// NO.20-024 | 05/2020

DISCUSSION PAPER

// BARBARA BOGGIANO

Long-Term Effects of the Paraguayan War (1864 – 1870): From Male Scarcity to Intimate Partner Violence

Leibniz Association

ZEW

Long-term effects of the Paraguayan War (1864-1870): from male scarcity to intimate partner violence.

Barbara Boggiano*

May 2020

Abstract

This paper investigates the long-term effects of the Paraguayan War (1864–1870) on intimate partner violence. The identification of these causal effects relies on a novel historical dataset from which I exploit the distance from municipalities to military camps during the war. Over 130 years later, the likelihood of intimate partner violence is still 5.54 percent higher than average in municipalities that were more heavily affected by the war. The loss of life among men led to female-biased sex ratios and defined Paraguay as the 'country of women'. However, I show that, contrary to conventional wisdom, female-biased sex ratios are not the only driver of the long-term effects of the war. Instead, the main transmission channel is the relative status of females within the household. Male scarcity leads to atypical status inconsistencies within the household that do not respect traditional gender roles and induces intimate partner violence that is transmitted across generations.

Keywords: intimate partner violence, long-term effects, gender norms, male scarcity.
JEL Classification: I15, N36, O15, Z10.

Email address: bb203@le.ac.uk, *Latest version:* sites.google.com/view/barbaraboggiano/research

I gratefully acknowledge funding by the German Academic Exchange Service (DAAD) via a One Year Research Grant for Doctoral Candidates, and appreciate the hospitality of ZEW–Leibniz Centre for European Economic Research where part of this research was conducted. I would like to express my gratitude for the abundance of support, guidance and helpful comments from Facundo Albornoz Crespo, Piotr Denderski, Jesse Matheson and Thomas Siedler. I would also like to thank seminar participants at the University of Leicester, ZEW–Leibniz Centre for European Economic Research, C4ED–Center for Evaluation and Development and the CRC Tr 224 Summer School in Annweiler. I am grateful for insightful discussions with Sarra Ben Yahmed, Francesco Berlingieri, Subir Bose, Paula Calvo, Maria Cubel, Giuseppe De Feo, Luis Fernandez Intriago, Martin Foureaux Koppensteiner, Ruben Hipp, Anastasia Papadopoulou, Francisco Roldan, André Stenzel, Arek Szydlowski, and Alberto Vindas Quesada. All errors are my own.

"War is a great social catalyst from which neither victor nor vanquished can escape. In conflicts that result in catastrophic loss of life, the very foundations of society are seriously weakened. But, so long as a viable remnant of the old order remains, historical continuities are not completely destroyed and the opportunity exists for starting anew. These generalizations are especially applicable to Paraguay".

Warren, H., & Warren, K., "Paraguay and the Triple Alliance: the postwar decade, 1869-1878".

1 Introduction

The socio-economic role of women has undergone rapid change in recent decades. Nonetheless, violence against women is a violation of human rights which remains a global issue transcending national boundaries as well as socio-economic, cultural and racial distinctions. According to the United Nations, the global economic cost of violence against women amounts to two percent of GDP worldwide (UN Women, 2016).

Paraguayan women have encountered more challenges in trying to achieve social equality than their counterparts in the region and around the world. Intimate partner violence is one of the many challenges they face, with 38.1 percent reporting to have been victims of intimate partner violence during their lifetime compared to 30 percent worldwide (Castillo, 2011; García-Moreno *et al.*, 2013).[1]

In this paper, I use novel historical data to study the long-term effect of war on intimate partner violence (IPV). I link current variations in IPV against women within Paraguay to a sizeable demographic shock that accompanied one of the most critical events in Paraguayan history: the Paraguayan War (1864–1870). This war was the bloodiest conflict in Latin American history. It led to one of the greatest female-biased sex ratios ever recorded since it had a disproportional impact on the male population between 15 and 50 years of age, see Table 1. In the municipality most affected by the war, historical evidence suggests the presence of 5 males per 100 females of fertile age (Whigham and Potthast, 1999).

I find that today, more than 130 years later, in municipalities that were more heavily affected by the war, IPV is 1.89 percentage points more likely than in the average municipality. This implies that the likelihood of IPV is 5.54 percent higher than average in municipalities that were more heavily affected by the war. I then present evidence related to male survival rates as well as historical gender differences in human capital and labour participation suggesting that the main transmission channel is the relative status of females within the household.

To quantify the causal effect of the war on levels of IPV today, I employ a novel identification strategy. I define *Weighted Inverse Distance* (WID) as the average inverse distance from a

[1] Paraguayan females additionally face barriers in the labour market, fertility and reproductive control, low literacy rates and lack of property rights (Ñopo, 2012; Bértola and Williamson, 2017; Petrozziello *et al.*, 2011).

neighbourhood to the five military camps during the war, weighted by camp size, as military camps were more likely to recruit soldiers from the municipalities located closer to them. This measure is similar to others used in the literature, such as Valencia Caicedo (2018), but also accounts for the size of the military camps since bigger camps were likely to draft more men.[2]

Any long-term effect of the war on IPV cannot be directly explained by long-lasting changes in demographic variables as these revert to normal within a generation or two. Instead, the gender norms that emerged in the aftermath of the war can cause long-lasting effects as they are transmitted across generations (see Fernández *et al.*, 2004 in the context of female labour participation and Pollak, 2004 in the context of IPV). Among the many transmission channels that could be at play, I analyse two opposing channels which reflect some of these emerging norms. Firstly, I examine evidence compatible with male scarcity enabling females' financial independence, which is associated with a reduction in IPV. Secondly, I examine evidence consistent with male scarcity leading to atypical status inconsistencies within the household where men are disadvantaged with respect to their partners and are, consequently, more likely to engage in IPV (Molm, 1997; Macmillan and Gartner, 1999). I refer to these channels as the *financial independence channel* and the *relative status channel*, respectively. I present evidence that corroborates the relevance of both transmission channels. However, the positive long-term effect of the war on IPV suggests that the relative status channel dominates.

There is ample theoretical and empirical literature suggesting that female labour participation increases when men are scarce, or more specifically in the presence of female-biased sex ratios (Becker, 1973; Goldin, 1991; Acemoglu *et al.*, 2004; Goldin and Olivetti, 2013; Teso, 2018). However, there were institutional barriers such as females being deemed *unfit* to perform any critical socio-economic role without a male's permission (Capdevila, 2010). I consider absolute male scarcity by looking at male survival rates. I measure how many males survived the war as a proportion of the projected male population if no war had taken place. If these figures are low—the absolute loss of male lives is severe—female labour participation would increase. This is despite females being considered unfit to perform almost any critical role, as critical roles cannot wait to be filled by a future generation of males. Females therefore would perform traditionally male tasks despite the institutional barriers. This could lead to higher levels of female financial independence, which is associated with lower levels of IPV as income allows females to leave abusive relationships (Aizer, 2010). Contraty to this, females performing traditionally male tasks could also lead an improvement their relative status within the household, a known risk factor of IPV (Macmillan and Gartner, 1999). This happens as, in contexts of male

[2]Enforcement of the compulsory draft is likely to have been weaker the further away a male lived from a military camp. This is because men were drafted on foot (Thompson, 1869). A fundamental premise of this paper's analysis is the exogeneity of camps' placement and size. I address this in detail in Section 5.

scarcity, females are more likely to be more educated, to participate in the labour market, and to contribute more, which shapes different gender identities and relations within the household and, ultimately, inducing IPV.

I corroborate the importance of the relative status channel by showing that male survival rates were lower in areas more severely affected by the war and that IPV is higher in places with lower male survival rates. Males were also less likely to be educated relative to females and gender differences in labour participation were lower in areas more heavily affected by the war, despite the institutional barriers. Moreover, I show that today, IPV is more prevalent in municipalities where males were less likely to be educated than females and where the historical gender differences in labour participation were lower. These results suggest that females were more likely to have a better relative status within the household in areas more severely affected by the war, a factor which is positively related to current levels of IPV. This channel outweighs the alternative financial independence channel for which I show that female-biased sex ratios are more pronounced in areas more heavily affected by the war, which is negatively related to current levels of IPV.

The findings presented in this paper contribute to three strands of literature. Firstly, they contribute to a nascent literature on the historical roots of attitudes towards gender roles by showing that a war can shape gender norms in a way that has long-term effects on IPV. I provide evidence that, in the Paraguayan context, a more severe demographic shock increases the likelihood of IPV in the long run, suggesting that the labour market results observed in the literature lead to higher instead of lower levels of IPV. This is a consequence of the threat to males posed by women having a better relative status within the household, which makes an important contribution to their ability to leave an abusive relationship due to higher levels of financial independence. Secondly, these findings have policy implications that go beyond those presented in the existing economic literature on IPV since they provide evidence of the long-term causes. In terms of public policy, examining historical demographic shocks and the resulting changes in gender norms enables us to better target policies against IPV. Lastly, this paper contributes to the historical literature by constructing a unique data set that documents the consequences of the war on Paraguayan demographics, school attendance and female labour participation in the aftermath of the war and in the long term.

The rest of the paper is organized as follows. In Section 2, I review the literature. The historical background is discussed in Section 3 and the data is described in Section 4. I analyse the WID measure's exogeneity and validity in Section 5. In Section 6, I describe the main empirical specification and present its corresponding results. I explore the transmission channels in Section 7. Robustness checks are presented in Section 8. In Section 9, I conclude.

2 Literature Review

This paper builds on the literature on historical determinants of development (Nunn, 2009, 2014).[3] In particular, it relates to previous work studying the long-term effects of demographic shocks on the socio-economic and political role of women. There is substantial literature that attributes these long-run effects to changes in norms regarding the role of females within the family, in the public/political arena and the labour market. Gender norms emerge and persist as they are transmitted across generations (Fernández *et al.*, 2004; Pollak, 2004).[4]

Male scarcity incentivises females to replace males in the labour market and also reduces female bargaining power within the household due to the low opportunity cost for males of re-matching in the marriage market. As a consequence, more conservative attitudes towards women within the household can materialise.[5] Consistent with the effects of female-biased sex ratios on marriage markets and intra-household bargaining power presented by Becker (1973), women are less likely to marry (Abramitzky *et al.*, 2011; Brainerd, 2017), more likely to have children out of wedlock (Bethmann and Kvasnicka, 2013), and more likely to work (Goldin, 1991; Acemoglu *et al.*, 2004; Goldin and Olivetti, 2013) whenever males are scarce. Teso (2018) traces the long-term effects of the transatlantic slave trade on current variations in women's labour force participation. He finds evidence that women whose ancestors were more exposed to this shock are more likely to participate in the labour force today.[6] The literature mentioned above focused on females replacing males in the labour market and its consequences; in my paper, however, I focus on an unexplored consequence of male scarcity in the form of IPV.

An understanding of historical and cultural roots is crucial to the analysis of IPV. Alesina *et al.* (2016) find that when women are more economically valuable—through dowry and home production—they are less likely to be subjected to intrafamily violence, and this type of violence is considered less acceptable. However, they do not investigate how demographic patterns may have impacted IPV. Natural historical experiments provide a setting in which to address this issue. This paper links a demographic shock (the Paraguayan War) to the presence of IPV in the long run.

The prevalence of IPV has increasingly been recognised as an important public health issue

[3]The critical role of human capital for development is well established (Becker *et al.*, 1990; Benhabib and Spiegel, 1994; Barro, 2001). Valencia Caicedo (2018) finds that the distance from the nearest Jesuit mission has significant and large negative effects on educational attainment 250 years after the expulsion of the missionaries. To acquire a more in-depth understanding of the role of historical institutions in development, see Dell (2010).

[4]For other relevant papers see Alesina *et al.* (2013) and Guiso *et al.* (2016).

[5]Notably, more conservative attitudes also arise in the context of male-biased sex ratios (Grosjean and Khattar, 2019; Amaral and Bhalotra, 2017). However, the channels of transmission are different.

[6]There also is ongoing concurrent work on the long-term effects of the Paraguayan War by Alix-Garcia *et al.* (2020). However, the measure of the impact of the war (distance to the warpath) is different, as are the outcomes of interest. One of Alix-Garcia *et al.* (2020) main outcomes is female labour participation for which I find similar results, see Appendix D.

worldwide.[7] There is ample literature relating gender differences in the labour market—such as gender differences in unemployment risk and gender wage gaps—to IPV. Aizer (2010) shows that increasing a woman's relative wage reduces IPV by improving her outside options. Consistent with the female independence channel described earlier, she shows that reducing the gender wage gap also reduces IPV. Similarly, Anderberg *et al.* (2016) develops a model according to which a partnership provides insurance against unemployment risk through the pooling of resources. This, in turn, leads to a negative relationship between risk of male unemployment and IPV and a positive relationship between risk of female unemployment and IPV. In contrast to this approach, research on atypical inconsistencies in status among members of the household examines IPV when the female resources—cultural and socio-economic—are greater than those of the male partner. In this context, the disadvantaged party—the husband—would be more likely to resort to coercion (Molm, 1997). This atypical status inconsistencies are usually in terms of education, occupation, or income within marital relationships. Macmillan and Gartner (1999) provides evidence of how employment and education play a critical role on IPV as the relative statuses of husbands and wives within the household where gendered expectations of male authority and female dependence generate IPV. I provide evidence suggesting that, in Paraguay, the coercion effect of a higher female relative status within the household—in terms of labour participation and, ultimately, income—is more dominant than the protection effect that financial independence provides against IPV. These negative consequences of atypical inconsistencies in status that do not respect traditional gender norms are consistent with recent evidence on women trying to follow traditional gender norms also in developed countries. Roth and Slotwinski (2020) shows that in Switzerland women misreport their income in surveys to avoid to out-earn their partner and respect gender norms.

3 Historical Background

Although civil wars and internal conflicts were relatively common in the Rio de la Plata Basin in the nineteenth century, there were fewer wars between the individual countries in the region and these were not comparable with the Paraguayan War in terms of length, casualties and economic losses. The war and its consequences have been the subject of much debate in South America, both in the historical literature and public opinion. Historians have debated

[7] In particular, some previous studies have analysed the relationship between emotional cues and IPV, both from the perspective of the perpetrators' criminal behaviour and the victim. Card and Dahl (2011) show that a team losing a football match unexpectedly has a positive impact on IPV. From the victims' perspective, Ishida *et al.* (2010) find evidence of an association between IPV and common mental disorders in Paraguay. They find evidence that emotional abuse, regardless of when it occurred, is associated with an increased risk for common mental disorders, whereas recent physical abuse is associated with an increased risk for suicidal ideation.

at length on the magnitude of the demographic shock after the war. Among historians, there are two main positions regarding the consequences of the war. According to Reber (1988), the war cost Paraguay between 8.7 and 18.5 percent of the pre-war population. Contrasting with this analysis, Whigham and Potthast (1999) show novel evidence of 60 to 69 percent loss of life during the war using the previously undiscovered 1870 Census.

The Paraguayan War began in late 1864 as a result of an opposition uprising in Uruguay where Paraguay ended up on the opposing side to Argentina and Brazil. For more details about the causes of the conflict, see Appendix A.

Paraguay began active preparations for war in March 1864 with a military force of 80,000 males in five military camps (Cerro León, Encarnación, Humaitá, Asunción and Concepción). Mortalities, injuries and desertion reduced the pool of able-bodied men. One year into the conflict, 40,000 men had already died—both from disease and in battle outside Paraguay's territory—and 10,000 surrendered.[8]

In early 1867, the Paraguayan army had no more than 20,000 men left to fight the Allies (Reber, 1999). By the end of the year, a second, broader call to arms was issued for males between the ages of 12 and 60. Local authorities were required to provide an overview of the draft-eligible male population that met the age requirement.

By December 1869, the Paraguayan army was split, and most Paraguayan forces had surrendered. In the end, the remaining forces—6,000 males—were driven to the northern frontier of Paraguay. On arrival there was only a handful of men, the rest had either perished along the way, deserted or had been killed trying. On 1 March 1870, Solano Lopez—Paraguay's army leader—was wounded and died later that day. His death marked the end of the Paraguayan War. Figure 1 summarises the 1864-1870 period.

The post-war reconstruction in Paraguay included the adoption of the Constitution and the Civil and Marriage Codes (1870–1897). These legal acts excluded females from all forms of power, putting them under the tutelage of their fathers or husbands in all matters pertaining to management and/or inheritance of assets. The Marriage Code declared females as unfit to perform almost any critical role—but agriculture and home production—representing a step backwards for women's rights in Paraguay.[9] Moreover, women were not entitled to manage the expenses of their household, they were not allowed to act as witnesses in public affairs, and they were obliged to ask for permission to practice a profession (Capdevila, 2010).

[8]Most of them surrendered in the siege of Uruguayana (Brazil) in 1865 during the campaign to help the *Blancos* in Uruguay. After the siege, 5,545 out of 8,000 soldiers surrendered and the rest died of hunger and sickness.

[9]The relative lack of women's rights compared to men's was common in the region but not the norm in Paraguay. Before 1864, Paraguayan women were the heads of their households, meaning they held a position of power and authority. This step backwards also reflects how long it took for Paraguayan females to gain full rights compared to women from other countries in the region (Uruguay in 1946, Brazil in 1962, Argentina in 1968 and Paraguay in 1992). For more details on the evolution of women's civil rights in the region, see Giordano (2013).

Historical accounts also describe a less favourable marriage market for females after the war. The more vulnerable position of women in Paraguay is reflected in how marriages were represented. Figure 3 shows how different aspects of the marriage changed negatively before, during and after the war.

Moreover, Paraguayan women were expected to be dedicated solely to the subsistence of the Paraguayan nation while the few remaining males were to be dedicated to rebuilding the institutional structure devastated by the war. In 1870, Paraguay was left with no schools. By 1876, there were 350 schools, 320 of which catered for 10,000 boys and 30 of which catered for just 2,000 girls (Warren and Warren, 1978).

4 Data

4.1 Historical Data

To study the long-term impact of the Paraguayan War on IPV, I match individual-level data from the Paraguayan National Survey of Demography and Sexual and Reproductive Health with historical data. Table 2 summarises the five sources of historical data used.

The first source is the Census of 1870, as documented by Whigham and Potthast (1999). From this Census, I observe the total population stratified by gender and age groups in 34 out of 92 municipalities.[10] The second source is the lists of draft-eligible males in December 1867 and January 1868 for 45 of the 92 municipalities. The third source of information is the 1846 Census (Williams, 1976). This census includes the total population classified by age and freedom status groups in 69 out of the 92 municipalities. The fourth source is the 1886 Statistical Yearbook of the Paraguayan Republic (*Anuario Estadistico de las Republica del Paraguay*, 1886) which includes data on the school system and a summary of the 1886 Census by gender and age group. The fifth and final source of historical data is Thompson (1869) from which I retrieve the locations and sizes of the military camps in 1864.

