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The Human Capital Consequences of Civil War: Evidence from Guatemala

Rubiana Chamarbagwala* and Hilcías E. Morán†
rchmarb@indiana.edu hems@banguat.gob.gt

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Abstract: We combine data from the 2002 National Population Census and the distribution of the number of victims and human rights violations across 22 departments to examine how the worst period of the civil war in Guatemala, between 1979 and 1984, affected human capital accumulation. The year of birth and the department of birth jointly determine an individual's exposure to the worst period of the civil war. Specifically, the identification strategy exploits variation in the war's intensity across departments and which cohorts were school age during the war. We find a strong negative impact of the civil war on female education, with exposed girls completing 0.44 years less schooling than non-exposed girls. Given an average of 3.65 years of schooling for females, this represents a 12 percent decline. This impact is stronger for older female cohorts exposed to the war, who completed 0.64 years less schooling, a decline of 17 percent. Older males exposed to the war were less likely to complete grades 7 to 12. However, older females exposed to the war experienced a larger decline in completing grades 4 to 12. These effects are robust to the inclusion of indicators for department of residence, year of birth, and controls for differential trends in human development in war affected and peaceful departments of Guatemala.

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* Corresponding Author: Department of Economics, Wylie Hall, Room 105, 100 S. Woodlawn, Indiana University, Bloomington, IN 47405

† Departamento de Investigaciones Económicas, 7a. Av. 22-01, zona 1, Banco de Guatemala, Guatemala City, Guatemala

1 Introduction

The microeconomic impact of war on civilian populations can be substantial and persistent. Not only can people living in war zones suffer injuries and have their property destroyed, they may also be displaced from their homes, lose their means of survival, or be unable to attend school, all of which may result in a permanent decline in their productivity and earnings. Understanding which economic consequences of conflict are more profound or persistent is important for implementing post-conflict reconstruction effectively. Moreover, since war costs tend to be disproportionately borne by the poor and most vulnerable populations, conflict may intensify poverty and inequality (Quinn et al. 2007). Thus, evidence of the negative consequences of war can help identify those populations that reconstruction policy should target. This paper examines how the worst period of the civil war in Guatemala (1979-1984) affected human capital accumulation of the population living in high war intensity departments and which social groups were worst affected.

There is a large literature that examines the aggregate effects of armed conflict on investment, income, and growth.¹ One set of studies finds that populations quickly recover back to pre-war trends. Cities that experienced heavy bombing during World War II were indistinguishable from those that were not bombed 20 to 25 years after the war in Japan (Davis & Weinstein 2002) and in Germany (Brakman et al. 2004). After the Vietnam War, Miguel & Roland (2005) find that physical infrastructure, education, and poverty levels all converged across regions within 25 years.

The cross-country literature also finds rapid recovery of postwar economies (Organski & Kugler 1977, 1980, Przeworski et al. 2000). Compared to currency crises, banking crises, and sudden shifts in executive power, Cerra & Saxena (2008) find that while civil wars cause the largest short-run fall in output (six percent on average), output

¹See Blattman & Miguel (2008) for an extensive survey of the causes and effects of civil war.

also rebounds quickly only in the case of civil war, recovering half of the fall within a decade. In countries affected by civil war, economic, social, and political development are also found to improve steadily after a war (Chen et al. 2008). Evidence on the short-run effects of war and violence also exists. Abadie & Gardeazabal (2003) find that terrorist violence in the Basque region of Spain significantly reduced economic growth relative to its neighboring regions. Justino & Verwimp (2006) find that 20 percent of the Rwandan population moved into poverty after the genocide. In a study of African countries affected by internal armed conflicts, Stewart et al. (2001) find that primary school enrollments decreased in only three out of eighteen countries, but improved in five during civil conflicts and that on average, girls fared better than boys since boys often serve in the army.

The recent availability of data from war regions has resulted in a growing empirical literature that estimates the microeconomic effects of war on income, poverty, wealth, health, and education, for both combatants and civilians. The long-term health effects of war appear to be significant. Alderman et al. (2004) find that young children who suffered from war-related malnutrition in Zimbabwe are significantly shorter as adults and that this may affect their lifetime labor productivity. Akresh et al. (2007) find a negative relationship between height-for-age z-scores and exposure to the Rwandan civil war, the effect being particularly strong for girls. In a similar paper, Akresh et al. (2008) find that an additional month of war exposure in rural Burundi decreases childrens' height-for-age z-scores compared to non-exposed children.

