio among non-institutionalized individuals

Province	Sex ratio 1991	Sex ratio 2002	Change in Sex ratio (1991-2002)	Perpetrators from Gacaca
City of kigali	1.152	0.898	-0.254	5629
Kigali ngali	0.821	0.585	-0.236	87433
Gitarama	0.778	0.593	-0.185	91461
Butare	0.780	0.581	-0.199	78037
Gikongoro	0.770	0.629	-0.141	42366
Cyangugu	0.794	0.616	-0.177	39395
Kibuye	0.756	0.569	-0.187	57279
Gisenyi	0.764	0.572	-0.193	26835
Ruhengeri	0.736	0.583	-0.153	14477
Byumba	0.775	0.633	-0.142	17217
Kibungo	0.795	0.580	-0.216	59547
Correlation with sex ratio in 2002				-0.515

Data from the Rwandan Census of Population and Friedman (2011)

The sex ratio is defined as the ratio of the number of males aged

20 to 44 to the number of females aged 15 to 39

Table 6: The marriage market and domestic violence

	(1)	(2)	(3)	(4)
	Ever victim of domestic violence			
Sex ratio$_{p,t}$	-2.537***	-2.566***	-1.957*	-2.001*
	[0.655]	[0.659]	[0.959]	[0.972]
% Literate men$_{p,t}$		-0.874	-1.086	-0.922
		[0.910]	[0.954]	[0.967]
Formal sector employment$_{p,t}$			-0.870	-0.592
			[0.983]	[0.996]
Post-genocide	-0.486***	-0.503***	-0.430**	-0.437**
	[0.126]	[0.128]	[0.154]	[0.156]
Age at marriage	-0.019**	-0.019**	-0.019**	-0.021**
	[0.010]	[0.010]	[0.010]	[0.010]
Informal marriage	0.067**	0.067**	0.067**	0.045
	[0.029]	[0.029]	[0.029]	[0.030]
Adventist	-0.029	-0.029	-0.029	-0.030
	[0.040]	[0.040]	[0.040]	[0.040]
Protestant	-0.018	-0.018	-0.018	-0.022
	[0.029]	[0.029]	[0.029]	[0.030]
Muslim	-0.034	-0.034	-0.034	-0.075
	[0.105]	[0.105]	[0.105]	[0.114]
Woman's years of school	0.006	0.006	0.006	0.007
	[0.005]	[0.005]	[0.005]	[0.005]
Husband's years of school	-0.009**	-0.009**	-0.009**	-0.008*
	[0.004]	[0.004]	[0.004]	[0.004]
Urban	-0.028	-0.028	-0.028	-0.017
	[0.042]	[0.042]	[0.042]	[0.045]
Polygynous household				0.188***
				[0.051]
Constant	3.564***	4.350***	4.446***	4.273***
	[0.735]	[1.103]	[1.123]	[1.139]
Observations	1,680	1,680	1,680	1,642
R^2	0.403	0.403	0.403	0.410

Standard errors in brackets estimated using Donald-Lang two-step procedure.

Covariates include years since marriage, entered as a cubic; dummies for the woman's and the husband's occupation (column 4 only); 5 year cohort dummies; dummies for quintiles of the distribution of a wealth index; province fixed effects.

All regressions are estimated using apposite weights for the domestic violence module.

Table 7: Robustness checks

	(1)	(2)	(3)	(4)
	Ever victim of domestic violence			
	Drop unions 1994-1996	Drop movers	Keep divorced and separated	Control for sibling death in 1994
Sex ratio$_{p,t}$	-2.293**	-2.048*	-4.372**	-1.954*
	[0.768]	[0.930]	[1.347]	[0.955]
% Literate men$_{p,t}$	-0.905	-1.739	-2.574*	-1.067
	[0.763]	[0.924]	[1.339]	[0.949]
Formal sector employment$_{p,t}$	-0.787	-0.301	0.734	-0.861
	[0.786]	[0.953]	[1.380]	[0.978]
Post-genocide	-0.413**	-0.415**	-0.818***	-0.428**
	[0.123]	[0.149]	[0.216]	[0.153]
sib_dead1994				-0.012
				[0.056]
sib_dead1994_PG				-0.025
				[0.068]
Age at marriage	-0.018*	-0.022**	-0.026*	-0.019*
	[0.011]	[0.009]	[0.013]	[0.010]
Informal marriage	0.104***	0.023	0.074*	0.067**
	[0.033]	[0.029]	[0.041]	[0.029]
Woman years of school	0.004	0.003	0.013*	0.006
	[0.005]	[0.005]	[0.007]	[0.005]
Husband years of school	-0.009*	-0.008*	-0.002	-0.009**
	[0.005]	[0.004]	[0.006]	[0.004]
Urban	-0.050	-0.030	-0.028	-0.027
	[0.049]	[0.042]	[0.059]	[0.043]
Constant	4.518***	5.017***	7.578***	4.420***
	[0.899]	[1.089]	[1.577]	[1.118]
Observations	1,384	1,818	904	1,680
R^2	0.414	0.422	0.441	0.403

Standard errors in brackets estimated using Donald-Lang two-step procedure.