In the aftermath of the war, a provisional government recognised the need to know the level of resources the country still had at its disposal (Whigham and Potthast, 1999).[11] The findings in the 1870 Census were grouped by gender and age groups consisting of *ancianos* (elderly, over 50 years of age), *jóvenes* (young, a young person between 12 and 50), and *niños* (children, a child under the age of 12).[12] From this, I was able to calculate the male/female sex ratio in

[10] See Figure 2 for a map of the 95 municipalities (four correspond to neighbourhoods within Asunción).

[11] A provisional government was created as soon as the Brazilian occupation of Asunción began in January 1870. The politicians involved were in exile during the government of Solano Lopez and belonged to the *Legion Paraguaya* which fought alongside the Allied Forces against Solano Lopez.

[12] According to Whigham and Potthast (1999), the definition of these categories seems to vary from place to place, but for the majority, the age ranges described hold.

each of the 34 municipalities immediately after the war, as shown in Table 4.[13] This allows me to examine the immediate effects of the war on sex ratios. However, since the 1870 Census is only available for 34 municipalities, I also perform the analysis using data from the 1886 Census. With the 1886 Census, I can distinguish between narrower age groups/age groups with narrower ranges. I then classify them by their participation in the war using the following categories: (I) newborns, (II) people who were born after the war (ages 1–14), (III) people who were born prior to or during the war but were too young to be drafted (ages 15–30) and (IV) people who were born before the war and were compulsorily drafted in 1868 (ages 31+). I perform the analysis only for the group (IV) sample.

The draft-eligible males' lists contain individual information regarding all males aged 12 and older including full name, age, medical condition (if any), military rank (if any) and freedom status (in the case of slaves and *libertos*).[14] I collected 45 lists, representing 45 municipalities, from the Asunción's National Archives (*Archivo Nacional de Asunción*) via the digitalisation conducted by the Utah Genealogical Society. These lists contain information about 11,081 males out of a total 121,254 projected to be alive in 1867/1868 (Boggiano, 2020). Combining the information in the lists of draft-eligible males with the Census of 1846, I calculate the survival rates of males. I match 42 observations from the lists of draft-eligible males to the population projections using the latest available census. I use the male survival rates measure as a proxy for absolute male scarcity, where a higher male survival rate implies lower male scarcity and vice versa. Using the same data, I also calculate the rate of non-compliance with the first draft. I can then show that the enforcement of the compulsory draft in 1864 was weaker the further away the men lived from a military camp.

I also look into changes in human capital investments and labour participation using data from the 1886 Statistical Yearbook. I use data on school attendance by gender for the 89 municipalities in 1886 to calculate out-of-school rates by municipality and by gender and their differences. From the same source, I also use data on female and male teachers to analyse the short-term effects of the war on female labour participation.

4.2 Contemporaneous Data

This paper uses data on IPV and female labour participation from a collection of surveys conducted by the Paraguayan Center for Population Studies (CEPEP), with technical assistance

[13] In Figure E.1, I show the spatial distribution of the municipalities in the 1870 Census and their respective male/female sex ratios. For the Caapucú municipality, I only observe the total female population without the distinction by age group, which does not allow me to calculate the gender imbalance for the fertile population. I then proxy this by using all males over all females instead.

[14] *Libertos* were the children of slaves born after 1943 who owed service to their mothers' masters until the age of 25 if they were male and 24 if they were female (Cooney, 1974).

from the U.S. Centers for Disease Control and Prevention, in 2004 and 2008 with a total of 13,777 women between 15 and 44 years old residing in Eastern Paraguay.[15]

The 2004 and the 2008 Paraguayan National Survey of Demography and Sexual and Reproductive Health (*Encuesta Nacional de Demografía y Salud Sexual y Reproductiva*) employed a multi-stage cluster sample based on the 2002 Census tracts. A total of 352 and 384 census tracts were randomly selected for the 2004 and 2008 surveys, respectively; a number of households, proportional to the size of the population, were randomly selected from each cluster, and one woman aged 15–44 years was randomly selected from each household for the interview. The individual response rate was 97.4 percent (2004) and 95.1 percent (2008), and the final, nationally representative sample consists of 7,321 and 6,540 women, respectively. Data were collected using a standardised questionnaire in face-to-face household interviews conducted from August to September 2003 and June to October 2008. An "intimate partner" is defined as a current or former partner in either a consensual or a marital union. IPV is classified as being either emotional, physical or sexual. The portion of the interview concerning IPV was conducted with women who had been in either a marital or a consensual union at some point in their lives and was only carried out when privacy was secured.[16]

I include four measures of IPV: (1) emotional, (2) physical, (3) sexual, and (4) any kind. Emotional IPV takes a value of 1 when the interviewed female has responded affirmatively to questions on whether she has been subjected to insults, public humiliations or threats. Physical IPV takes a value of 1 when the interviewed female has responded affirmatively to questions on whether she has been slapped, pushed, punched or kicked, threatened with an object and/or strangled or burned by her partner. Sexual IPV takes a value of 1 when the interviewed female has responded affirmatively to a question whether she has been forced to have sex against her will by her partner. If any of the above has been responded to affirmatively, a dummy for any kind of IPV takes a value of 1, and 0 otherwise.

The cartographic data which allows me to match the individual-level data with historical data was provided by the Cartography Department of the Department of Statistics, Surveys and Censuses (*Dirección General de Estadística, Encuestas y Censos*, DGEEC). From the 2002 Census, I am able to identify the location at the neighbourhood level of 6,668 out of 9,161 individuals who reported to have been in a marital or consensual union at some point in their lives and responded to the 2004 or 2008 surveys, while for the rest I am able to locate them within their corresponding municipality (see Table 4). By identifying their location, I am able to link

[15] The Paraguayan National Survey of Demography and Sexual and Reproductive Health is a survey with national coverage, but I excluded the observations that were not located in Eastern Paraguay due to the focus of this paper. For descriptives of the sample used, see Table 5.

[16] Before the interview, the respondents were told that their information would be handled with discretion.

them with the WID measure and historical data to examine whether the war has long-lasting effects on IPV.

5 Weighted Inverse Distance—Exogeneity and Validity

In this section, I describe the main explanatory variable of the analysis, *weighted inverse distance* (WID). I also show that it captures the impact of the war and I validate the implicit exogeneity assumption regarding the camps' location and sizing.

I proxy the impact of the war via the distance to military camps. In particular, my measure weights the inverse distance to all military camps by the size of the respective camps relative to the overall military force drafted in 1864.

$$WID_{jk} = \sum_{c=1}^{5} \frac{1}{DistToCamp_{cjk}} * SizeOfCamp_c,$$

where c are the five military camps, j is the contemporaneous neighbourhood where the females are located, and k is the municipality (both historical and contemporaneous).[17]

I use data on the location and size of the military camps from Thompson (1869). Distance to a camp is calculated using cartographical data provided by the DGEEC.

To examine whether the WID measure captures the impact of the war, I perform two analyses. Firstly, I check whether the WID measure correlates with post-war male/female sex ratios, male survival rates, and human capital levels and labour participation outcomes for females (both in absolute and relative terms). This analysis allows me to examine whether the war had an immediate effect on male scarcity and women's financial independence and relative status within the household. A more detailed discussion of the importance of these results can be found in Section 7.3. Secondly, I check whether municipalities with a higher WID measure exhibit lower levels of non-compliance with the first compulsory draft of 1864. This analysis allows me to test the assumption that the further away from a military camp a municipality was, the stricter the enforcement of the compulsory draft.[18]

[17] Before 1864, the army comprised of 28,000 males. In March, the military Camp at Cerro León was established where 30,000 men between the ages of 15 and 50 were recruited. From March to August 1864, recruits were drafted into camps at Encarnación (17,000), Humaitá (10,000), Asunción (4,000) and Concepción (3,000). Six thousand men died during this period due to diarrhea, dysentery, measles and smallpox (Thompson, 1869). See Table 4 for a list of distances of municipalities to the largest military camp (Cerro León) and Figure 2 for the list and map of the municipalities in 1864.

[18] A crucial premise of this analysis is Paraguay's lack of immigration after the war since one of the main characteristics of late 19th and early 20th-century demographics is European immigration to South America. However, Paraguay was the exception. In contrast to other countries in the region, before the war none of the three dictatorships promoted immigration. Moreover, under the first post-independence government (1811–1840), marriages with foreigners required the permission of the government and were usually denied. After the war, the liberal governments in Paraguay copied their counterparts in the region and started promoting immigration. However, unlike neighbouring countries such as Argentina or Brazil, Paraguay did not attract massive numbers

In Figure 4, I show a negative relationship between WID and male/female sex ratios and male survival rates once outliers are accounted for.[19] These short-term consequences of the war are key since conventional wisdom suggests that they have an impact on IPV that is transmitted across generations.[20] Relevant demographics return to natural levels after the end of the war (see Figure 5). As a result, any evidence on the long-term effect of the WID measure on IPV cannot be explained by the sex ratios or male survival but only by the gender norms regarding women's position within the family and society generated by those factors.[21]

In line with historical accounts by Warren and Warren (1978) and Capdevila (2010), one can conjecture that a social norm emerged after the war which made it more difficult for girls to get an education. However, in Figure 6a, I present a negative relationship between WID and girls' out-of-school rates—uneducated girls—and, in Figure 6b, I present a positive relationship between gender differences in out-of-school rates (OSR) and the WID measure. This implies that municipalities more severely affected by the war exhibit higher levels of female human capital, i.e. fewer uneducated females, and males are less likely to be more educated relative to females. This evidence suggests that there is more gender equality in education in the more severely affected municipalities.

Furthermore, in Figure 6c and Figure 6d, I show that there is a positive relationship between the WID measure and female teachers per child at school and a negative relationship between the difference of male and female teachers per child at school and the WID measure. Teaching was one of the few professions available to women after the war and the only profession available to males and females simultaneously. This suggests that females are more likely to work in the aftermath of the war in the municipalities that were more heavily affected and, therefore, also more likely to have an income. Moreover, this also suggests that, in municipalities more affected by the war, females replaced males in the only profession where that was possible.

In summary, the war had a considerable impact both in terms of demographics and socio-economic outcomes for females.

To check the assumption that males were less likely to be drafted the further away they were from a military camp, I analyse non-compliance with the first draft. Specifically, Using the WID measure, I examine whether municipalities with a higher number of males between the age of 15 and 50 in 1864 (19 and 54 in 1868) that, according to the lists of draft-eligible males of 1868

of immigrants. Most immigrants entering Paraguay settled in rural colonies and did not mix with the local population.

[19] The measure of male survival rates used is built on the assumption of unbiased sex ratios pre-war. Results also hold when an alternative female-biased sex ratio scenario is applied.

[20] For more detail regarding the strength of these relationships, see Appendix E.

[21] An analysis of the fertility patterns after the war would help us to understand how long it take for demographics to return to their natural rates. In Appendix G.1, I analyse the role of changes in fertility patterns after the war.

were not medically discharged, are further away from the military camps.

The number of males who were eligible in 1864 and appear on the lists of draft-eligible males of 1867/1868 as not having been medically discharged is low. However, in Figure 7, I present the negative relationship between the non-compliance rate and the WID measure (n = 38, ρ = -0.1656). This shows that a higher WID measure—lower distance to camps—negatively correlates with non-compliance. This evidence suggests that it became harder for the Paraguayan Government in 1864 to enforce the compulsory draft the further away and smaller a military camp was.

To examine whether the WID measure is likely to be exogenous, I analyse whether the camps were the optimal location and size. I use the population data from the 1846 Census. I generate as many points per municipality as its total population. I look for the size and location of camps, which minimises the average distance between each person and the closest camp. I run a K-medians clustering algorithm with five clusters corresponding to the five camps 15,000 times.[22] The algorithm gives me the optimal location of the camps. I calculate the size of each camp by counting the points that belong to each cluster. I then rescale the camp sites so that in total the number of drafted males matches historical records (64,000 males).

In Figure 8, I present the optimal locations and sizes of camps based on the 1846 Census collected by Williams (1976).[23] There is little overlap between the optimal location and size of camps and the actual locations reported by Thompson (1869). Both camps along the southern border of Paraguay were misplaced/missized given the population in the area. None of the camps properly covered the population of the eastern area of the country. Similarly, there should have been more camps given the population density in the centre of the country.

Overall, this confirms that the location and sizes of camps imposed by Solano Lopez were not optimal and, therefore, corroborates the assumption that camps' locations and sizes were exogenous.

6 The Long-Term Effects of the Paraguayan War on IPV

The main contribution of this paper is to quantify the long-lasting effects of a war on IPV and to study the role played by different channels in explaining the effect's persistence. I link current variations in reported IPV within Paraguay to the impact of the Paraguayan War in different municipalities of Eastern Paraguay.

To do this, I regress different measures of IPV—emotional, physical, sexual, and any kind of

[22]The algorithm only ensures that local minima will be found. In terms of distances, this algorithm uses the sum of absolute differences. Each centroid is the component-wise median of the points in that cluster. For the standard K-means clustering algorithm with the square of Euclidean distances, see Figure B.2.

[23]In Figure B.1, I present the same analysis but with census data collected by Kegler de Galeano (1976).

IPV—from the surveys on the WID measure corresponding to the neighbourhood in which the surveyed respondent resides. The model I develop is the following:

$$P(IPV_{ijk} = 1 \,|\, WID_{jk},\, X_{ijk}) = \mathbb{1}\left(\beta_1 WID_{jk} + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right). \tag{1}$$

IPV_{ijk} is a binary variable that takes value 1 if the individual i, in neighbourhood j, in municipality k has been subjected to IPV, WID_{jk} is the WID measure for neighbourhood j, in municipality k, X_{ijk} a set of covariates at the individual level, and ε_{ijk} is the individual error term clustered at the neighbourhood level.[24] I denote each observation both by neighbourhood i and municipality j, as I also perform part of the analysis with historical data which is at the municipality level.

I assume that observations are independent across groups (clusters) but allow for them to be correlated within groups, $E\left(\varepsilon_{ijk}\,\varepsilon_{gjk}\right) \neq 0$. This relaxes the usual requirement that observations should be independent at the individual level. Given this specification, I cluster the errors at the neighbourhood level.

Table 6 presents the marginal effects over the means of Equation (1). As a baseline, I present the direct effect of WID on different IPV outcomes—emotional, physical, sexual, and any kind of IPV—in each column from (1) to (4) clustered at the neighbourhood-level without any individual-level controls. The sample analysed comprises a total of 9,161 respondents in 503 clusters.[25] In columns (5) to (8), I include individual-level controls. Individual-level controls include the age of the respondent, area of residence—urban or rural—, and whether the respondent speaks Spanish. All coefficients on IPV are positive, statistically significant and largely unaffected by the inclusion of individual-level controls. I also report the mean and standard deviation of the outcomes analysed.

An increase of one standard deviation in the mean WID measure, which is equal to 0.027, increases the likelihood of a female being subjected to any kind of IPV by 3.06 percentage points. In column (8), I include individual-level controls which reduce this likelihood to 1.89 percentage points or 5.54 percent of the sample mean. Similar coefficients can be found for the more specific types of violence. In the case of emotional violence, an increase of one standard deviation in the mean WID measure increases the likelihood of a female being subjected to emotional IPV by 1.66 percentage points or 4.87 percent of the sample mean. Similarly, for physical violence, the increase is 0.96 percentage points (5.64 percent of the sample mean), while for sexual violence, the corresponding figure is 0.68 percentage points (11.03 percent of the sample mean). All these

[24] Even for the observations I cannot geographically locate at the neighbourhood level within a municipality, a neighbourhood identifier is still available. I cluster the observations by using this neighbourhood identifier, and I use the average of the WID measures for all neighbourhoods in the relevant municipality.

[25] In the case of sexual IPV responses, the final sample is 9,160 in 503 clusters.

results include individual-level controls. Since a more detailed discussion about individual-level covariates can be found in Section 8 for the remainder of the main analysis, I include these individual-level controls.

To understand the magnitude of this effect, I analyse females from different ends of Eastern Paraguay. Based on the OLS estimates, a change from the lowest (0.002) to the highest (0.391) value of the WID measure increases the likelihood of a female being subjected to any kind of IPV by 29.25 percentage points (see Appendix C). This magnitude is substantial, as it is almost the same as the estimated percentage of women worldwide who have been victims of IPV at some point during their lifetime (30 percent; García-Moreno *et al.*, 2013). These results suggest that, more than 130 years later, the areas where the effect of the war was the highest are more likely to exhibit substantially worse IPV outcomes over women's lifetimes than areas where the effect of the war was less severe.

7 Transmission Channels

Paraguayan demographics were severely affected by the war. However, these changes in demographics were a temporary shock (see Figure 5). As a consequence, any evidence on the long-term effect of the war on IPV cannot be explained by long-lasting changes in demographic variables such as sex ratios or male survival rates. However, these long-term effects of the war might be explained by the gender norms that emerged from this demographic shock. I then analyse the roles of two opposing channels. Firstly, I examine whether male scarcity enabled females' labour participation and, consequently, females' financial independence, which might, in turn, lead to a reduction in IPV. Secondly, I examine whether male scarcity increased relative female labour participation and relative female human capital accumulation, thus improving the relative status of females within the household and, consequently, leading to higher levels of IPV. I will refer to these channels as the financial independence channel and the relative status channel, respectively.

To corroborate whether any of these channels are at play, I analyse the relationship between demographics and gender norms emerging after the war and current levels of IPV. The demographics include female-biased sex ratios and male survival rates. I then examine the role of gender differences in historical human capital and labour participation.[26]

[26]In Appendix G.2, I analyse the role of fertility after the war in the proposed transmission channels.

7.1 The Role of Demographics

Female-Biased Sex Ratios The war left Paraguay with four to five females per male, which defined it as the *'country of women'* (Whigham and Potthast, 1999). Female-biased sex ratios can have a persistent effect as they influence gender norms. In contexts of female-biased sex ratios, males improve their position in the marriage market (Abramitzky *et al.*, 2011) and females replace them in the labour market (Goldin, 1991; Acemoglu *et al.*, 2004; Goldin and Olivetti, 2013). Data limitations preclude me from testing the first finding.[27] Institutional changes where females are deemed unfit to perform certain economic activities or hold certain roles within society would prevent this second relationship from holding (Capdevila, 2010). This would result in women having less financial independence and a poorer status within the household, which, in turn, is associated with higher and lower levels of IPV, respectively (Macmillan and Gartner, 1999; Aizer, 2010; Abramsky *et al.*, 2019). However, in Section 5, I show an increase in female labour participation after the war despite institutional barriers. We would expect this to have the opposite outcome. Females with more financial independence are allowed to negotiate change within or leave an abusive relationship and, consequently, are less prone to IPV. Women making more of a financial contribution to the household improve their relative status within the household, which is perceived as a threat by their partner, and this is usually associated with higher risks of IPV since males' inability to provide becomes a cause of conflict.