There is growing body of research that estimates the impact of war on schooling and labor market outcomes. Examining the effect of Uganda's civil conflict on combatants, Blattman & Annan (2007) find that male youth who were recruited into armed groups received less schooling, are less likely to have a skilled job, and also earn lower wages. de Walque (2006) finds that individuals with an urban, educated background were more

likely to have died during the Cambodian genocide period of 1975-1978 and as a result, males of school age during that period have less education than previous or subsequent cohorts. Akresh & de Walque (2008) find a strong negative impact of the Rwandan genocide on schooling, with children exposed to the civil war experiencing an 18.3 percent decline in their average years of education. The authors find a stronger negative effect for males and for the non-poor. For Central Asia, Shemyakina (2006) finds that adolescent Tajik girls whose homes were destroyed during the civil war are less likely to obtain secondary education and that this affects their wages. Unlike Stewart et al. (2001), de Walque (2006), and Akresh & de Walque (2008), Shemyakina (2006) finds that the civil war in Tajikistan only decreased school enrollments of 12-16 year old girls living in high conflict intensity areas but had no significant impact on the education of boys or younger children.

In this paper, we examine the impact of the worst period of the Guatemalan civil war (1979-1984) on childrens human capital accumulation. From 1960 to 1996, Guatemala experienced a 36-year civil war. The worst period of the war began in 1979 and ended in 1984, during which over 90 percent of the total human rights violations were committed. According to the Commission for Historical Clarification (CEH) and Recovery of Historical Memory Project (REMHI), roughly 200,000 individuals lost their lives or disappeared, more than 500,000 people or 8.3 percent of the 1983 population were displaced, and many Mayan villages were completely destroyed as a result of the civil war (Commission for Historical Clarification 1999, Archdiocese of Guatemala 1999, Perera & Chauche 1995)². Of the cases of human rights violations documented by the CEH, 83 percent of fully identified victims were Mayan and 17 percent were Ladino.³ Even

²The CEH was sponsored by the United Nations whereas the REMHI was sponsored by the Archdiocese of Guatemala.

³According to the Guatemalan population census of 2002, 41 percent of the total population was self-identified as Mayan and 59 percent was self-identified as Ladinos. Mayan refers to the native or indigenous population and Ladinos are a socio-ethnic category that in the Guatemalan case, represents a mix between Spanish and Mayans.

though the civil war in Guatemala lasted from 1960 to 1996, it began as a military rebellion that intensified during the 1970s. The period between 1960 and 1978 was relatively peaceful, until the worst period of the war began in 1979 and lasted until 1984. From 1985 onwards, the violence declined rapidly, until the war ended in 1996. Most human rights violations were committed by the state against the civilian population and left a large number of children orphaned and abandoned. Families and communities lost property and their means of survival. The increase in military spending diverted necessary investments of public resources away from health and education, resulting in the abandonment of social development.⁴ This accelerated the deterioration of health and educational conditions in those areas most severely affected by the confrontation. In addition, the destruction of physical assets, including private and community property, and the loss of infrastructure, such as bridges and electrical towers, also represented considerable losses and amounted to over 6 percent of the country's 1990 gross domestic product. These material losses frequently involved the total destruction of family capital, especially among Mayan families, and particularly in the west and north-west of Guatemala.

We use the 2002 National Population Census and the distribution of the number of victims and human rights violations across departments to examine the magnitude of the war's effect on years of schooling and grade completion and identify the groups which were most affected by the war. The empirical identification strategy exploits variation in the war's intensity across departments and which cohorts were school age during the war. Our results show a strong negative impact of the civil war on female education, with girls exposed to the 1979-1984 war during school age completing 0.44 years less schooling than non-exposed girls, which constitutes a 12 percent decline. This impact is stronger for older female cohorts exposed to the war, who completed 0.64 years

⁴In 1985, public investment in physical capital reached its lowest level in the last 40 years and represented only 2 percent of the country's GDP.

less schooling, a decline of 17 percent. Older males exposed to the war were less likely to complete grades 7 to 12. However, older females exposed to the war experienced a larger decline in completing grades 4 to 12. These effects are robust to the inclusion of indicators for department of residence and year of birth. Besides these controls, all our regressions include interactions between year of birth indicators and the availability of basic services in a department prior to the war, thereby controlling for different trends in human development in war affected and peaceful departments of Guatemala.

Our results show that the Guatemalan civil war had a negative impact on the human capital accumulation of both males and females who were of school age during the worst period of the war and suggests that the war may have had long-term economic consequences by lowering the adult wages and labor productivity of these individuals. In addition, the war appears to have intensified both regional and gender disparities in human capital accumulation. In 2002, 18 years after the worst period of the civil war ended, individuals in low war intensity departments had on average 1.83 years more schooling than those in high war intensity departments. Female education continued to lag behind male education even in 2002 throughout the entire country but especially so in departments that had experienced more fighting between 1979 and 1984.