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in brackets estimated using Donald-Lang two-step procedure. Covariates include years since marriage, entered as a cubic; dummies for the woman's and the husband's occupation (column 4 only); 5 year cohort dummies; dummies for quintiles of the distribution of a wealth index; religion; province fixed effects.

All regressions are estimated using apposite weights for the domestic violence module.

Table 8: Husband's education and age at marriage

VARIABLES	(1) Husband's years of education	(2) Husband's years of education	(3) Age at marriage
Sex Ratio$_{p,t}$	5.990**	4.934*	-5.070
	[2.323]	[2.423]	[3.050]
Primary education*Sex ratio$_{p,t}$		2.467***	
		[0.826]	
Post-genocide	1.610***	1.563***	4.651***
	[0.451]	[0.454]	[0.490]
Primary education	2.396***	0.655	
	[0.145]	[0.583]	
Age at marriage	0.064***	0.061***	
	[0.021]	[0.021]	
urban	1.230***	1.240***	0.046
	[0.279]	[0.280]	[0.138]
% Literate Men$_{p,t}$	5.605***	4.776**	4.361
	[1.942]	[1.873]	[4.100]
Employment in formal sector$_{p,t}$	4.174**	3.125	-0.308
	[1.996]	[1.920]	[3.218]
Constant	-10.889***	-8.764***	22.205***
	[2.269]	[2.313]	[4.629]
Observations	5,084	5,084	5,084
R^2	0.213	0.214	0.316

The regression controls for province and cohort fixed effects

Robust standard errors clustered at the province-time level in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Bargaining power, contraception and attitude towards violence

	(1) Wife has final say on large purchases	(2) Wife has final say on daily purchases	(3) Current use of contraception	(4) Husband justifies violence
Sex ratio$_{p,t}$	1.039	1.860*	1.167*	-0.551
	[0.766]	[0.919]	[0.563]	[0.862]
% Literate men$_{p,t}$	-0.067	-0.784	-1.047*	-0.468
	[0.651]	[0.878]	[0.494]	[0.857]
Formal sector employment$_{p,t}$	-0.785	-1.586**	-0.945	0.654
	[0.501]	[0.647]	[0.561]	[0.883]
Age at marriage	-0.007***	-0.007**	-0.008*	-0.004
	[0.002]	[0.003]	[0.005]	[0.008]
Informal marriage	0.057***	0.027	-0.029**	0.048*
	[0.014]	[0.017]	[0.013]	[0.026]
Adventist	0.019	0.052**	0.002	-0.025
	[0.019]	[0.024]	[0.020]	[0.032]
Protestant	0.033**	0.035**	-0.046***	-0.069***
	[0.014]	[0.017]	[0.013]	[0.024]
Muslim	0.111**	0.053	-0.083*	-0.032
	[0.056]	[0.059]	[0.049]	[0.095]
Woman years of school	0.007***	0.010***	0.014***	-0.008**
	[0.002]	[0.003]	[0.002]	[0.004]
Husband years of school	0.000	0.001	0.006***	-0.009***
	[0.002]	[0.002]	[0.002]	[0.003]
N. children ever born			0.015***	
			[0.004]	
Constant	-0.152	0.242	0.592	0.945
	[0.810]	[0.750]	[0.407]	[1.019]
Observations	4,059	4,063	4,066	1,620
R^2	0.221	0.387	0.272	0.270

Standard errors in brackets estimated using Donald-Lang two-step procedure.

Covariates include years since marriage, entered as a cubic; 5 year cohort dummies; dummies for quintiles of the distribution of a wealth index; province fixed effects. Column (4) includes also 5 year dummies for the husband's year of birth. All regressions are estimated using apposite weights for the core questionnaire; column(4) uses weights from the male questionnaire.

Appendix

Table A1: Sex ratio among non-institutionalized individuals

Province	Sex ratio 1991	Sex ratio 2002	Change in Sex ratio (1991-2002)	Perpetrators from Gacaca
City of kigali	1.300	1.098	-0.202	5629
Kigali ngali	0.994	0.798	-0.196	87433
Gitarama	0.947	0.786	-0.161	91461
Butare	0.924	0.772	-0.152	78037
Gikongoro	0.931	0.808	-0.123	42366
Cyangugu	0.945	0.828	-0.117	39395
Kibuye	0.939	0.772	-0.167	57279
Gisenyi	0.928	0.771	-0.157	26835
Ruhengeri	0.900	0.802	-0.098	14477
Byumba	0.953	0.824	-0.129	17217
Kibungo	0.965	0.778	-0.187	59547
Correlation with sex ratio in 2002				-0.532

Data from the Rwandan Census of Population and Friedman (2011)

The sex ratio is defined as the ratio of the number of males aged

20 to 44 to the number of females aged 20 to 44