I explore whether female-biased sex ratios explain the long-lasting effects of the war on IPV. To do so, I perform two analyses. Firstly, I examine whether the female-biased sex ratio has a long-term effect on contemporary levels of IPV where the sign of the estimate would validate one of the channels described. If the financial independence channel dominates, I should observe a negative relationship between historical female-biased sex ratios and current levels of IPV. Otherwise, the relative status channel dominates. Secondly, I analyse whether the effect of WID on IPV is absorbed once I control for the female-biased sex ratios.

To see whether the female-biased sex ratios after the war explain current levels of IPV and the direction of the effect I use the following empirical specification:

$$P(IPV_{ijk} = 1 \,|\, \text{MFR}_k,\, X_{ijk}) \quad = \quad \mathbb{1}\left(\beta_1 \,\text{MFR}_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right), \tag{2}$$

where MFR_k male/female ratio, i.e. the ratio of men to women, aged 12-50, in municipality k for the year 1870. ε_{ijk} are individual error terms clustered at the municipality-level. Similar to the main specification, the outcomes are expressed in binary form.

I also analyse whether there the male/female sex ratio has a long-term impact on IPV and

[27] The main limitation is that the marriage market data I have access to is too incomplete for me to perform this analysis

whether this effect absorbs the effect of WID on IPV.

$$P(IPV_{ijk} = 1 \,|WID_{jk},\, \text{MFR}_k,\, X_{ijk}) \quad = \quad \mathbb{1}\left(\beta_1 WID_{jk} + \beta_2 \,\text{MFR}_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right). \quad (3)$$

However, since the 1870 Census is only available for 33 observations, I also perform the analysis using data from the 1886 Census. With the 1886 Census, I distinguish people according to their age and participation in the war. I perform the analysis only for the people who were born before the war and were exposed to compulsory drafting (ages 31+ in 1886, 12+ in 1868).

In Table 7 Panel (A) and (C), I present the marginal effects of the male/female sex ratio in 1870 and 1886—respectively—on IPV. Almost all effects are positive and significant. An increase in one standard deviation of the male/female ratio in 1886, which is equal to 0.119, increases the likelihood of a female being subjected to any kind of IPV by 1.86 percentage points. These results suggest that the higher the male/female ratio—the less female-biased the sex ratios—the more likely it is for a female to be subjected to IPV. This suggests that the more female-biased the sex ratio, the more financially independent females are, the less likely they are to be subjected to IPV, as women who are more financially independent are more likely to be able to negotiate within the potentially abusive relationship or to leave. In any of these cases, IPV is transmitted across generations (Pollak, 2004).

In Table 7 Panels (B) and (D), I analyse whether the effect of the war on IPV I measured in Table 6 is through male/female sex ratios. As a benchmark, I present marginal effects estimates of WID on IPV restricting the sample to the women in municipalities for which I have such historical data. The coefficients in column (4) of Panels (B) and (D) show that one standard deviation increase in WID—0.037 (1870) and 0.015 (1886)—increases the females' likelihood of being subjected to any kind of IPV by 2.60 and 1.46 percentage points, respectively. These estimates are reduced to 2.35 and 0.93 when the male/female sex ratio is included. The inclusion of these controls absorbs 9.40 percent and 36.58 percent of the effect, suggesting that 9.40 percent and 36.58 percent of the effect of the war on IPV arises from an effect of female-biased sex ratios.[28] However, I show in the subsequent sections that the historical persistence of the war not only arises from female-biased sex ratios, as conventional wisdom suggests. Moreover, despite absorbing part of the main effect—of WID on IPV—the financial independence channel corroborated by this evidence is outweighed by the opposing channel (see Section 7.3).

[28] The reason why the effect of WID on IPV is absorbed by the inclusion of the female-biased sex ratios regressor, despite the fact that the relationship of WID and female-biased sex ratios with IPV have opposite signs, is because the regressor used to capture female-biased sex ratios is male/female sex ratios. The sign of the relationship of WID and male/female sex ratios with IPV is the same, i.e. positive. The inclusion of male/female sex ratios thus absorbs the effect of WID on IPV, and therefore, the female-biased sex ratios do the same.

Male Survival Rates In a context where females are considered unfit to perform any roles but agriculture and home production, the male loss of life can deeply affect the social structure. In this scenario, the relative male scarcity would not drive the changes in the social structure—since females cannot replace males in certain positions—but the absolute loss of male life will. Male survival rates (MSR) are appropriate measures of absolute male scarcity; higher MSR implies a lower degree of male scarcity and vice versa. Before the war, Paraguayan women were heads of households, meaning they held a position of power and authority (Ganson, 1990). After the war, females were relegated to subsistence activities. If females are not allowed to perform certain economic activities required given the size of a municipality's population, those positions might remain vacant until a man can fill them. Moreover, in these contexts, females were/are less likely to be financially independent—associated with higher levels of IPV—and less likely to contribute more to the household—associated with lower IPV. However, after the war, there was an increase in female labour participation, both in absolute terms and relative to male labour participation (see Section 5). If male survival rates are low—the absolute loss of male lives is severe—female labour participation would increase as predicted by the literature despite the institutional barrier. Females would perform traditionally male tasks making them more likely to be financially independent—lower IPV—and more likely to make a larger contribution to the household, which improves their status within that household—higher IPV. If the financial independence channel dominates, I should observe a positive relationship between male survival rates and current levels of IPV. Otherwise, the relative status channel dominates.

I then examine whether MSR has a direct long-term effect on IPV and its sign to check whether it corroborates any of the transmission channels. To do so, I regress

$$P(IPV_{ijk} = 1 \,|\, MSR_k,\, X_{ijk}) \quad = \quad \mathbb{1}\left(\beta_1\, MSR_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right) \tag{4}$$

where MSR_k are male survival rates, and k denotes an assumption regarding pre-war sex ratios, (1) unbiased or (2) female-biased.[29]

I also examine whether the effect of WID on IPV is absorbed once I control for MSR. I

[29] I calculate the adult male population in 1846 under two scenarios (1) unbiased sex ratios before the war and (2) the worst female-biased sex ratios for which the literature provides evidence (44 percent of males). I project the adult male population of 1867/1868—depending on the year of the record—by using the adult population by municipality from Williams (1976) and the calculated growth rate between the 1793 Census (Kleinpenning, 2003) and the 1846 Census. In the cases where no information about a municipality is available in the 1846 Census (i.e., Belen), I use the last available census shown in Kleinpenning (2003). Similarly, in the cases where there is no information on a municipality available in 1793, I use the growth rate from Whigham and Potthast (1999) of 1.75 percent per year. I divide the total number of draft-eligible males per municipality by the projected populations. I end up with two measures for each municipality, one corresponding to the case where I assumed unbiased pre-war sex ratios and one to the case where I assumed Paraguay had a severe—in terms of the literature—female-biased sex ratio before the war.

estimate the following:

$$P(IPV_{ijk} = 1 \,|\, WID_{jk}\, MSR_k,\, X_{ijk}) \quad = \quad \mathbb{1}\left(\beta_1\, WID_{jk} + \beta_2\, MSR_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right). \quad (5)$$

In Table 8 Panel (A), I present the marginal effects of MSR on IPV assuming unbiased pre-war sex ratios. All estimates of IPV are negative, significant and largely unaffected by a change in the assumption regarding pre-war bias in the sex ratios (see Table F.1).

According to these results, an increase in one standard deviation of $MSR_{\text{No GI}}$ in 1868 (0.077) reduces the likelihood of a female being subjected to any kind of IPV today by 1.34 percentage points. These results suggest that there are negative long-term effects of male survival rates of the Paraguayan War on IPV. The higher the male survival rate in a municipality, the less likely it is that women will be subjected to any kind of violence 138 years after the end of the war. This evidence validates the relative status channel.

In Panel (B), I present logit estimates for the effect of WID on IPV controlling for male survival rates and unbiased pre-war sex ratios. As a baseline, in columns (1) to (4), I present the estimates of the main analysis for the restricted sample. The coefficients of the WID measure are non-significant in all specifications. This suggests that the effect of the war on IPV is driven by the observations excluded from the sample for data availability reasons. However, in the specifications presented in columns (5) to (8), I present results that suggest that male survival rates are a transmission channel, since the effect of $MSR_{\text{No GI}}$ on any kind of IPV becomes non-significant once I include the WID measure in the analysis. Unfortunately, the data limitations presented prevent me from quantifying the extent to which the absolute loss of male life channel affectscontemporary levels of IPV. Nevertheless, in light of the main result (see Section 7.3), I argue that the evidence presented here suggests that the relative status is the main channel driving the overall long-term effect.

7.2 The Role of Human Capital and Labour Participation

School Attendance Since changes in demographics are not persistent, long-term effects cannot be purely driven by them. I then investigate whether the long-run effect of the Paraguayan War on IPV can be explained by the transmission of specific attitudes towards females. I focus on human capital investments in males, both in absolute and relative terms with respect to their female counterparts, since males' lack of education—both in absolute and relative terms—has an effect on the perception of the relative status of the members of a household, which is a known risk factor of IPV.

To quantify the gender differences in human capital investments after the war, I use the data on children out of school by gender provided in the 1886 Statistical Yearbook. I use the total

number of boys and the total number of girls out of school to calculate the out-of-school rates (OSR) for both genders separately. I also construct a variable that represents how many boys out of school there are per girl out of school. With this variable, I aim to capture the lack of education of boys relative to girls. Children out of school means children who are not enrolled in any school in 1886. These children are typically illiterate.

$$OSR^{Boys} = \frac{\#\text{ Boys in School}}{\#\text{ Boys}} \tag{6}$$

$$OSR^{Girls} = \frac{\#\text{ Girls in School}}{\#\text{ Girls}} \tag{7}$$

$$OSR^{Ratio} = \frac{OSR^{Boys}}{OSR^{Girls}}. \tag{8}$$

Historians have pointed out that females were expected to be dedicated only to subsistence activities after the war while the few remaining males were dedicated to rebuilding the institutional structure of the country. Consequently, the return on female human capital is lower. However, these differences in returns to education did not hinder girls' human capital after the war (see Section 5). Similar to contexts where females make a bigger financial contribution, when males are less educated than their partners IPV is also more prevalent (Macmillan and Gartner, 1999).

To identify whether gender differences in schooling corroborate the relative status channel, I analyse whether the three measures of out-of-school rates have a long-run effect on IPV by estimating the following specification:

$$P(IPV_{ijk} = 1 \,|\, OSR_k^m,\, X_{ijk}) = \mathbb{1}\left(\beta_1\, OSR_k^m + X'_{ijk}\gamma \geq \varepsilon_{ijk}\right), \tag{9}$$

where OSR_k^m is one of three measures of out-of-school rates in municipality k. I use out-of-school rates for girls, for all children, and the ratio between girls and boys out of school, $m \in \{Girls, Boys, Ratio\}$.

I then examine whether the inclusion of the out-of-school control absorbs the effect of WID on IPV. To do so, I use the following two empirical specifications:

$$P(IPV_{ijk} = 1 \,|\, WID_{jk},\, OSR_k^m,\, X_{ijk}) = \mathbb{1}\left(\beta_1\, WID_{jk} + \beta_2\, OSR_k^m + X'_{ijk}\gamma \geq \varepsilon_{ijk}\right) \tag{10}$$

In Table 9 Panels (A), (C) and (E), I examine the long-term effects of out-of-school rates—both absolute and relative—on IPV. Almost all gender-specific coefficients are non-significant. However, coefficients associated with the gender differences in out-of-school rates are positive and significant, which suggests that the lower the historical gender differences in human capital, the higher the current levels of IPV.[30]

[30] A higher ratio implies lower differences since the OSR were much higher for girls than for boys.

In Table 9 Panels (B), (D) and (F), I analyse the effect of WID on IPV, controlling for the three measures of out-of-school rates. I find that the WID coefficients change significantly on inclusion of OSR^{Boys} and OSR^{Ratio}. The inclusion of each of these variables reduces the effect of an increase of one standard deviation in WID (0.028) from 1.71 percentage points to 1.63 and 1.44 percentage points, respectively. These reductions represent 4.68 percent and 15.79 percent of the overall effect. These results suggest that the relative education of males plays a role as a transmission channel. This evidence corroborates the hypothesis that the long-term effects of the war are transmitted through a particular type of gender norm. In municipalities where males are less educated, relative to their female counterparts, the effects of the war in terms of IPV resonate in the long run.[31]

Female Labour Participation After the war, Paraguayan females were declared unfit to participate in the labour market (Capdevila, 2010). One exemption to this were teachers. The few available professions for females outside the household, according to the 1886 Statistical Yearbook, were the following: laundress, seamstress, *plachadoras* (women who iron clothes), teachers and midwives. However, the only available profession for both males and females simultaneously was teaching. In 1886, 146 females were teachers in Paraguay compared to 300 of their male counterparts.

In Section 5, I show that in municipalities more severely affected by the war, females replaced males in the only profession where they were able to do so. I then examine whether female labour participation after the war has a direct long-term effect on IPV and whether the sign of the estimates would allow me to infer which channel dominates. If the direct effects are positive, then they would corroborate that municipalities that saw an increase in female labour participation—both in absolute and relative terms—generated gender norms that enabled IPV. Otherwise, they would corroborate that in municipalities where female labour participation increased after the war, the emerging gender norm was that females were financially independent, which implies that women were/are less likely to be subjected to IPV.

I also analyse whether female labour participation after the war can explain the long-term effects of the war on IPV. Similar to the analysis presented in previous sections, I compare the estimates of WID in the restricted sample for which the historical data is available with and without controlling for female labour participation, in absolute and relative terms.

I calculate the number of teachers per child attending school for both genders and examine whether female labour participation—both in absolute and relative terms with respect to males—has an effect on current levels of IPV and whether the effect of WID on IPV can be explained

[31] If OSR^{Girls} is included, WID coefficients remain largely unaltered. This suggests that girls' lack of education is not what is captured by the WID coefficients.

by female labour participation. I then regress

$$P(IPV_{ijk} = 1 \,|\, Z_k,\, X_{ijk}) \;=\; \mathbb{1}\left(\beta_1\, Z_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right). \tag{11}$$

$$P(IPV_{ijk} = 1 \,|\, WID_{jk},\, Z_k,\, X_{ijk}) \;=\; \mathbb{1}\left(\beta_1\, WID_{jk} + \beta_2\, Z_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right). \tag{12}$$

where $Z = \{FTPC,\, (MTPC - FTPC)\}$ and $FTPC$ and $MTPC$ are the number of female and male teachers per child attending school, respectively.

In Table 10, I present the estimates for Equations (11) and (12) for both outcomes. In Panel (A) and (C), I provide the estimates for the effect of FTPC and (MTPC-FTPC) on IPV, respectively. All estimates presented in Panels (A) are non-significant. In Panel (B), the coefficients associated with emotional and any kind of IPV are negative and significant. This suggests that there is a positive long-term effect of the gender differences in labour participation on emotional IPV. Moreover, this sign suggests that in municipalities with lower gender differences in labour participation, after the war gender norms arose allowing females to make larger financial contributions to the household, thus making them more likely to be subjected to IPV and transmit it to future generations.

In Panels (B) and (D), I provide estimates of the effects of WID on IPV controlling for FTPC and (MTPC-FTPC), respectively. I show that the estimates for the effect of WID on IPV are largely unaltered by the inclusion of the female labour participation regressor (FTPC). These results suggest that the effect of WID on IPV does not occur through changes in female labour participation in absolute terms after the war. However, the inclusion of (MTPC-FTPC) reduces the effect of an increase in one standard deviation of WID (0.028) from 1.71 percentage points to 1.57 percentage points. This reduction represents 8.19 percent of the overall effect of the war on current levels of IPV. Meanwhile, the coefficients associated with (MTPC-FTPC) remain largely unaltered. Similar to the results presented on the roles of male survival rates and out-of-school rates, these results corroborate that gender differences in labour participation after the war play a role as part of the relative status channel of the effect of the war on IPV.

7.3 Discussion

In this paper, I have discussed and shown the mechanics behind the long-term effect of the war on IPV. As demographics are not persistent, long-term effects cannot be purely driven by them. I have shown that the gender norms that emerged in the aftermath of the war—and the subsequent temporary demographic shock—can cause long-lasting effects as these are transmitted across generations. Among many transmission channels that could be at play, I analysed two opposing channels that reflect some of these emerging norms, the financial independence channel and the

relative status channel. Figure 9 depicts these transmission mechanics. The use of the signs of the statistically significant coefficients sheds light on which channel dominates.

I found evidence of a direct and negative long-term effect of male survival rates on levels of IPV. This suggests that the absolute loss of male life enabled females' relative labour participation and human capital. This improved women's status within the household, a risk factor for IPV, which corroborates the relative status channel.

I also found that historical gender differences in labour participation have a negative effect on IPV in the long run. This implies that lower gender differences in labour market participation is compatible with a higher likelihood of females making a relatively larger contribution to the household, and therefore with a higher likelihood of being subjected to IPV. Moreover, results associated with the gender differences in historical lack of education are in line with a positive effect of relative status within the household on IPV. In municipalities where there is a higher rate of uneducated boys relative to girls, there is a higher likelihood of IPV in the long run. Similar to the case where females contribute more to the household, males being less educated than their partners is an IPV risk factor. Once I include these specific regressors, they absorb 8.19 percent and 15.79 percent of the main effect, respectively. These results are evidence that female-biased sex ratios alone do not explain the long-lasting effects of the war on IPV.

These results are in line with the idea of traditional gender roles where the male is considered the breadwinner. In the context of this paper, the threat of losing this traditional role due to a demographic shock reducing the gender differences in the labour market is shown to be a risk factor of IPV that is transmitted over time. However, income is one of the many status inconsistencies that are usually conceptualised in the literature. Other status inconsistencies presented are education and occupation (Macmillan and Gartner, 1999).

Additionally, I have shown the importance of an alternative and less dominant channel, namely the financial independence channel. I have shown that 36.58 percent of the long-term effect of WID on IPV is absorbed by the inclusion of the female-biased sex ratio regressor. In municipalities more severely affected by the war, the emerging female-biased sex ratio increased female labour participation despite institutional steps that declared them unfit to do so. This allowed females to be financially independent, which improved their negotiation abilities within the marriage or their chances of being able to leave an abusive relationship. Overall, this reduced the likelihood of females being subjected to IPV and transmitting it to future generations.

I have shown evidence that effects present in the literature persist in the very long term. Women in municipalities with higher historical female financial independence are less likely to be subjected to IPV and women in municipalities where females have historically had a better status within the household—in terms of relative human capital and labour participation—are

more likely to be subjected to IPV. Given that the war has a positive long-term effect on IPV, the relative status channel outweighs the financial independence channel.

8 Robustness Checks

A concern regarding the main results presented in Section 6 is the possible underreporting of IPV. By interpreting these results as a lower bound for the long-term effects of the war on IPV today I aim to alleviate these concerns.