This paper is structured as follows. Section 2 describes the historical context and impact of the civil war. Section 3 describes the data and empirical identification strategy. Section 4 presents the results and Section 5 concludes.

2 Civil War in Guatemala

2.1 Political History

Located in Central America, Guatemala borders Mexico to the north and west, the Pacific Ocean to the southwest, Belize and the Caribbean Sea to the northeast, and Honduras and El Salvador to the southeast. With a current population of 13,002,206. The

country consists of 22 geographical departments, which in turn consist of 331 counties. More than half of Guatemalans are descendants of indigenous Mayans and a substantial proportion of the population are of mixed European and indigenous ancestry and are known as Ladinos. Most of Guatemala's population is rural, though urbanization is accelerating. The predominant religion is Roman Catholicism, into which many indigenous Guatemalans have incorporated traditional forms of worship. Between 1960 and 1996, the country experienced a 36-year civil war, the worst period of which occurred between 1979 and 1984.

After Spanish colonial rule for 300 years, Guatemala gained independence from Spain in 1821. An authoritarian state was then created which excluded the indigenous population, was racist in its precepts and practices, and served to protect the economic interests of the privileged minority. The state gradually evolved as an instrument for the protection of the concentration of productive wealth in the hands of the non-Mayan population, guaranteeing the continuation of social exclusion and injustice, which led to protest and political instability. Faced with movements proposing economic, political, social, or cultural change, the state increasingly resorted to violence and terror in order to maintain social control.

Among the potential causes of the Guatemalan civil war was the chronic status quo of inequality and social exclusion that was inherited from the colonial period (Commission for Historical Clarification 1999, Archdiocese of Guatemala 1999, Perera & Chauche 1995). For example, in Quiché, the department most affected by the civil war and where almost 100 percent of the population is Mayan, by 1973 94 percent of the population did not have any basic services such as water, sanitation, and electricity.⁵ Other factors that may have played a relevant role in the Guatemalan civil war was the global cold war confrontation and U.S. economic interests. With the support of the CIA an authoritarian right-wing government was installed in 1954, after overthrowing the popular

⁵This data is from the population census of 1973.

elected liberal president Jacobo Arbenz. This liberal president had started an extensive land reform program in 1952, which adversely affected big land owners and favored mainly Mayan and poor Ladinos. After six years of authoritarian rule from 1954 to 1960, a group of junior military officers revolted in 1960. When they failed, several went into hiding and established close ties with Cuba, forming the first guerrilla group. This group became the nucleus of the forces that were in armed insurrection against the government for the next 36 years. Throughout the armed confrontation, insurgent groups adopted Marxist doctrine. At the end of 1996, the Government of President Alvaro Arzú Irigoyen, together with the Guatemalan National Revolutionary Unity (URNG), with the participation of the United Nations as moderator and with the support of the international community, concluded a long negotiating process, by signing the Peace Accords.

The CEH found that state forces and related paramilitary groups were responsible for 93 percent of the violations documented by the CEH, including 92 percent of the arbitrary executions and 91 percent of forced disappearances. Victims included men, women and children of all social strata: workers, professionals, church members, politicians, peasants, students and academics; in ethnic terms, the vast majority were Mayans. According to the CEH, 83 percent of fully identified victims were Mayan and 17 percent were Ladino.

Between 1962 and 1970, military operations were concentrated in the eastern part of the country, Guatemala City, and the south coast. During this period, the victims were mainly peasants, members of rural union organizations, university and secondary school teachers and students, and guerrilla sympathisers. Between 1971 and 1978, the military operations were more selective and geographically dispersed. Victims included community and union leaders, catechists, and students. During the most violent and bloody period of the entire armed confrontation, 1979 to 1984, military operations were

concentrated in Quiché, Huehuetenango, Chimaltenango, Alta and Baja Verapaz, the south coast, and the capital. During this period, 91 percent of the total human rights violations were committed, the victims being mainly Mayan and to a lesser extent Ladino. Figure 2, which shows the number of human rights violations committed by the state and guerrillas over the 1960-1996 period, reveals the sharp increase in these violations between 1979 and 1984. Figure 3 shows the geographical distribution of the victims of the civil war across Guatemala's 22 departments. With almost 96 victims per 1000 population, Quiché experienced the worst of the war, followed by Baha Verapaz, Alta Verapaz, Petén, and Huehuetenango. During the final period, 1985 to 1996, operations were selective and affected the Mayan and Ladino population to a similar extent.