An additional concern is an alternative interpretation of these results, as the Paraguayan War could have led to changes that affected all types of interpersonal violence, making society more violent in general. In light of this alternative account, I analyse the long-term effects of the war on interpersonal crime using administrative data on personal crimes per 100 inhabitants (homicides, child abuse, injuries/assaults, rape and family violence). In this analysis, I control for measures of poverty and inequality—Gini, average family income, poverty (%) and poverty gap—since income is considered to protect females from IPV. I also control for the current sex ratios at the municipality level, since I want to isolate the historical effects from a potential contemporaneous effect.[32]

In Table 11, I show evidence contrary to this alternative account. I show positive and significant coefficients of the long-term effects of the war on personal crimes related to gender, rape and family violence. Furthermore, I show insignificant coefficients of the effects of the war on personal crimes not directly related to gender. Consistent with the gender norms emerging in the aftermath of the war, these results confirm that the long-term effects of the war on gender norms are not driven by an overall increase in violence in Paraguay. Moreover, these results remain unaltered by the inclusion of the demographic, inequality and poverty controls.

In Appendix C, I present additional robustness checks. Firstly, I check whether a different functional form of the distance to the military camps would alter the results. The results still hold when the measure used is the weighted distance squared.[33] Secondly, I check whether provincial institutional differences would alter the results. To do so, I add province fixed effects and the results remain unaltered. Thirdly, I check whether the results are robust to a change in the clustering level from neighbourhood to a historical municipality. The significance of the results is unaltered by this change. Lastly, a potential concern is the effects of current levels of female human capital and labour participation on IPV. To address this I include education and labour participation controls. Despite the potential endogeneity of these variables, since the

[32]The analysis is performed at the municipality level except for Asunción, where it is performed at the neighbourhood level.

[33]The functional form used is $WID_{jk}^{squared} = \sum_{c=1}^{5} \frac{1}{(DistToCamp_{cjk})^2} * SizeOfCamp_c$,.

shock itself led to higher levels of female human capital and labour participation, the inclusion of these controls is a useful robustness check. Results remain largely unaltered. They only become insignificant with the inclusion of the working outside the household regressor, conditional on the respondent working. However, since these controls are highly endogenous, I exclude them from the rest of the analysis.

In addition and to validate the relevance of my findings, I show that female labour participation is higher in municipalities more severely affected both in the aftermath of the war—16 years later—and more than 130 years later (see Appendix D). This is consistent with the literature on the short- and long-term effects of female-biased sex ratios (Goldin, 1991; Acemoglu *et al.*, 2004; Goldin and Olivetti, 2013; Teso, 2018). This implies that the Paraguayan case can inform the debate on how demographic shocks affect gender norms.

9 Conclusion

This paper shows the persistent effects of a historical shock that affects demographics and gender norms on IPV. Today, more than 100 years later, the impact of the *Paraguayan War* still resonates. I show that females who live in areas that were historically more severely affected by the war are more likely to be subjected to IPV. The magnitude of this increase is 1.89 percentage points if the WID measure increases by one standard deviation. This implies that IPV is 5.54 percent more likely than average in municipalities that were more severely affected by the war in the long run.

The findings presented in this paper show the importance of historical events in understanding the determinants of gender norms, their long-term persistence and consequences. The gender norms that emerged after the demographic shock caused by the war have enabled violence against women and, specifically, IPV. Using a historical natural experiment such as the Paraguayan War allows us to understand the roots of this type of violent event, enabling the development of economic policies against it.

References

Abramitzky, R., Delavande, A. and Vasconcelos, L. (2011). Marrying up. the role of sex ratio in assortative matching. *American Economic Journal. Applied Economics*, **3** (3), 124–57.

Abramsky, T., Lees, S., Stöckl, H., Harvey, S., Kapinga, I., Ranganathan, M., Mshana, G. and Kapiga, S. (2019). Women's income and risk of intimate partner violence: secondary findings from the maisha cluster randomised trial in north-western tanzania. *BMC public health*, **19** (1), 1108.

Acemoglu, D., Autor, D. H. and Lyle, D. (2004). Women, war, and wages. the effect of female labor supply on the wage structure at midcentury. *Journal of Political Economy*, **112** (3), 497–551.

Aizer, A. (2010). The gender wage gap and domestic violence. *American Economic Review*, **100** (4), 1847–59.

Alesina, A., Brioschi, B. and Ferrara, E. L. (2016). *Violence against women. a cross-cultural analysis for Africa*. Tech. rep., National Bureau of Economic Research.

—, Giuliano, P. and Nunn, N. (2013). On the origins of gender roles. women and the plough. *The Quarterly Journal of Economics*, **128** (2), 469–530.

Alix-Garcia, J., Schechter, L., Valencia Caicedo, F. and Zhu, S. J. (2020). Country of women? repercussions of the war of the triple alliance in paraguay. *work in progress presented at Workshop in Gender and Economics, University of Luxembourg*.

Amaral, S. and Bhalotra, S. (2017). Population sex ratios and violence against women: The long-run effects of sex selection in india. *Available at SSRN 3055794*.

Anderberg, D., Rainer, H., Wadsworth, J. and Wilson, T. (2016). Unemployment and domestic violence: Theory and evidence. *The Economic Journal*, **126** (597), 1947–1979.

Barro, R. J. (2001). Human capital and growth. *American economic review*, **91** (2), 12–17.

Becker, G. S. (1973). A theory of marriage. part i. *Journal of Political Economy*, **81** (4), 813–846.

—, Murphy, K. M. and Tamura, R. (1990). Human capital, fertility, and economic growth. *Journal of Political Economy*, **98** (5, Part 2), S12–S37.

Benhabib, J. and Spiegel, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary economics*, **34** (2), 143–173.

Bértola, L. and Williamson, J. (2017). Has latin american inequality changed direction. *World Bank Publications*.

Bethmann, D. and Kvasnicka, M. (2013). World war ii, missing men and out of wedlock childbearing. *The Economic Journal*, **123** (567), 162–194.

Boggiano, B. (2020). New evidence on the demographics of the paraguayan war. *Working Paper*.

Brainerd, E. (2017). The lasting effect of sex ratio imbalance on marriage and family. evidence from world war ii in russia. *Review of Economics and Statistics*, **99** (2), 229–242.

Capdevila, L. (2010). *Una guerra total. Paraguay 1864-1870. ensayo de historia del tiempo presente*. Centro de Estudios Antropológicos de la Universidad Católica (CEADUC).

Card, D. and Dahl, G. B. (2011). Family violence and football: The effect of unexpected emotional cues on violent behavior. *The Quarterly Journal of Economics*, **126** (1), 103–143.

Castillo, M. (2011). Violencia de pareja en el paraguay según la encuesta nacional de demografía y salud sexual y reproductiva 2008. *Revista Latinoamericana de Población*, **5** (9), 27–48.

— and Melian, M. (2015). Control reproductivo en mujeres que sufren violencia de pareja en paraguay.

Cooney, J. W. (1974). Abolition in the republic of paraguay: 1840–1870. *Jahrbuch für Geschichte Lateinamerikas Anuario de Historia de America Latina*, **11** (1), 149–166.

Dell, M. (2010). The persistent effects of peru's mining mita. *Econometrica*, **78** (6), 1863–1903.

Fernández, R., Fogli, A. and Olivetti, C. (2004). Mothers and sons: Preference formation and female labor force dynamics. *The Quarterly Journal of Economics*, **119** (4), 1249–1299.

Ganson, B. J. (1990). Following their children into battle: women at war in paraguay, 1864-1870. *The Americas*, **46** (3), 335–371.

García-Moreno, C., Pallitto, C., Devries, K., Stöckl, H., Watts, C. and Abrahams, N. (2013). *Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence*. World Health Organization.

Giordano, V. (2013). La sanción de la capacidad civil plena de la mujer en los países del cono sur, 1945-1990: Una propuesta de análisis del fenómeno legal. *Latin American Research Review*, pp. 25–43.

Goldin, C. and Olivetti, C. (2013). Shocking labor supply. a reassessment of the role of world war ii on women's labor supply. *American Economic Review*, **103** (3), 257–62.

Goldin, C. D. (1991). The role of world war ii in the rise of women's employment. *The American Economic Review*, pp. 741–756.

Grosjean, P. and Khattar, R. (2019). It's raining men! hallelujah? the long-run consequences of male-biased sex ratios. *The Review of Economic Studies*, **86** (2), 723–754.

Guiso, L., Sapienza, P. and Zingales, L. (2016). Long-term persistence. *Journal of the European Economic Association*, **14** (6), 1401–1436.

Ishida, K., Stupp, P., Melian, M., Serbanescu, F. and Goodwin, M. (2010). Exploring the associations between intimate partner violence and women's mental health: evidence from a population-based study in paraguay. *Social Science & Medicine*, **71** (9), 1653–1661.

Kegler de Galeano, A. (1976). Alcance histórico-demográfico del censo de 1846. *Revista paraguaya de sociología*, **13** (35), 71–121.

Kleinpenning, J. M. (2003). *Paraguay 1515-1870: a thematic geography of its development*, vol. 1. Iberoamericana.

Macmillan, R. and Gartner, R. (1999). When she brings home the bacon: Labor-force participation and the risk of spousal violence against women. *Journal of Marriage and the Family*, pp. 947–958.

Molm, L. D. (1997). Risk and power use: Constraints on the use of coercion in exchange. *American Sociological Review*, pp. 113–133.

Moore, A. M., Frohwirth, L. and Miller, E. (2010). Male reproductive control of women who have experienced intimate partner violence in the united states. *Social science & medicine*, **70** (11), 1737–1744.

Ñopo, H. (2012). *New century, old disparities: Gender and ethnic earnings gaps in Latin America and the Caribbean*. World Bank Publications.

Nunn, N. (2009). The importance of history for economic development. *Annu. Rev. Econ.*, **1** (1), 65–92.

— (2014). Historical development. In *Handbook of economic growth*, vol. 2, Elsevier, pp. 347–402.

Pastore, M. and Seiglie, C. (2016). Differential industrial organization of natural resource production and trade taxation and major international conflicts in the western hemisphere.

Petrozziello, A., Menon, J., Greenberg, M. and Brucke, S. (2011). *PARAGUAY GENDER ASSESSMENT 2011*. Tech. rep., USAID.

Pollak, R. A. (2004). An intergenerational model of domestic violence. *Journal of Population Economics*, **17** (2), 311–329.

Reber, V. B. (1988). The demographics of paraguay: A reinterpretation of the great war, 1864-70. *The Hispanic American Historical Review*, **68** (2), 289–319.

— (1999). A case of total war: Paraguay, 1864–1870. *Journal of Iberian and Latin American Research*, **5** (1), 15–40.

Robles, M. and Santander, H. (2012). Paraguay: Pobreza y desigualdad de ingresos a nivel distrital. *sites. google. com/site/roblesmarcos/Mapa_Pobreza_Paraguay_MR_HS. pdf, retrieved*, **7**.

Roth, A. and Slotwinski, M. (2020). Gender norms and income misreporting within households. *ZEW-Centre for European Economic Research Discussion Paper*, (20-001).

Teso, E. (2018). The long-term effect of demographic shocks on the evolution of gender roles: Evidence from the transatlantic slave trade. *Journal of the European Economic Association*, **17** (2), 497–534.

Thompson, G. (1869). *The War in Paraguay. With a Historical Sketch of the Country and Its People and Notes Upon the Military Engineering of the War*. Longmans, Green, and Company.

UN Women (2016). The economic costs of violence against women.

Valencia Caicedo, F. (2018). The mission: Human capital transmission, economic persistence, and culture in south america*. *The Quarterly Journal of Economics*, p. qjy024.

Villanueva, J. (2001). Las primeras etapas de la politica aduanera argentina. *Instituto Torcuato Di Tella*.

Warren, H. G. and Warren, K. F. (1978). *Paraguay and the Triple Alliance. the postwar decade, 1869-1878*, vol. 44. University of Texas Press.

Whigham, T. L. and Potthast, B. (1999). The paraguayan rosetta stone. new insights into the demographics of the paraguayan war, 1864-1870. *Latin American Research Review*, pp. 174–186.

Williams, J. H. (1976). Observations on the paraguayan census of 1846. *The Hispanic American Historical Review*, **56** (3), 424–437.

Tables

Table 1: Female-Biased Sex Ratios in the Literature

Historical Event	Date	Description	Male/Female Ratio
*Slave Trade**			
	late C18th	West Africa, whole population	0.70
	late 1770s	Angola, whole population	0.65
	late 1770s	Angola, adults	0.50
*Paraguayan War***			
	1870	Eastern Paraguay, whole population	0.540
	1870	Eastern Paraguay, fertile population	0.338
	1886	Eastern Paraguay, draft age population	0.306
*Post-War Russia****			
	1959	Age 18–44 (year of birth 1915–1941)	0.796

* General estimates provided by Manning (1990) and Miller (1988), retrieved from Teso (2018),

** Data by municipality retrieved from Whigham and Potthast (1999) and the 1886 Statistical Yearbook,

*** Data from 1959 by single year of age retrieved from Brainerd (2017).

Table 2: Historical Data Sources

Type	Date	Level	Description	Source
Population	1846	Municipality (69)	Total population stratified by age groups*	Williams (1976)
Population	1870	Municipality (34)	Total population stratified by gender and age groups*	Whigham and Potthast (1999)
Population	1886	Municipality (88)	Total population stratified by gender and age groups*	Statistical Yearbook of the Paraguayan Republic**
Military camps	1864	–	Location and sizes	Thompson (1869)
Draft eligible males	1868	Individual (11081)	Total male population (age 12+) in 45 municipalities	Own collection***
Out-of-school rates	1886	Municipality (88)	Total child population stratified by gender and school attendance****	Statistical Yearbook of the Paraguayan Republic**
Teachers	1886	Municipality (88)	Total population stratified by gender	Statistical Yearbook of the Paraguayan Republic**

*Age groups are more disaggregated in 1886 compared to 1846 and 1870. This higher disaggregation allows me to identify the generation exposed to compulsory drafting.

**Anuario Estadistico de las Republica del Paraguay (1886).

***Data is at the individual level but used in this paper at the municipality level. For more details, see Boggiano (2020).

****Children are classified as children enrolled in school as well as children out of the school system.

Table 3: Paraguayan Municipalities in 1860 (Kleinpenning, 2003).

ID	Name	ID	Name	ID	Name
1	Salvador	33	Pirayu	65	Oliva
2	Aquidaban	34	Ytaugua	66	Ybucui
3	Concepcion	35	Aregua	67	Caazapa
4	Belen	36	Luque	68	San Juan Nepomuceno
5	Horqueta	37	Limpio	69	Yuty
6	Tacuati	38	Asuncion - Santisima Trinidad	70	Mbuyapey
7	Lima	39	Asuncion - Recoleta	71	San Isidro
8	San Pedro	40	Asuncion - Catedral + Encarnacion	72	Quiquyo
9	Rosario	41	Asuncion - San Roque	73	Caacupu
10	San Estanislao	42	Lambare	74	Villa Franca
11	Carimbatai	43	Capiata - Aldana y Toledo	75	San Juan Bautista
12	Curuguaty	44	San Lorenzo del C Grande	76	San Miguel
13	Igatimi	45	San Lorenzo de la Frontera	77	Santa Maria
14	Yhu	46	San Antonio	78	Santa Rosa
15	Caaguazu	47	Ypane	79	San Ignacio
16	Ajos	48	Capiata	80	Tacuaras
17	Carayao	49	Rojas y Yatayty	81	Pilar
18	San Joaquin	50	Guarambare	82	Guazu-Cua
19	Union	51	Ita	83	Isla Umbu
20	Caraguatay	52	Villeta	84	Pedro Gonzalez
21	Arroyos y Esteros	53	Carapegua	85	Desmochados
22	Occidental	54	Yaguaron	86	Laureles
23	Emboscada	55	Paraguari	87	Yabebiri
24	Altos	56	Hiati	88	Santiago
25	Atyra	57	Yataiti	89	San Cosme
26	Tobati	58	Mbocayaty	90	Bobi
27	Barrero Grande	59	Villa Rica	91	San Pedro del Parana
28	Ytacuribi	60	Y(h)acanguazu	92	Carmen del Parana
29	San Jose de los Arroyos	61	Itape	93	Jesus
30	Valenzuela	62	Ybitimi	94	Trinidad
31	Piribebuy	63	Acahay	95	Encarnacion
32	Caacupe	64	Quiindi		

Table 4: Paraguayan Population and Distances to Military Camps

Variables	Obs	Mean	Std. Dev.	Min	Max
*Male/female ratio**					
Whole population (1870)	34	0.540	0.187	0.202	1.12
Fertile population (1870)	33	0.338	0.190	0.052	2.00
Drafted population (1886)	88	0.313	0.120	0.132	0.735
*Draft-eligible males***					
Lists of draft-eligible males (1867/1868)	45	250.178	153.140	21	562
*Distances****					
To Cerro Leon (in km)	9,161	147.409	101.689	8.566	370.136
WID (Cont. data)	9,161	0.0150	0.027	0.002	0.391
WID (Hist. data)	88	0.0137	0.014	0.004	0.109

*Whigham and Potthast (1999), Statistical Yearbook (1886),

** Own elaboration using data from the Archivo Nacional de Asuncion,

***Own elaboration using data from the Cartography Department of the DGEEC.

Table 5: Sociodemographics of the Sample Population

Variables		*n*	%	N
Age				
	15-19	503	5.59%	9161
	20-24	1510	16.48%	9161
	25-29	1987	21.59%	9161
	30-34	1948	21.26%	9161
	35-39	1755	19.17%	9161
	40-44	1467	16.01%	9161
Educational attainment				
	None	173	1.89%	9161
	Primary	4752	51.87%	9161
	High school	2858	31.20%	9161
	College or more	1378	15.04%	9161
Marital status				
	Consensual union	3935	42.95%	9161
	Married	4492	49.03%	9161
	Widowed	83	0.91%	9161
	Separated	621	6.78%	9161
	Divorced	30	0.33%	9161
Childhood violence				
	Witnessed	2057	22.52%	9161
	Suffered	1554	16.96%	9161
IPV				
	Emotional	2880	31.44 %	9161
	Physical	1,553	16.95%	9161
	Sexual	564	6.16%	9161
	Any kind	3120	34.06%	9161

Source: Own elaboration using data from ENDSSR-2004 and ENDSSR-2008.