2.2 Civilian Impacts of the War

Civil war can affect human capital accumulation through several channels. First, the forced displacement of families as well as the loss of income-earning members in families may reduce resources available to many households. In order to maintain certain consumption levels, resources may be drawn away from schooling and towards more basic needs such as food, shelter, clothing, and health. During the Guatemalan civil war, estimates of the number of displaced people vary from 500,000 to a million and a half people in the most intense period from 1981 to 1983, all of whom lost relatives and property. Moreover, the armed confrontation left a large number of children orphaned, abandoned, and their families destroyed. Thus, it is likely that children were removed from schools and possibly even made to engage in domestic or market work.

Second, infrastructure, such as schools and educational facilities, may be destroyed and teachers may be killed. As a result, children may have to travel long distances to attend school or stop attending school entirely. Third, since civilians are often the victims of armed forces and militias, parents may withdraw their children from school in order to keep them safe. A large number of children were among the direct victims

of arbitrary execution, forced disappearance, torture, rape, and other violations of their fundamental rights during the civil war in Guatemala. This may have induced parents to stop sending their children to school. Finally, the expected returns to schooling may fall as a result of civil wars, which may discourage parents from sending their children to school. The destruction of existing industries and lack of creation of new industries may result in a scarcity of skilled jobs, making parents redistribute household resources away from individuals with lower expected returns and toward those with higher ones.

Armed conflict may have a stronger impact on certain groups of individuals. While previous analyses of school enrollments have found that males fare particularly badly since they are more likely to become combatants (Stewart et al. 2001, de Walque 2006, Akresh & de Walque 2008), it is also possible that the most vulnerable groups in the population may be affected the most. For example, Shemyakina (2006)'s study finds that females rather than males received less secondary education in Tajikistan as a result of the civil war. This paper finds similar results for females exposed to the worst period of the civil war in Guatemala. Since girls in Guatemala receive less schooling on average, get married at an early age, and usually engage in household chores and child rearing rather than market work, they may be more likely to receive less schooling than boys, especially when resources become scarce. Parents may also withdraw their daughters from school in order to protect them from being sexually assaulted, raped, and harassed. Since women are often over-represented amongst the poor and because we find a more pronounced negative impact of the war on female schooling, our results show that armed conflict in Guatemala worsened the position of women amongst the poorest groups by deteriorating their educational attainment.

3 Data and Estimation

3.1 Data

In this paper we attempt to measure the effect that Guatemala’s civil war had on the educational achievements of cohorts who were exposed to the worst period of the war (1979-1984). We use several sources of data, including the 2002 National Population Census, which was published by the Instituto Nacional de Estadística, Guatemala. From the 2002 Census we get information on an individual’s department of birth and current department of residence. Due to the massive population displacement that occurred during the civil war, we restrict our analysis to individuals who had the same department of birth and department of residence at the time of the Census in 2002.⁶ Including only non-displaced individuals and those who did not migrate out of their department since their birth allows us to identify the department in which they lived during their school age. Restricting our sample to non-displaced and non-migrant individuals may, however, lead us to underestimate the effect of the civil war on schooling outcomes since displaced individuals and those who chose to move may have been more negatively affected by the war than non-displaced ones. We address this issue in Section 4.4. In order to allow for completion of education by 2002, we include individuals who were born between 1950 and 1977. The youngest cohort – i.e. those who were born in 1977 – were 25 years old in 2002 and therefore had the opportunity to complete college by the time of the 2002 census.

We use the 2002 Census to measure years of schooling and grade completion rates. Table 1 reports the average years of schooling and grade completion rates for all individuals born between 1950 and 1977 and separately for females and males. In Guatemala, primary school consists of grades 1 to 6, secondary school of grades 7 to 9, and high

⁶Restricting the sample to those who had the same county of birth and county of current residence provides very similar results, which are available from the authors upon request.

school includes grades 10 to 12.⁷ Individuals who were born between 1950 and 1960 were 19 to 29 years old in 1979, when the worst period of the civil war began, and were therefore not exposed to this period of the war when they were school age. However, individuals born between 1961 and 1977 were exposed to the worst period of the war during some or all of their primary, secondary, and high school years.