Table 6: WID on IPV (marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
Marginal effects (WID)	1.020*** (0.271)	0.540*** (0.154)	0.275*** (0.0658)	1.134*** (0.325)	0.614*** (0.207)	0.354** (0.141)	0.252*** (0.0675)	0.698*** (0.256)
N	9161	9161	9160	9161	9161	9161	9160	9161
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	.003	.0021	.0034	.0033	.0131	.0085	.0074	.0135
Number of clusters	503	503	503	503	503	503	503	503
Dep. var. mean	0.314	0.170	0.0616	0.341	0.314	0.170	0.0616	0.341
Dep. var. st. dev.	0.464	0.375	0.240	0.474	0.464	0.375	0.240	0.474

Standard errors in parentheses

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

Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

Table 7: Female-Biased Sex Ratios on IPV (marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A) 1870								
Marginal effects	-	-	-	-	0.0556**	0.0338**	0.0165**	0.0571*
(Male/female ratio)					(0.0263)	(0.0143)	(0.00710)	(0.0314)
N	-	-	-	-	4086	4086	4086	4086
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	.0095	.0048	.006	.0102
Number of clusters	-	-	-	-	21	21	21	21
(B) 1870								
Marginal effects	0.608***	0.426***	0.291***	0.702**	0.543**	0.392**	0.278***	0.636**
(WID)	(0.224)	(0.160)	(0.0785)	(0.281)	(0.218)	(0.159)	(0.0802)	(0.274)
Marginal effects	-	-	-	-	0.0448	0.0259	0.0109	0.0445
(Male/female ratio)					(0.0277)	(0.0226)	(0.0128)	(0.0292)
N	4086	4086	4086	4086	4086	4086	4086	4086
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	.0102	.0061	.0104	.0113	.0108	.0065	.0107	.0119
Number of clusters	215	215	215	215	215	215	215	215
$\rho\,(WID,\ MFR_{1870})$	0.1839							
St. dev. WID	0.0369							
(C) 1886 (IV)								
Marginal effects	-	-	-	-	0.160***	0.0744*	0.0295	0.156**
(Male/female ratio)					(0.0528)	(0.0403)	(0.0278)	(0.0667)
N	-	-	-	-	7739	7739	7739	7739
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.013	0.008	0.006	0.013
Number of clusters	-	-	-	-	38	38	38	38
(D) 1886 (IV)								
Marginal effects	0.929***	0.415	0.0811	0.973***	0.552*	0.238	-0.00341	0.617*
(WID)	(0.299)	(0.271)	(0.101)	(0.339)	(0.306)	(0.285)	(0.111)	(0.353)
Marginal effects	-	-	-	-	0.133**	0.0620	0.0297	0.125*
(Male/female ratio)					(0.0558)	(0.0419)	(0.0305)	(0.0716)
N	7739	7739	7739	7739	7739	7739	7739	7739
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.012	0.008	0.006	0.013	0.013	0.008	0.006	0.014
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID,\ MFR_{1886})$	0.3409							
St. dev. WID (1886)	0.0155							

Standard errors in parentheses

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

Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

Table 8: Male Survival Rates on IPV (marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A)								
Marginal effects ($MSR_{\text{No GI}}$)	-	-	-	-	-0.100 (0.0794)	-0.174*** (0.0530)	-0.0167 (0.0396)	-0.174** (0.0778)
N	-	-	-	-	4358	4358	4358	4358
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.010	0.004	0.013
Number of clusters	-	-	-	-	20	20	20	20
(B)								
Marginal effects (WID)	-0.186 (1.270)	0.346 (1.218)	-0.188 (0.425)	0.0741 (1.343)	-0.114 (1.271)	0.490 (1.193)	-0.175 (0.424)	0.198 (1.337)
Marginal effects ($\text{MSR}_{\text{No GI}}$)	-	-	-	-	-0.0990 (0.108)	-0.180* (0.0959)	-0.0149 (0.0515)	-0.176 (0.111)
N	4358	4358	4358	4358	4358	4358	4358	4358
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	.0123	.0087	.0039	.0125	.0125	.01	.0039	.0131
Number of clusters	280	280	280	280	280	280	280	280
ρ	0.0163							
St. dev. WID	0.0084							

Standard errors in parentheses

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

Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

Table 9: Out of School Rates on IPV (marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A)								
Marginal effects (OSR^{Boys})	-	-	-	-	0.0430 (0.0383)	0.0196 (0.0232)	0.0177 (0.0145)	0.0377 (0.0414)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.007	0.006	0.012
Number of clusters	-	-	-	-	38	38	38	38
(B)								
Marginal effects (WID)	0.529** (0.252)	0.345** (0.138)	0.245*** (0.0451)	0.610** (0.288)	0.494* (0.252)	0.334** (0.137)	0.235*** (0.0480)	0.583** (0.287)
Marginal effects (OSR^{Boys})	-	-	-	-	0.0294 (0.0366)	0.00952 (0.0206)	0.0103 (0.0140)	0.0218 (0.0387)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.008	0.008	0.013	0.013	0.008	0.008	0.013
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID, OSR^{Boys})$	0.1505							
(C)								
Marginal effects (OSR^{Girls})	-	-	-	-	-0.0108 (0.0457)	-0.0172 (0.0300)	0.0288* (0.0156)	-0.0363 (0.0511)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.007	0.006	0.012
Number of clusters	-	-	-	-	38	38	38	38
(D)								
Marginal effects (WID)	0.529** (0.252)	0.345** (0.138)	0.245*** (0.0451)	0.610** (0.288)	0.530** (0.244)	0.348*** (0.129)	0.236*** (0.0383)	0.612** (0.258)
Marginal effects (OSR^{Girls})	-	-	-	-	-0.0125 (0.0438)	-0.0195 (0.0283)	0.0268* (0.0138)	-0.0384 (0.0488)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.008	0.008	0.013	0.013	0.008	0.009	0.013
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID, OSR^{Girls})$	-0.0912							
(E)								
Marginal effects (OSR^{Ratio})	-	-	-	-	0.0412* (0.0233)	0.0251* (0.0138)	-0.00135 (0.00698)	0.0516** (0.0258)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.008	0.005	0.013
Number of clusters	-	-	-	-	38	38	38	38
(F)								
Marginal effects (WID)	0.529** (0.252)	0.345** (0.138)	0.245*** (0.0451)	0.610** (0.288)	0.456** (0.210)	0.308** (0.122)	0.254*** (0.0369)	0.514** (0.231)
Marginal effects (OSR^{Ratio})	-	-	-	-	0.0320 (0.0225)	0.0186 (0.0131)	-0.00675 (0.00750)	0.0413* (0.0249)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.008	0.008	0.013	0.013	0.008	0.008	0.014
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID, OSR^{Ratio})$	0.2422							

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

Table 10: Female Labour Participation in 1886 on IPV (marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A)								
Marginal effects	-	-	-	-	0.222	-0.161	-0.502	0.157
(FTPC)					(1.734)	(1.303)	(0.560)	(1.986)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.007	0.005	0.012
Number of clusters	-	-	-	-	38	38	38	38
(B)								
Marginal effects	0.529**	0.345**	0.245***	0.610**	0.533**	0.352***	0.251***	0.616**
(WID)	(0.252)	(0.138)	(0.0451)	(0.288)	(0.255)	(0.135)	(0.0337)	(0.291)
Marginal effects	-	-	-	-	-0.179	-0.427	-0.678	-0.306
(FTPC)					(1.686)	(1.260)	(0.573)	(1.909)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.008	0.008	0.013	0.013	0.008	0.008	0.013
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID,\ FTPC)$	0.4286							
(C)								
Marginal effects	-	-	-	-	-1.279**	-0.588	-0.250	-1.395*
(MTPC–FTPC)					(0.636)	(0.479)	(0.234)	(0.719)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.013	0.007	0.006	0.013
Number of clusters	-	-	-	-	38	38	38	38
(D)								
Marginal effects	0.529**	0.345**	0.245***	0.610**	0.484**	0.328**	0.240***	0.559**
(WID)	(0.252)	(0.138)	(0.0451)	(0.288)	(0.223)	(0.133)	(0.0462)	(0.255)
Marginal effects	-	-	-	-	-1.153*	-0.500	-0.183	-1.251*
(MTPC–FTPC)					(0.618)	(0.481)	(0.232)	(0.706)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.008	0.008	0.013	0.013	0.008	0.008	0.014
Number of clusters	38	38	38	38	38	38	38	38
$\rho\,(WID,\ MTPC - FTPC)$	0.2489							

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

Table 11: WID on personal crimes (OLS, administrative data)

	(1) Homicide	(2) Child abuse	(3) Injury/ assault	(4) Rape	(5) Family violence	(6) Homicide	(7) Child abuse	(8) Injury/ assault	(9) Rape	(10) Family violence
WID	0.187	0.0178	1.425	0.215***	1.391**	0.184	0.0148	1.395	0.217***	1.375**
	(0.334)	(0.0643)	(0.958)	(0.0506)	(0.626)	(0.319)	(0.0744)	(0.853)	(0.0506)	(0.569)
Gini	-0.000269	-0.000665**	-0.0201	-0.000317	-0.00450***	-0.000418	-0.000791**	-0.0213	-0.000229	-0.00517***
	(0.000788)	(0.000287)	(0.0134)	(0.000208)	(0.00123)	(0.000883)	(0.000361)	(0.0142)	(0.000192)	(0.00141)
Poverty (%)	-0.000463	0.00123*	0.0323	-0.000216	0.00372	0.000641	0.00217*	0.0416*	-0.000871*	0.00875**
	(0.00181)	(0.000678)	(0.0196)	(0.000387)	(0.00291)	(0.00259)	(0.00111)	(0.0234)	(0.000454)	(0.00389)
Poverty gap	0.00187	-0.00174*	-0.0571	0.000535	-0.00353	0.000382	-0.00301*	-0.0696	0.00142*	-0.0103*
	(0.00273)	(0.000888)	(0.0359)	(0.000752)	(0.00423)	(0.00372)	(0.00150)	(0.0417)	(0.000771)	(0.00565)
N	283	283	283	283	283	283	283	283	283	283
Sex ratio	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Av. family income	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
adj. R^2	.0196	.1868	.0808	.0067	.3429	.0196	.1941	.08	.0084	.3471
Number of clusters	15	15	15	15	15	15	15	15	15	15
Dep. var. mean	0.0262	0.0117	0.175	0.0162	0.0942	0.0262	0.0117	0.175	0.0162	0.0942
Dep. var. st. dev.	0.0391	0.0197	0.390	0.0191	0.132	0.0391	0.0197	0.390	0.0191	0.132

Standard errors in parentheses

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

Notes:

(1) Population and Crime data was retrieved from the 2013 Paraguayan Criminological Atlas (Atlas Criminológico de Paraguay).

(2) Crimes are weighted by 100 inhabitants.

(3) Poverty and income data were retrieved from Robles and Santander (2012).

Figures

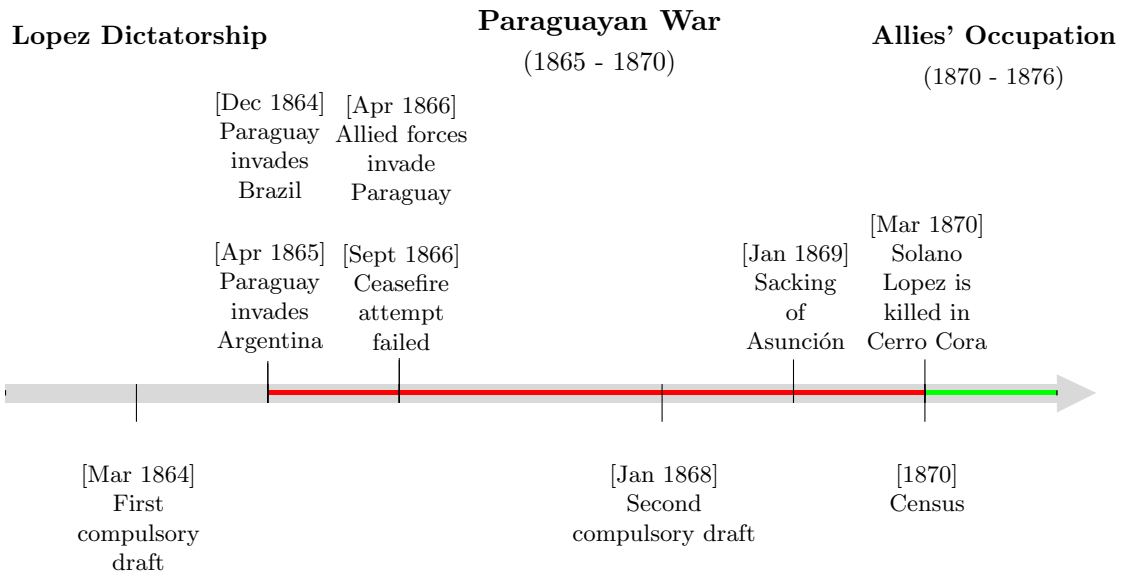


Figure 1: Timeline of the Paraguayan War (1864 - 1870).

Notes:
(1) The top part of the timeline depicts the main events during the Paraguayan War.
(2) The bottom part of the timeline depicts points in time over history when population measures were generated.

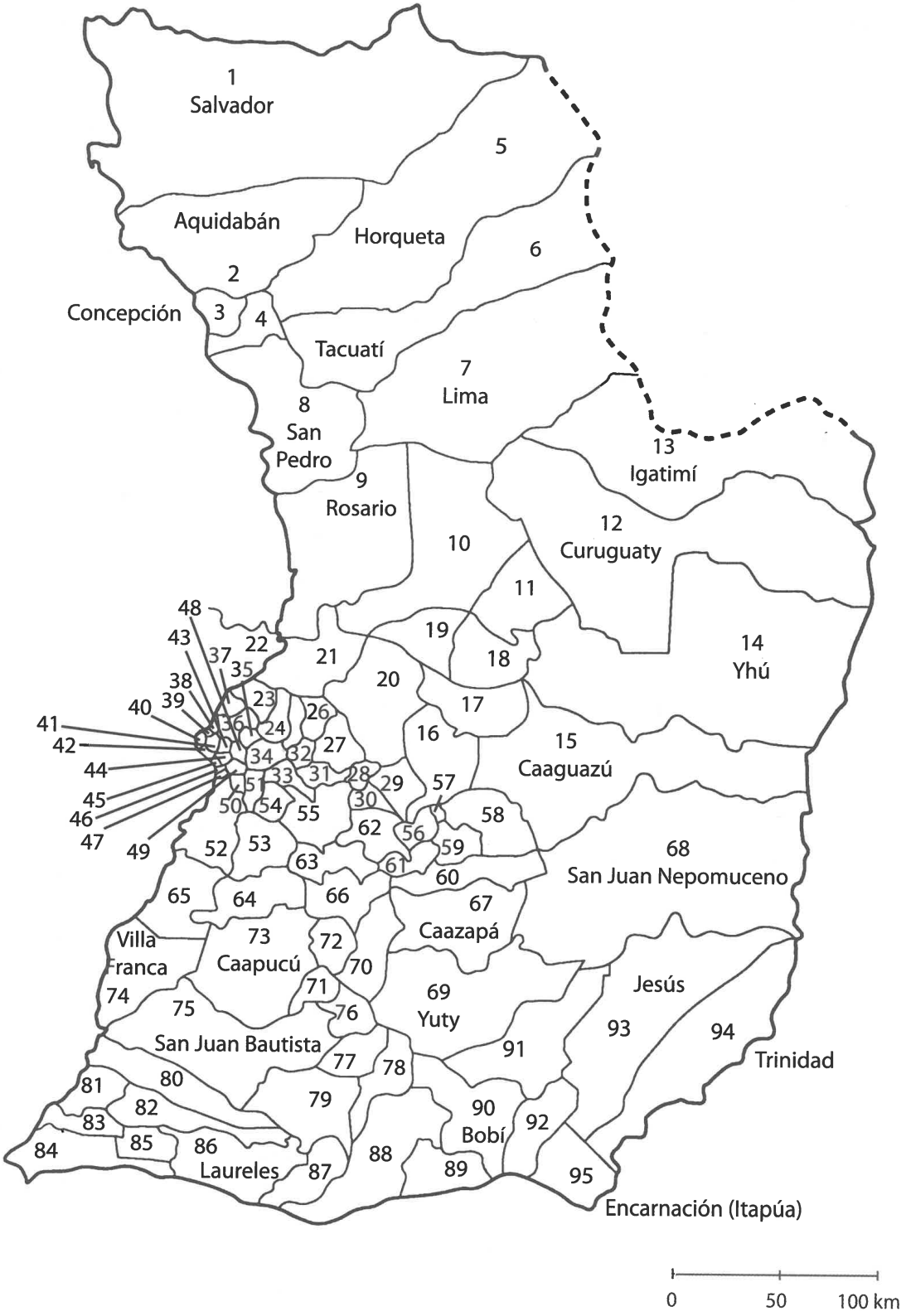


Figure 2: Paraguayan Municipalities (Kleinpenning, 2003).

Note:
(1) See details in Table 3.

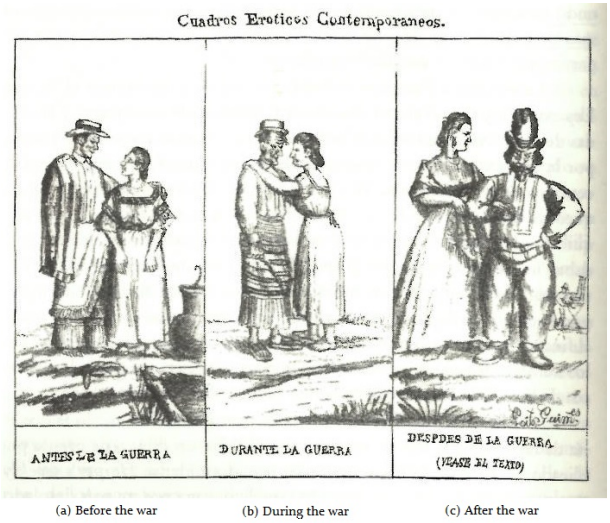
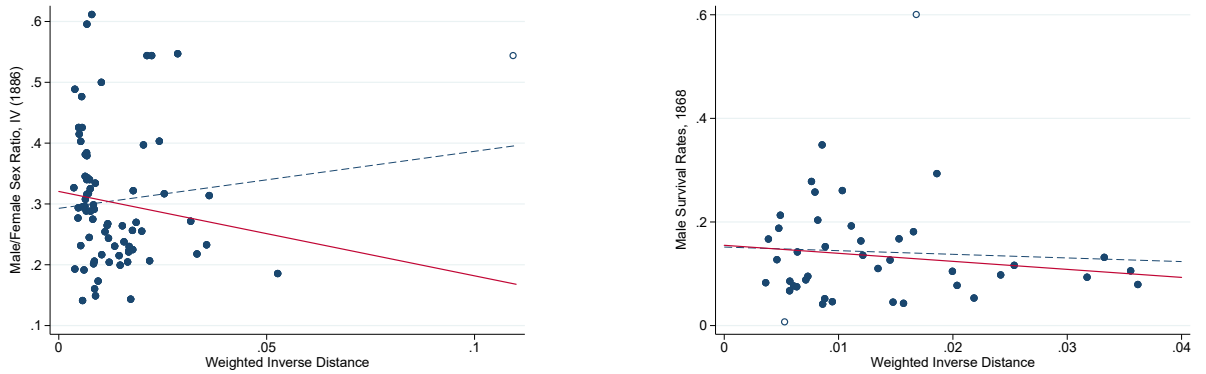


Figure 3: Contemporary Erotic Paintings, *El Cabrion* (January 1872).

Museo Militar de Asunción, Capdevila (2010)

Notes:
(1) In the picture on the left, the male is taller and the female is looking up at him.
(2) In the picture in the centre, the man and the woman are both the same height. They appear to be more poorly dressed than in the left-hand picture but they are still looking at each other.
(3) In the picture on the right, the female is taller than the male, who compensates for his lack of height with a hat, she is looking down at him and he is not looking at her at all.



(a) $\text{MFSR}^{i,1,2}$ **(b)** $\text{MSR}^{i,1,3}$

Figure 4: Post-War Demographics and WID

Comments:
(i) Exposure to the compulsory draft leads to lower post-war male/female sex ratios, and lower male survival rates.
Notes:
(1) Hollow dots are considered outliers. The dashed line represents the linear prediction of the underlying observations including outliers while the solid line does not include outliers.
(2) MFSR accounts for the male/female sex ratio among the drafted population in 1886 (group IV in Figure 5).
(3) MSR accounts for male survival rates in 1868.

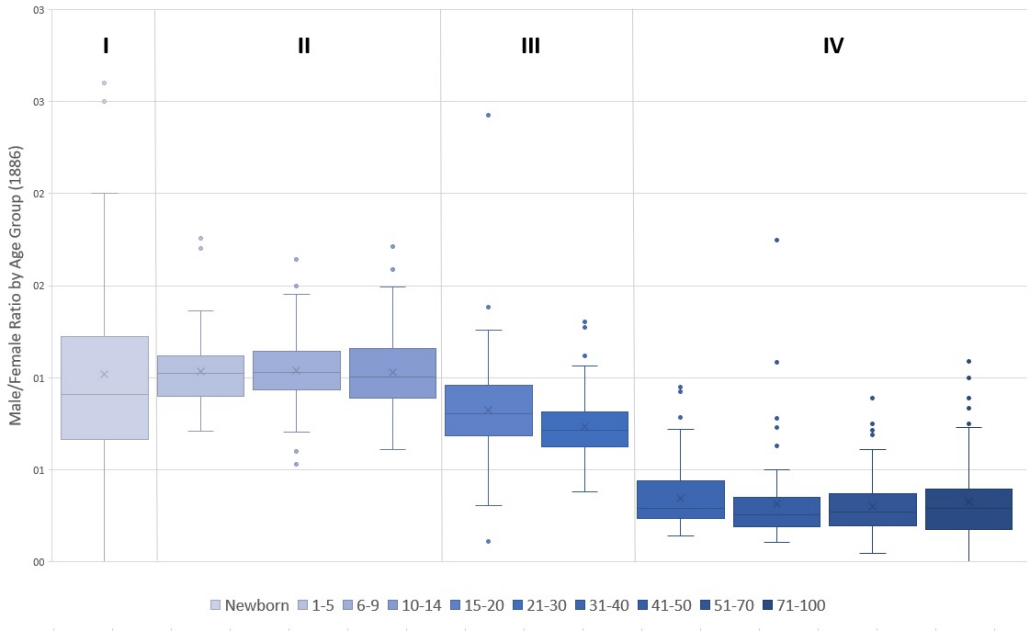
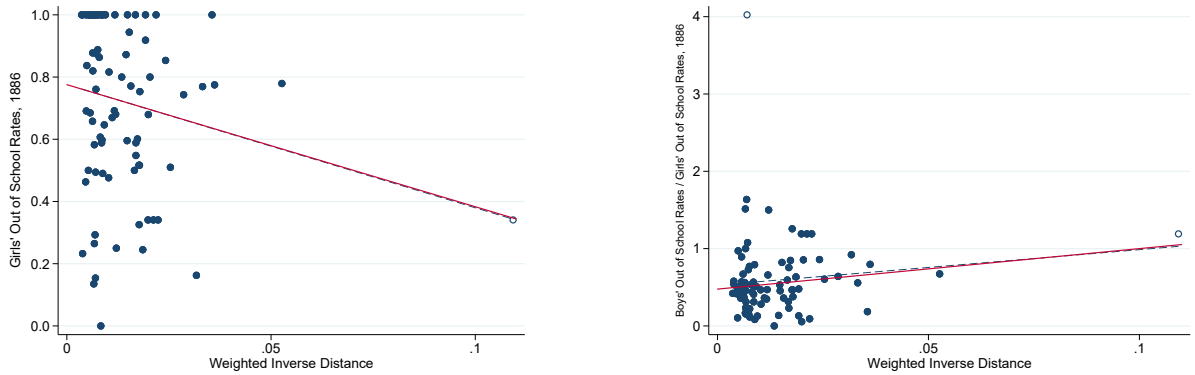
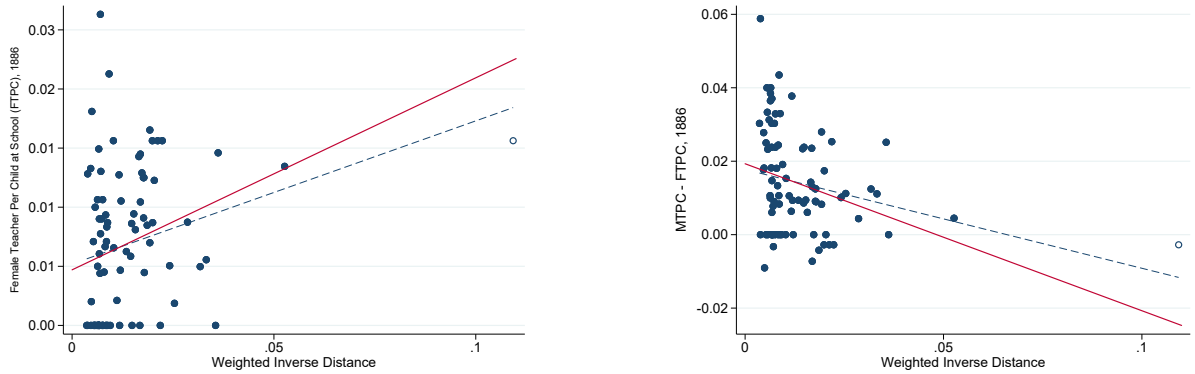


Figure 5: Gender Imbalance by Age Group (1886)

Notes:
(1) Age groups are depicted with different shades. Newborns being the lightest coloured group and the elderly (adults above 71 years old) being the darkest.
(2) The numbering at the top depicts the relationship between the different age groups and the war. People who belonged to groups I and II were born after the war. People who belonged to group III were born during the war but were not old enough to be drafted, conditional on being male. People who belonged to group IV were compulsorily drafted, conditional on being male and not medically discharged in 1868.



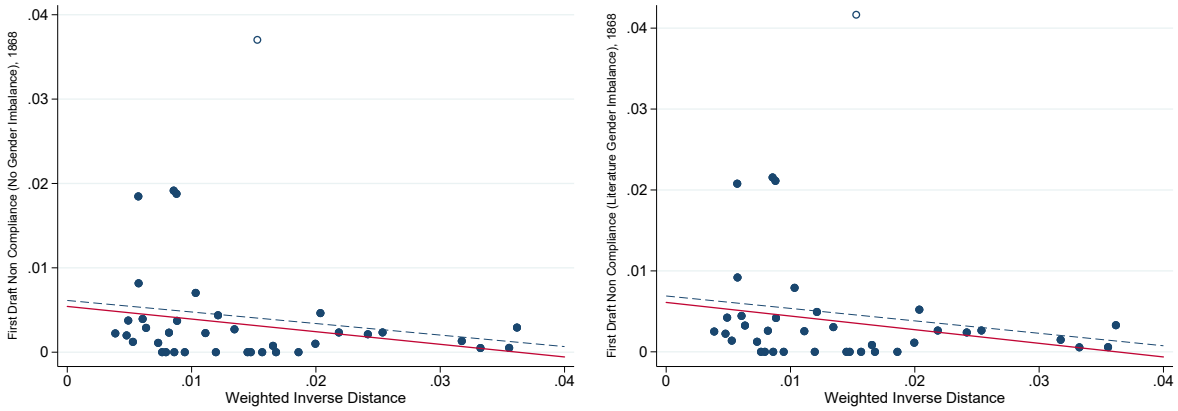
(a) Girls' Out of School Rates^{i,1,2} **(b)** Out of School Rates Ratio^{i,1,2}



(c) FTPC^{i,1,3} **(d)** MTPC-FTPC^{i,1,3}

Figure 6: WID and Post-War Human Capital and Female Labour Participation

Comments:
(i) Exposure to the compulsory draft leads to lower post-war levels of girls out of school (uneducated females), gender differences in out-of-school rates, and differences between male and female teachers per child at school. Meanwhile, it leads to higher levels of female teachers per child at school.
Notes:
(1) Hollow dots are considered outliers. The dashed line represents the linear prediction of the underlying observations including outliers, while the solid line does not include outliers.
(2) Out-of-school rates indicate the share of children not attending school in a municipality in 1886, i.e., the share of uneducated children. When the ratio is higher, gender differences are lower since OSR for girls are much higher than for boys.
(3) FTPC and MTPC denote female and male teacher per child at school, respectively.



(a) Pre-war unbiased sex ratios^{i,1} **(b)** Pre-war female-biased sex ratios^{i,1}

Figure 7: Non-Compliance and WID

Comments:
(i) Exposure to the compulsory draft leads to lower non-compliance.
Notes:
(1) Hollow dots are considered outliers. The dashed line represents the linear prediction of the underlying observations including outliers, while the solid line does not include outliers.

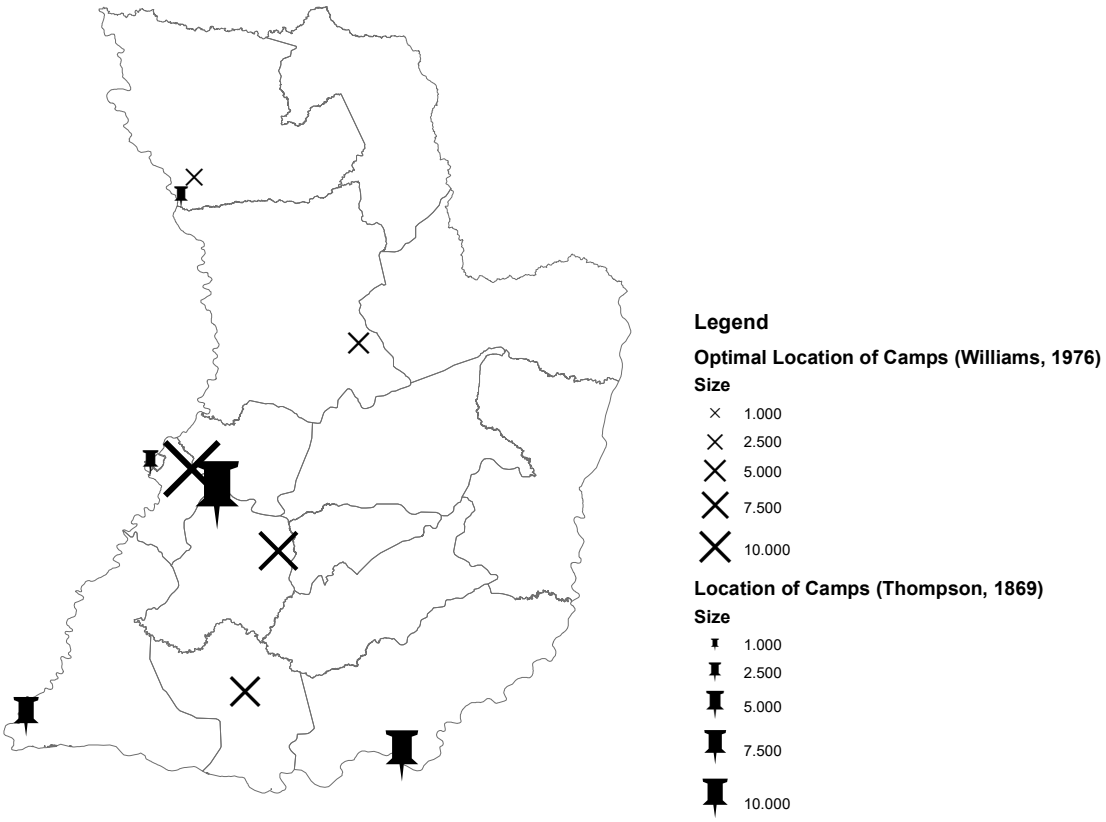
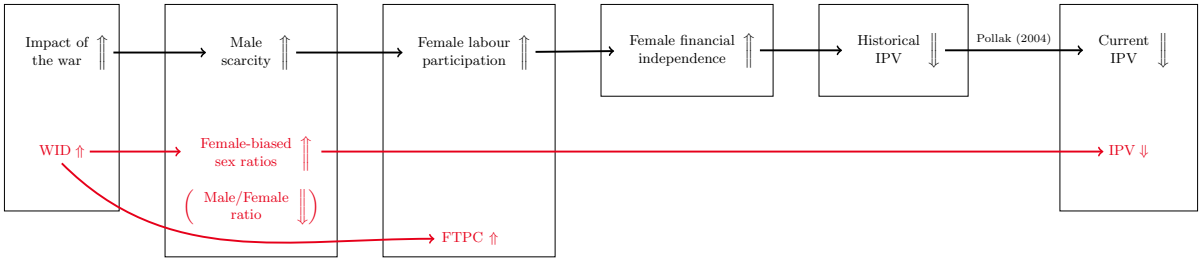
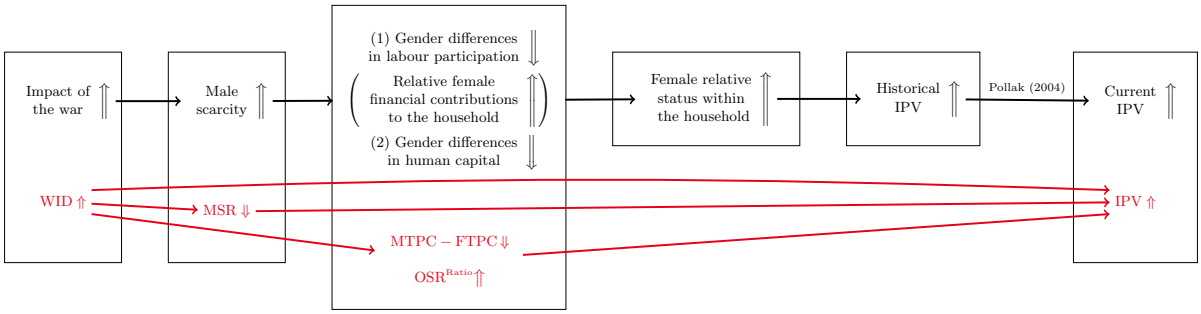


Figure 8: Optimal Location of Military Camps (1864).



(a) Financial Independence Channel



(b) Relative Status Channel

Figure 9: Transmission Channels

Notes:
(1) The top part of each subfigure depicts the mechanics behind each transmission channel.
(2) The bottom part of each subfigure depicts the corroborating results found in the paper.

A Balance of Power within the Rio de la Plata Basin

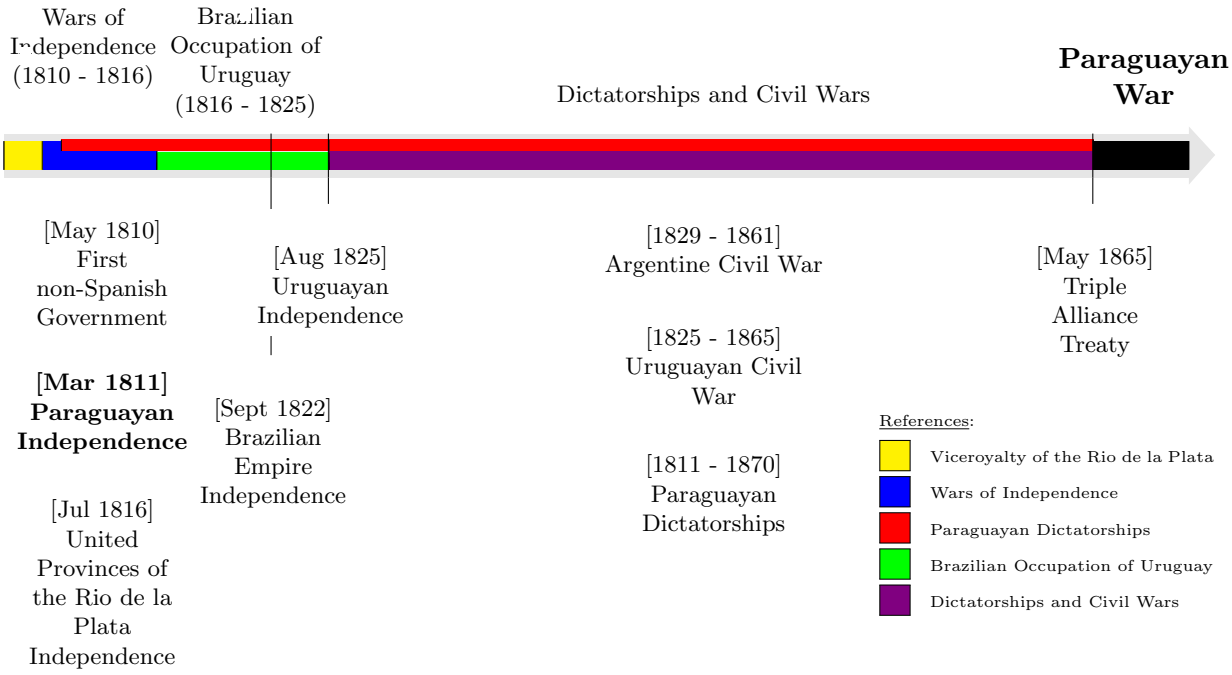


Figure A.1: Timeline of Conflicts in the Rio de la Plata Basin (1800 - 1870)

Notes:
(1) The top part of the timeline depicts the historical periods that led to the Paraguayan War.
(2) The bottom part of the timeline depicts specific important events that defined these historical periods.

Paraguay (today Eastern Paraguay), the Argentine Confederation (Argentina), the Banda Oriental (Uruguay) and Brazil are four nations that were obliged to to maintain a relationship to a certain extent because they all depended on the Rio de la Plata Basin to reach the Atlantic Trade Routes.[34] This interdependency, their different views on fundamental political issues and overlapping claims to territories led to 60 years of conflict. Figure A.1 summarises the main events over the 1810–1870 period.

Since Paraguay's Independence (1811), the country has been governed by three successive dictatorships and has become the most industrialised and technologically advanced nation in South America with virtually no recourse to slavery, foreign financing or investment.[35] In contrast, other countries in the region took 30 years to become more politically stable republics which then began to integrate into the world's economy driven by the industrialisation of the US and Western Europe through a single export route via the Rio de la Plata. This route was controlled from Buenos Aires and Montevideo allowing their administrations to supervise, tax or plunder inbound and outbound shipments while Paraguay and the Matto Grosso province of Brazil (north of Paraguay) were landlocked and had no direct control over their export routes. The Paraguayan and Brazilian governments had incentives to exert influence, if and wherever possible, over the governments of their neighbours. Figure A.2 shows a map of the political divisions of South America at the start of the Wars of Independence (1810–1816).

Argentina became a unified country with centralised custom rights in 1861. This incentivised the Argentine government to exert more control over the Rio de la Plata Basin to protect its exports to Europe.[36] Fearing isolation from the Atlantic Export Routes, Paraguay sought to help Uruguay's governing party overcome an opposition uprising in 1863 backed by Argentina and

[34] More detail about the impact of trade on international conflicts in the region in Pastore and Seiglie (2016).
[35] By 1863, Paraguay had developed the first iron foundry, the first railway line and the first electric telegraph line in South America. The foundry operated until 3 May 1868 when Brazil demolished it (Reber, 1999).
[36] At the time, customs revenues were the main source of funds for the government (Villanueva, 2001).

Figure A.2: Viceroyalty of the Rio de la Plata (1776 - 1810).

Brazil, allowing them to become actively involved in the conflict as well.[37] Despite Paraguay's efforts, the Uruguayan government was ousted, and the new leaders joined Argentina and Brazil in a Triple Alliance to move against Paraguay.

[37] There were two military factions: the conservative *Blancos*—who were backed by Paraguay and looked after the agricultural interests of the countryside and promoted protectionism—and the liberal *Colorados*—who were backed by Argentina and Brazil and represented the business interests of Montevideo. During this conflict, like many other Uruguayan cities, Montevideo and its port were under siege by the Brazilian forces.

B Optimal Location of Military Camps

Alternative source and alternative assumption

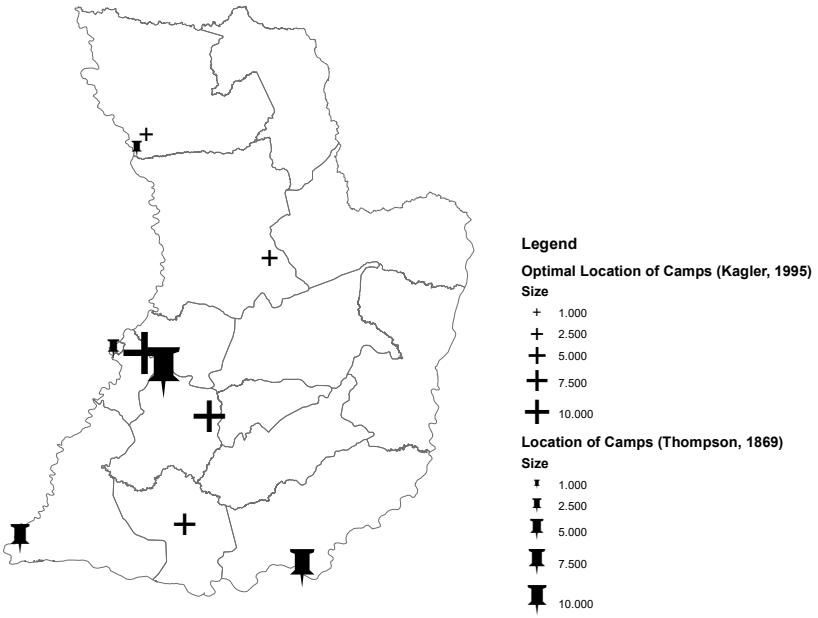


Figure B.1: Optimal Location of Military Camps, 1864 (K-Medians Clustering, Kagler 1976).

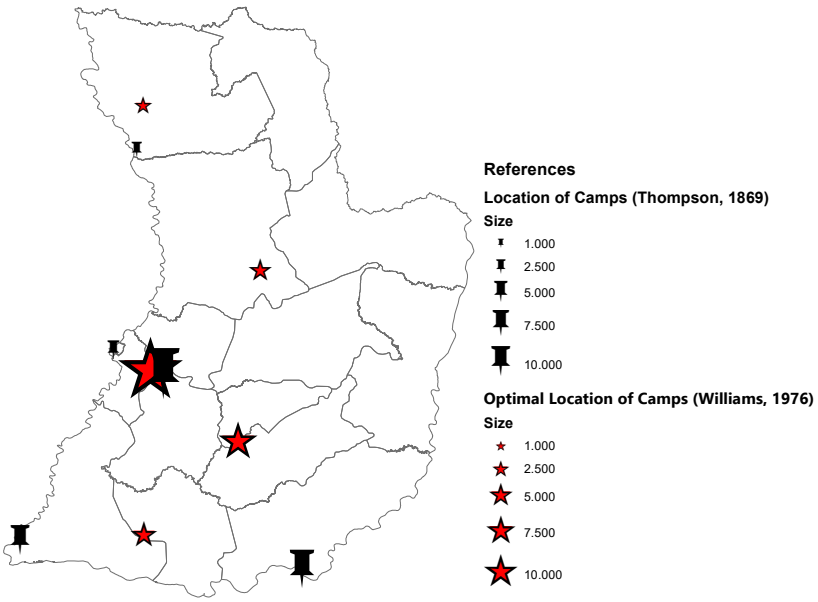


Figure B.2: Optimal Location of Military Camps, 1864 (K-Means Clustering, Williams 1976).

C Additional Results

Table C.1: WID on IPV

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A) Logit								
WID	4.737***	3.842***	4.790***	5.053***	2.864***	2.547**	4.461***	3.121***
	(1.255)	(1.095)	(1.153)	(1.442)	(0.965)	(1.014)	(1.193)	(1.143)
Marginal effects	1.020***	0.540***	0.275***	1.134***	0.614***	0.354**	0.252***	0.698***
	(0.271)	(0.154)	(0.0658)	(0.325)	(0.207)	(0.141)	(0.0675)	(0.256)
pseudo R^2	.003	.0021	.0034	.0033	.0131	.0085	.0074	.0135
(B) OLS								
WID	1.105***	0.663***	0.413***	1.196***	0.678***	0.444**	0.382***	0.752***
	(0.287)	(0.206)	(0.136)	(0.328)	(0.231)	(0.192)	(0.140)	(0.274)
adj. R^2	.0039	.0021	.002	.0044	.0158	.0073	.0034	.0168
(C) Logit - Distance Squared								
WID (Dist.Sq.)	3.804**	2.939**	3.858***	4.009**	2.617**	2.144**	3.677***	2.743**
	(1.490)	(1.187)	(0.918)	(1.768)	(1.108)	(0.991)	(0.890)	(1.324)
Marginal effects	0.820**	0.413**	0.222***	0.900**	0.561**	0.298**	0.208***	0.614**
	(0.322)	(0.167)	(0.0532)	(0.398)	(0.238)	(0.138)	(0.0510)	(0.296)
pseudo R^2	.0018	.0013	.0026	.0019	.0129	.0083	.007	.0132
(D) Logit with Province FE								
WID	3.456***	3.356***	3.941***	3.818***	2.140**	2.257*	3.305**	2.525**
	(1.069)	(1.197)	(1.297)	(1.278)	(1.016)	(1.164)	(1.366)	(1.198)
Marginal effects	0.742***	0.467***	0.223***	0.854***	0.458**	0.312*	0.185**	0.564**
	(0.229)	(0.167)	(0.0737)	(0.286)	(0.218)	(0.161)	(0.0768)	(0.268)
pseudo R^2	.0119	.0084	.007	.0132	.017	.0118	.0113	.0179
N	9161	9161	9160	9161	9161	9161	9160	9161
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
Number of clusters	503	503	503	503	503	503	503	503
Dep. var. mean	0.314	0.170	0.0616	0.341	0.314	0.170	0.0616	0.341
Dep. var. st. dev.	0.464	0.375	0.240	0.474	0.464	0.375	0.240	0.474

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.2: WID on IPV (with historical-municipality-level clustering)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
WID	4.737**	3.842***	4.790***	5.053**	2.864**	2.547**	4.461***	3.121**
	(2.182)	(1.326)	(0.521)	(2.355)	(1.368)	(0.993)	(0.627)	(1.481)
Marginal effects	1.020**	0.540***	0.275***	1.134**	0.614**	0.354***	0.252***	0.698**
	(0.469)	(0.180)	(0.0280)	(0.528)	(0.292)	(0.134)	(0.0364)	(0.331)
N	9161	9161	9160	9161	9161	9161	9160	9161
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	.003	.0021	.0034	.0033	.0131	.0085	.0074	.0135
Number of clusters	45	45	45	45	45	45	45	45
Dep. var. mean	0.314	0.170	0.0616	0.341	0.314	0.170	0.0616	0.341
Dep. var. st. dev.	0.464	0.375	0.240	0.474	0.464	0.375	0.240	0.474

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C.3: WID on IPV (controlling for education and labour participation)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
WID	2.878***	2.659***	4.579***	3.154***	2.398**	2.133**	4.161***	2.662**
	(0.964)	(0.996)	(1.122)	(1.140)	(0.958)	(1.004)	(1.164)	(1.137)
Marginal effects	0.617***	0.368***	0.255***	0.706***	0.513**	0.292**	0.229***	0.594**
	(0.207)	(0.138)	(0.0623)	(0.256)	(0.205)	(0.138)	(0.0640)	(0.254)
N	9161	9161	9160	9161	9161	9161	9160	9161
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Highest Educ.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Working	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	.0131	.0115	.0125	.0137	.0203	.0195	.0168	.0212
Number of clusters	503	503	503	503	503	503	503	503
Dep. var. mean	0.314	0.170	0.0616	0.341	0.314	0.170	0.0616	0.341
Dep. var. st. dev	0.464	0.375	0.240	0.474	0.464	0.375	0.240	0.474

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.4: WID on IPV (controlling for working outside the household conditional on working)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
WID	1.496*	1.736*	3.776***	1.793	1.370	1.489	3.324***	1.642
	(0.857)	(0.982)	(0.968)	(1.094)	(0.856)	(0.971)	(0.991)	(1.086)
Marginal effects	0.352*	0.282*	0.243***	0.433	0.322	0.241	0.208***	0.396
	(0.201)	(0.160)	(0.0609)	(0.264)	(0.201)	(0.157)	(0.0616)	(0.262)
N	4003	4003	4003	4003	4003	4003	4003	4003
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Highest Educ.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Working	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WOHH	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	.0079	.013	.022	.0095	.0087	.0156	.0307	.0106
Number of clusters	487	487	487	487	487	487	487	487
Dep. var. mean	0.379	0.208	0.0739	0.408	0.379	0.208	0.0739	0.408
Dep. var. st. dev	0.485	0.406	0.262	0.492	0.485	0.406	0.262	0.492

Standard errors in parentheses,
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: WOHH stands for working outside the household.

D Relevance

Effects of the War on Female Labour Participation

In this paper, I have shown evidence of the long-term impact of the Paraguayan War on IPV. These results are relevant provided that the Paraguayan case is not exceptional. To address this, I analyse whether Paraguay is comparable to other countries. I perform two analyses already present in the literature—never conducted together in cases of female-biased sex ratios—of the effects of female-biased sex ratios.[38] Firstly, I establish the short-term effects of the war—proxied by WID—on female labour participation (Goldin, 1991; Acemoglu *et al.*, 2004; Goldin and Olivetti, 2013). I use teachers' data since it was the only profession available to both females and males simultaneously. To do so, I regress

$$LP_k \quad = \quad \beta_1 \, WID_k + \varepsilon_{jk} \tag{D.1}$$

where $LP1 = \{FTPC, (MTPC - FTPC)\}$ and $FTPC$ and $MTPC$ are the number of female and male teachers per child attending school, respectively. I also control for children out of school to proxy for how developed the school system is in each municipality in 1886.

In Table D.1, I present the OLS estimates of Equation (D.1). All coefficients are significant and unaltered by the inclusion of the children out of school control. This implies that the greater the impact of the war, the higher the number of female teachers per child attending school. Furthermore, the results presented in columns (3) and (4) suggest that females replaced males as teachers in areas where the impact of the war was more pronounced. These results are in line with the literature and, in particular, with the predictions by Becker (1973).

Table D.1: WID and Female Teachers Per Child at School in 1886

	(1) FTPC	(2) FTPC	(3) MTPC-FTPC	(4) MTPC-FTPC
WID	0.121***	0.111***	-0.269***	-0.238***
	(0.0335)	(0.0352)	(0.0827)	(0.0842)
Observations	87	87	87	87
Adjusted R^2	0.059	0.124	0.057	0.195
Controlling for OSR_{All}	No	Yes	No	Yes

Standard errors in parentheses

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

Notes:

(1) FTPC and MTPC stand for female and male teacher per child at school, respectively.

(2) OSR_{All} stands for out-of-school rates for all children.

I then perform a second analysis which quantifies the long-term impact of the war on female labour participation and the type of participation similar to Teso (2018). To quantify the long-term effects of the war on female labour participation, I use the contemporaneous data provided by CEPEP. In this case, the sample is not restricted to females reporting as having had an intimate partner. Thus, this sample is composed of 13,516 females of which 5,813 report as participating in work activities. In CEPEP's surveys, females are asked if they work, and in the event of an affirmative response, they are asked if they do so outside the home. This is an important distinction in the context of high levels of labour informality. I then regress

$$P(LP2 = 1 \,|\, WID_k, \, X_{ijk}) = \mathbb{1}\left(\beta_1 \, WID_k + X'_{ijk}\Delta \geq \varepsilon_{ijk}\right) \tag{D.2}$$

where $LP2 = \{FLP, \, FLPOHH\}$, FLP is a dummy variable that takes a value of 1 if the female interviewed answers affirmatively to the question of whether they are working, and $FLPOHH$ is a dummy variable that takes value of 1 if the female interviewed answers affirmatively to the question of whether they are working outside the home, conditional on them working. I control

[38] A similar analysis is performed in a context of male-biased sex ratios by Grosjean and Khattar (2019).

Table D.2: WID and Female Labour Participation (logit and marginal effects)

	(1) FLP	(2) FLPOHH	(3) FLP	(4) FLPOHH
WID	3.779***	6.327***	5.650***	8.440***
	(0.541)	(1.938)	(1.087)	(2.330)
Marginal effects	0.921***	1.159***	1.386***	1.637***
	(0.132)	(0.350)	(0.267)	(0.447)
N	13516	5813	9186	4012
Ind. level controls	Yes	Yes	Yes	Yes
Including singles	Yes	Yes	No	No
pseudo R^2	.1072	.0943	.1203	.1038
Number of clusters	507	494	503	487
Dep. var. mean	0.430	0.730	0.437	0.706
Dep. var. st. dev.	0.495	0.444	0.496	0.456

Standard errors in parentheses

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

Notes:

(1) FLP and FLPOHH stand for female labour participation and female labour participation outside the household respectively.

(2) Individual-level controls include age, area (urban/rural), highest education level, whether the respondent speaks Spanish and whether she has a partner.

for individual covariates and cluster the errors at the neighbourhood level, similar to previous specifications.[39]

In Table D.2, I present the logit results for Equation (D.2) and their respective marginal effects. Female labour participation coefficients are significant in all cases, independent of the type, the inclusion of individual-level controls or whether I included single females in the sample. These results imply, in line with the literature, that, more than 100 years later, in areas more heavily affected by the war, female labour participation is higher. Finally, I analyse which type of working conditions females are most likely to face. To do so, I explore the following outcomes: employed (which takes value 1 if females are employed with a monthly wage), daily paid (which takes value 1 if females are employed and paid by the day), self-employed, and employer (which takes value 1 if the female is an employer). All these outcomes are evaluated in the sub-sample of females working outside the household.

In Table D.3, I present the logit coefficients associated with the outcomes described and their respective marginal effects. The coefficients associated with daily paid, self-employment and employer status are significant in the full sample, while only the first two hold after excluding single females from the sample. In the case of daily paid, the coefficient is negative. This implies that the greater the effect of the war in a neighbourhood, the lower the likelihood of females being hired and paid daily. Since people employed in this fashion usually suffer from high job insecurity (both from a legal perspective and as a consequence of the business cycle), this result implies that females in areas more heavily affected by the war are less likely to work in daily paid jobs, conditional on working outside the household and, therefore, less likely to suffer from job insecurity. In the case of self-employed females, the coefficient is positive and significant. In the literature, self-employment, as well as employing others, are usually outcomes dominated by males. This evidence suggests that females in areas that were more severely affected by the war are more likely to participate and potentially replace males in risky endeavours.

All of these findings are in line with the results presented in the literature on the consequences of demographic shocks, both in the short and in the long run. This implies that the Paraguayan case is relevant and all the results presented in the main sections of this paper are important for the development of policy recommendations. Nowadays, such events are rarely observed.

[39] Individual-level controls also include highest education level and a dummy accounting for the female currently having a partner (trying to capture a higher likelihood of two income sources within the household).

Table D.3: WID and Type of Female Labour Participation (logit and marginal effects)

	(1) Employed	(2) Daily paid	(3) Self emp.	(4) Employer	(5) Employed	(6) Daily paid	(7) Self emp.	(8) Employer
WID	-1.362	-4.611*	2.995***	3.840*	-1.464	-7.480**	3.065**	-0.809
	(1.082)	(2.477)	(1.088)	(2.129)	(1.507)	(3.278)	(1.542)	(4.074)
Marginal effects	-0.265	-0.244*	0.391***	0.0246*	-0.311	-0.397**	0.498**	-0.00892
	(0.210)	(0.130)	(0.141)	(0.0144)	(0.321)	(0.174)	(0.251)	(0.0450)
N	4241	4241	4241	4190	2831	2831	2831	2791
Ind. level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Including singles	Yes	Yes	Yes	Yes	No	No	No	No
pseudo R^2	.0592	.0686	.0672	.0958	.0607	.0718	.0498	.0602
Number of clusters	468	468	468	461	442	442	442	435
Dep. var. mean	0.719	0.0726	0.175	0.0119	0.677	0.0749	0.220	0.0161
Dep. var. st. dev.	0.449	0.260	0.380	0.109	0.468	0.263	0.414	0.126

Standard errors in parentheses

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

Note: Individual-level controls include age, area (urban/rural), highest education level, whether the respondent speaks Spanish and whether she has a partner.

E Short-term Effects on Demographics and Gender Norms

E.1 WID on Female-Biased Sex Ratios

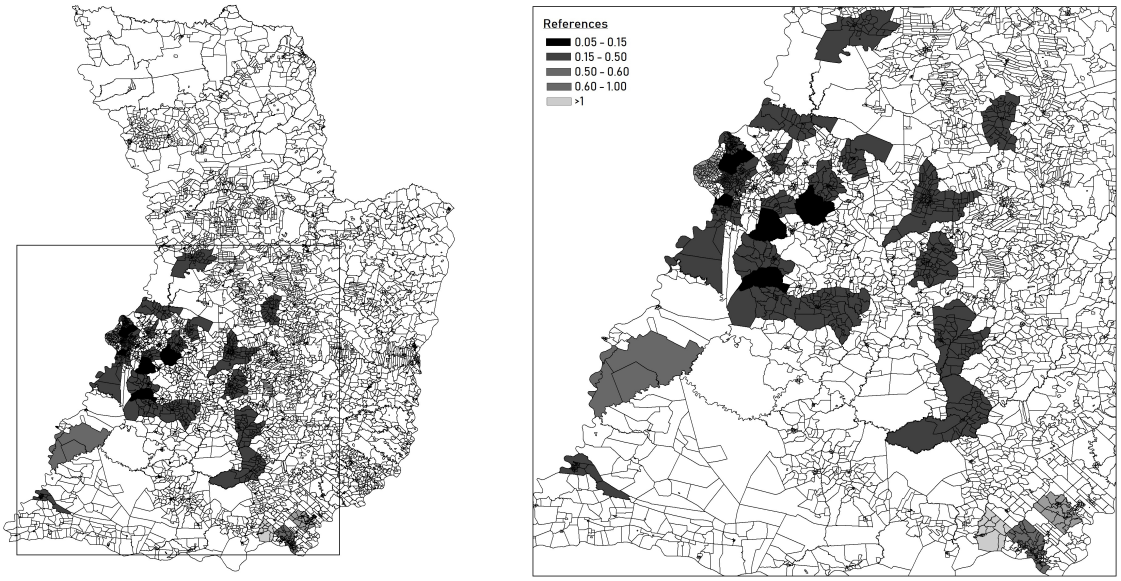


Figure E.1: Sex Ratios of the Fertile Population Immediately After the War (1870)

In Table E.1, I provide OLS estimates of the effect of WID on the male/female sex ratio in 1870 and the male/female sex ratio for the generation of those exposed to compulsory drafting in 1886. Coefficients presented in column (1) are positive. The sign of the estimate is in line with a positive correlation between the WID measure and the male/female ratio in 1870, which implies a positive correlation between distance to the military camps and gender imbalance. Contrary to collective wisdom, this implies that regions more heavily affected by the war exhibit a less pronounced gender imbalance. However, by analysing a graphical representation, the presence of outliers becomes apparent (see Figure E.2). Given the presence of outliers, I perform an OLS regression excluding them.

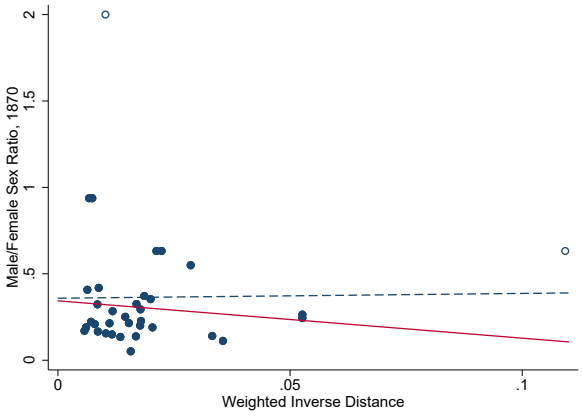


Figure E.2: Post-War Demographics (FBSR) and WID

Comments:
(i) Exposure to the compulsory draft leads to lower post-war male/female sex ratios.
Notes:
(1) Hollow dots are considered outliers. The dashed line represents the linear prediction of the underlying observations including outliers while the solid line does not include outliers.

Table E.1: WID on Female-Biased Sex Ratios

	(1) Male/female Ratio (fertile)	(2) Male/female Ratio (fertile)	(3) Male/female Ratio (fertile)	(4) Male/female Ratio (fertile)	(5) Male/female Ratio (IV)	(6) Male/female Ratio (IV)
WID	0.278	-2.159	-2.972	-2.972	0.938	-1.716
	(3.200)	(3.225)	(2.842)	(2.842)	(0.897)	(1.116)
N	35	33	19	19	75	75
adj. R^2	-0.030	-0.018	0.013	0.013	0.001	–
Pseudo R^2	–	–	–	–	–	0.0115
Specification	OLS	OLS	OLS	OLS	OLS	Quantile
Year	1870	1870	1868/70	1868/70	1886	1886
Infections	No	No	Yes	Yes	No	No

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

An explanation for a positive sign is the prevalence of infectious diseases (Thompson, 1869). Infectious diseases affected not only the drafted males in the military camps but also the civilian population of those areas. Importantly, these diseases did not discriminate by gender.

In columns (3) and (4) of Table E.1, I present OLS estimates of the effect of WID on the male/female sex ratio in 1870, controlling for the rate of infected individuals over the male population in 1868. I calculate the rate of infected individuals over the male population using the following information. First, I project the male population in December 1867/January 1868. To do so, I use the 1846 Census data and a growth rate calculated based on the previous two available censuses.[40] Using these data, I make two projections based on assumptions regarding pre-war gender imbalances. Secondly, I count the number of medically discharged males that suffered from an infection—and were medically discharged because of it—according to the lists of draft-eligible males. Finally, I calculate the ratio between the infection counts and the projected male population. I obtain 42 observations but can only match 19 of them to the 1870 Census to be able to control for infections. However, once I control for infections—independently of the assumption on pre-war gender imbalance—the sign of the estimate of the effect of WID on male/female sex ratio is negative where an increase in one standard deviation on WID (0.008) implies a reduction in the male/female ratio of 0.024, which translates to 2.4 males per 100 females. These results suggest that when I control for the prevalence of disease, a higher WID implies a lower male/female sex ratio.

I then look at the effect of WID on the male/female sex ratio using the 1886 Census. This allows me to analyse a larger sample. I find that the quantile coefficient presented in column (5) corresponds to the expected effect of the war on sex ratios.

E.2 WID on Male Survival Rates

In Table E.2, I present OLS estimates of WID on male survival rates both assuming no gender imbalance in 1846 and assuming a level of gender imbalance in line with that in the literature on other historic demographic shocks. All estimates are negative but non-significant. The results are presented in columns (1), (2), (4) and (5) are in line with a negative correlation between WID and male survival rates, which implies a positive correlation between distance to military camps and male survival rates independently of the existence of a pre-war gender imbalance. However, given the size of the sample, I examine whether these results are driven by the presence of outliers.

There is a single outlier, which is the municipality of Ipané, where the MSR are 0.288 and 0.324, respectively. I therefore perform the same analysis removing Ipane from the sample and I present the OLS estimates in Table E.2 columns (3) and (6). In both cases, the estimates are negative but insignificant. This confirms that the outlier was not driving the results.

[40] In the cases where this calculation is not possible, I use the average growth rate of 1.75 percent from Whigham and Potthast (1999).

Table E.2: WID on Male Survival Rates

	(1) $MSR_{\text{No GI}}$	(2) $MSR_{\text{No GI}}$	(3) $MSR_{\text{No GI}}$	(4) $MSR_{\text{Lit GI}}$	(5) $MSR_{\text{Lit GI}}$	(6) $MSR_{\text{Lit GI}}$
WID	-0.701	-0.697	-1.549	-0.789	-0.785	-1.743
	(1.866)	(1.770)	(1.339)	(2.099)	(1.991)	(1.506)
N	42	42	40	42	42	40
adj. R^2	-0.021	–	0.009	-0.021	–	0.009
Pseudo R^2	–	0.0134	–	–	0.0134	–
Specification	OLS	Quantile	OLS	OLS	Quantile	OLS
Outliers	Yes	Yes	No	Yes	Yes	No

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

E.3 WID on Out-of-School Rates

In Table E.3, I present OLS estimates of the effect of WID on out-of-school rates for girls in 1886. The coefficient is negative and significant. An increase of one standard deviation in the WID measure reduces the likelihood of girls being out of school by 5.54 percent. In column (2), I present the OLS estimate of the effect of WID on the out-of-school rates for all children. The coefficient is also negative but non-significant. In line with Becker's results, in terms of absolute human capital investments, these results suggest that the greater the effect of the war, the lower the out-of-school rate for girls. Notably, this does not hold for all children.

In column (3), I examine the effects of the war on relative human capital investments on girls relative to boys. The coefficient is big, positive but non-significant.

Table E.3: WID on Out of School Rates

	(1) OSR^{Girls}	(2) OSR^{Boys}	(3) OSR^{Ratio}
WID	-3.962***	0.387	4.599*
	(1.393)	(1.035)	(2.319)
Observations	88	88	87
Adjusted R^2	0.027	-0.011	0.003

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

F Male Survival Rates on IPV

Pre-War Female-Biased Sex Ratio Assumption

Table F.1: Male Survival Rates on IPV (logit and marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A)								
Marginal effects ($MSR_{\text{Lit GI}}$)	-0.253** (0.120)	-0.243*** (0.0722)	-0.0355 (0.0263)	-0.322** (0.126)	-0.0889 (0.0706)	-0.154*** (0.0471)	-0.0149 (0.0352)	-0.155** (0.0692)
N	4358	4358	4358	4358	4358	4358	4358	4358
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	0.002	0.003	0.000	0.003	0.012	0.010	0.004	0.013
Number of clusters	20	20	20	20	20	20	20	20
(B)								
Marginal effects (WID)	-0.186 (1.270)	0.346 (1.218)	-0.188 (0.425)	0.0741 (1.343)	-0.114 (1.271)	0.490 (1.193)	-0.175 (0.424)	0.198 (1.337)
Marginal effects ($\text{MSR}_{\text{Lit GI}}$)	-	-	-	-	-0.0880 (0.0957)	-0.160* (0.0852)	-0.0132 (0.0458)	-0.157 (0.0983)
N	4358	4358	4358	4358	4358	4358	4358	4358
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	.0123	.0087	.0039	.0125	.0125	.01	.0039	.0131
Number of clusters	280	280	280	280	280	280	280	280
ρ	0.0163							
St. dev. WID	0.0084							

Standard errors in parentheses

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

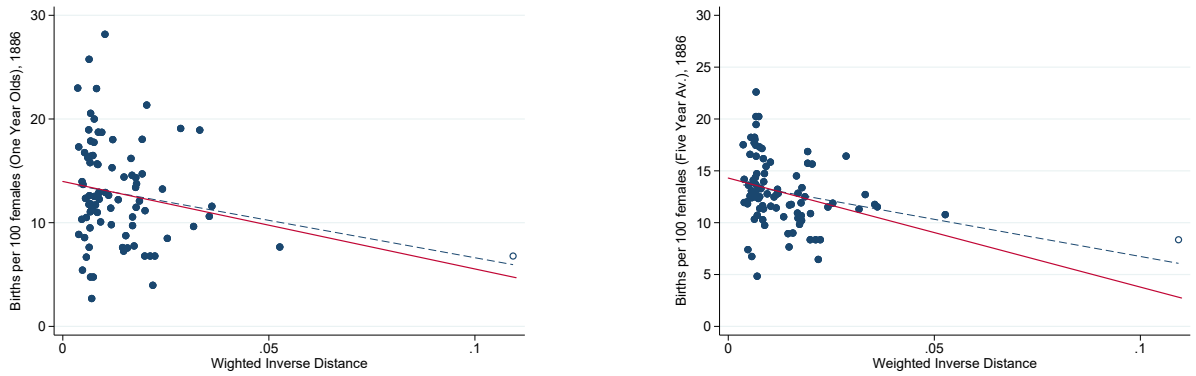
Note: Individual-level controls include age, area (urban/rural) and whether the female speaks Spanish.

G The Role of Fertility

I use census data from 1886 to examine whether there were changes in fertility across municipalities after the war and whether those changes play a role as part of a transmission channel.

G.1 WID on Fertility

The war could, in principle, have led to opposite outcomes with respect to fertility. On the one hand, changes in fertility rates might be evidence of the effects of male scarcity after the war in generating conservative gender norms.[41] Among the conservative gender norms that might arise, male reproductive control over females, particularly pregnancy promotion, might increase overall fertility (Moore *et al.*, 2010; Castillo and Melian, 2015).[42] However, the marriage market being worse for females also increases the numbers of unmarried females. More unmarried females might induce less overall fertility (Brainerd, 2017). Moreover, it is also possible that in areas more severely affected by the war, women increased their labour market participation and lowered their fertility as observed in many contemporaneous cases.



(a) Fertility First Year^{i,1} **(b)** Fertility 5 Year Av.^{i,1}

Figure G.1: WID and Post-War Fertility

Results:
(i) Exposure to the compulsory draft leads to lower post-war levels of fertility.
Notes:
(1) Hollow dots are considered outliers. The dashed line represents the linear prediction of the underlying observations including outliers while the solid line does not include outliers.

In Figure G.1a and Figure G.1b, I show a negative relationship between WID and fertility, independent of the fertility measure used and whether outliers area accounted for. Lower levels of fertility imply a slower return of the demographic variables to their natural rates. This evidence is in line with the idea that in marriage markets that are worse for females there are more unmarried females with lower fertility rates and that the increase in female labour participation after the war might have induced lower fertility rates rather than resulting in males exerting reproductive control over females to increase fertility.

In Column (1) of Table G.1, I analyse the effect of WID on births in 1886. Since there is a significant number of municipalities missing, in Column (2), I perform the same analysis with the one-year-olds in the Census. The coefficient is negative but insignificant.

Since this analysis is only cross-sectional, one possible concern is that 1886 is an abnormal year. To address this concern, I create a new measure using the five-year average. This is possible because the report of the 1886 Census in the 1886 Statistical Year Book provides information

[41] A lower number of males—both in absolute and relative terms with respect to females—could have decreased the bargaining power of females in the marriage market resulting in more conservative gender norms.

[42] Pregnancy promotion involves a male partner attempting to impregnate a woman, including verbal threats to get her pregnant and forced sex. Once the female is pregnant, a male partner resorts to behaviours that threaten a woman if she does not follow his wishes regarding the pregnancy.

Table G.1: WID on Births per 100 Females in 1886

	(1) Newborns	(2) One-year-olds	(3) Five-year Average
WID	30.19	-72.11***	-71.62***
	(22.79)	(23.35)	(19.49)
N	62	87	87
adj. R^2	-0.004	0.028	0.074

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

by the age and municipality of all children up to 5 years of age born in Paraguay. One caveat for this new measure is that it does not take into account potential spatial variation in child mortality. However, there is no record of any particular epidemic diseases at the time that might have affected one municipality more than the rest. In Column (3), I provide evidence that the higher the impact of the war on a municipality, the lower the fertility levels between 1881 and 1886.

G.2 Fertility as a Transmission Channel

In conditions of male scarcity, women are less likely to marry, more likely to have children out of wedlock, more likely to work and more likely to invest in human capital. In this section, I analyse the role of changes in fertility after the war in the transmission channels described. In Figure G.1a and Figure G.1b, I presented a negative relationship between WID and fertility, independent of the fertility measure used. The role of these changes in fertility patterns can be mechanical as lower fertility levels might have extended the duration of male scarcity in areas more severely affected by the war. However, as shown in Section 7.1, their consequences are not extended. Lower levels of fertility imply a slower return of the demographic variables presented in the previous section—sex ratios and absolute number of males—to their natural rates. It implies smaller populations and longer periods of fewer males being available relative to regions with higher fertility levels (all relative to differences in the pre-war population). In this context, these changes in fertility after the war might have prolonged the effects of the demographic variables analysed in the previous section. If these changes in fertility prolonged the effects of the female-biased sex ratios more than the effects of male survival rates, then lower levels of IPV would be expected. Otherwise, higher levels of IPV would be expected.

In this section, I analyse whether there are long-lasting effects of the changes in fertility after the war on current levels of IPV and which sign those effects have. To do so, I use the 1886 Census data from the 1886 Statistical Yearbook. Since data is only available by age bracket, traditional measures of fertility cannot be constructed. However, as a proxy for fertility, I use the number of newborn babies in the year 1886 over the number of fertile females (ages 15–50) to estimate whether there are long-term effects of fertility in 1886 on current levels of IPV.[43]

$$P(IPV_{ijk} = 1|Births_k, X_{ijk}) = \mathbb{1}(\beta_1 \, Births_k + X'_{ijk}\gamma \geq \varepsilon_{ijk}) \tag{G.1}$$

where $Births_k = \frac{Newborns}{Fertile\ Females} \cdot 100$ are newborns per 100 females in municipality k.

I then analyse whether these prolonged effects due to low fertility can explain the long-lasting effects of the war on IPV.

$$P(IPV_{ijk} = 1 \,|\, WID_{jk},\, Births_k,\, X_{ijk}) = \mathbb{1}\left(\beta_1 \, WID_{jk} + \beta_2 \, Births_k + X'_{ijk}\gamma \geq \varepsilon_{ijk}\right) \tag{G.2}$$

In Table G.2 Panel (A), I show the effects of fertility on IPV. Only the coefficient of the effect of fertility on sexual IPV is positive and significant. However, that coefficient and all the

[43] I assume that 2.5–3 generations live simultaneously. This assumption arises from the fact that the life expectancy at the time was around 45 years of age.

Table G.2: WID and Fertility on IPV (logit and marginal effects)

	(1) Emotional	(2) Physical	(3) Sexual	(4) Any kind	(5) Emotional	(6) Physical	(7) Sexual	(8) Any kind
(A)								
Marginal effects (Births	-	-	-	-	0.000270	0.000406	0.00156*	0.000275
per 100 females, 5y av.)	-	-	-	-	(0.00189)	(0.00129)	(0.000927)	(0.00208)
N	-	-	-	-	7805	7805	7804	7805
Ind. level controls	-	-	-	-	Yes	Yes	Yes	Yes
pseudo R^2	-	-	-	-	0.012	0.007	0.006	0.012
Number of clusters	-	-	-	-	38	38	38	38
(B)								
Marginal effects	0.912***	0.412	0.0768	0.954***	0.938***	0.434*	0.126	0.981***
(WID)	(0.291)	(0.268)	(0.103)	(0.330)	(0.275)	(0.259)	(0.105)	(0.308)
Marginal effects (Births	-	-	-	-	0.000935	0.000746	0.00165*	0.000952
per 100 females, 5y av.)					(0.00172)	(0.00116)	(0.000953)	(0.00190)
N	7805	7805	7804	7805	7805	7805	7804	7805
Ind. level controls	No	No	No	No	Yes	Yes	Yes	Yes
pseudo R^2	0.013	0.007	0.005	0.013	0.013	0.008	0.006	0.013
Number of clusters	38	38	38	38	38	38	38	38

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01
Note: Individual-level controls include the number of people in the household, age, area (urban/rural) and whether the female speaks Spanish.

rest are very close to zero. These results suggest that there are no direct long-term effects of the fertility changes after the war on IPV.

In Panel (B), I examine whether the effect of WID on IPV is absorbed by the fertility control. The WID estimates do not decrease with the inclusion of the fertility regressor. These results suggest that changes in fertility after the war have not prolonged the effects of any of the demographic variables and, therefore, are not part of any of the transmission channels described.

Download ZEW Discussion Papers from our ftp server:

http://ftp.zew.de/pub/zew-docs/dp/

or see:

https://www.ssrn.com/link/ZEW-Ctr-Euro-Econ-Research.html
https://ideas.repec.org/s/zbw/zewdip.html

IMPRINT

ZEW – Leibniz-Zentrum für Europäische Wirtschaftsforschung GmbH Mannheim
ZEW – Leibniz Centre for European Economic Research

L 7,1 · 68161 Mannheim · Germany
Phone +49 621 1235-01
info@zew.de · zew.de