Since individuals born between 1961 and 1966 were exposed to the war during secondary and high school age, they may have been less likely to complete post-primary education. The oldest individuals in this cohort (those born in 1961) were 18 years old in 1979 and were exposed to the 1979-1984 period of the civil war during only 1 year of high school whereas the youngest among this cohort (those born in 1966) were 13 years old in 1979 and 18 years old in 1984 and were in secondary or high school during the entire period between 1979 and 1984. Given that the majority of individuals in Guatemala have no schooling or complete only some primary school and that completion of primary school is necessary for post-primary education, individuals who were primary school age for even some period between 1979 and 1984 (those born between 1967 and 1977) may have experienced the biggest impact of the war. The oldest in this cohort (those born in 1967) were 12 years old in 1979 and exposed to the war during one year of primary school and most of their secondary and high school years. The youngest among this cohort (those born in 1977) were 7 years old in 1984 and of primary school age during only 1 year of the worst period of the civil war.

As Table 1 shows, educational attainment improved over time for all individuals, males, and females. The average years of schooling increased by 44 percent, from 3.6 to 5.2 for individuals born between 1950-1960 and 1967-1977. The proportion of individuals completing grades 1 to 12 increased substantially for each successive cohort. A similar pattern is observed for males and females. The increase in educational attainment

⁷Children usually attend primary school when they are between 7 and 12 years old, secondary school when they are 13 to 15 years old, and high school when they are between 16 and 18 years old.

presented in Table 1 most likely reflects the general tendency in developing countries for schooling outcomes to improve over time and suggests that children who were school age during the worst period of Guatemala's civil war (1979-1984) did not attain less schooling on average than those who had completed school age by 1979.

Two data sources provide information on the geographical intensity of the civil war in Guatemala. The first data source is from the Recovery of Historical Memory Project and provides the number of victims in each of the country's 22 departments (Archdiocese of Guatemala 1999). The second source is from the Commission of Historical Clarification and provides the number of human rights violations and acts of violence across these 22 departments (Commission for Historical Clarification 1999). Using the total population in each department from the 1983 National Population Census, the year closest to the 1979-1984 period, we calculate the number of victims and human rights violations per 1000 population in these departments.⁸

As can be seen in Figure 3, the six departments with the highest number of victims per 1000 population include Quiché, Baha Verapaz, Alta Verapaz, Petén, Huehuetenango, and San Marcos. The highest number of human rights violations per 1000 population occurred in Quiché, Baha Verapaz, Huehuetenango, Alta Verapaz, Chimaltenango, and Petén. We categorize as high war intensity departments the five departments that fall in both categories – namely, Quiché, Baha Verapaz, Alta Verapaz, Petén, Huehuetenango – and the remaining 17 departments as low war intensity. Table 2 includes the average educational attainment in low and high war intensity departments for all three cohorts and shows a large gap in education between the two groups for all three cohorts.

From the 1973 National Population Census, we obtain information on the level of human development in the country's 22 departments prior to the start of the worst

⁸The 1983 Census was administered and published by the Dirección General de Estadísticas, Guatemala.

period of the war.⁹ This information includes the proportion of households without any access to water, sanitation, and electricity. We use this information to control for different trends in human development in high and low war intensity departments before the worst period of the war occurred in 1979. As discussed in the next section, ignoring these differential trends may bias our empirical results.

3.2 Empirical Analysis

The year of birth and the department of birth jointly determine an individual's exposure to the worst period of the civil war (1979-1984). The identification strategy therefore exploits variation in the war's intensity across departments and which cohorts were school age during the war. This identification strategy can be illustrated using a two-by-two difference-in-differences table. In Table 3, Panel A shows the average years of schooling for individuals exposed to the worst period of the civil war (1979-1984) when they were school age (those born between 1961 and 1977) and individuals who had completed school age by 1979 (those born between 1950 and 1960). Columns 1 and 2 show the average years of schooling for individuals in the 5 high intensity war departments and 17 low intensity war departments, respectively.

Educational attainment is higher for cohorts that were exposed compared to those that were not exposed to the worst period of the civil war in both high and low intensity war departments. This is consistent with the increasing trend in educational attainment in developing countries. Moreover, schooling in high war intensity departments is lower than that in low war intensity departments for both cohorts, indicating a higher level of schooling in low war intensity departments for cohorts who were school age before and after 1979. Calculating the difference-in-differences estimator indicates a decline of 0.36 years of schooling for the exposed cohort in high war intensity departments and the result is significant at the 1 percent level. Given an average of 3.92 years of schooling in

⁹The 1973 Census was administered and published by the Dirección General de Estadísticas, Guatemala.

Guatemala (see Table 1 column 4), the magnitude of the effect is large and represents a decline of 9 percent. Panels B and C report these figures for males and females and show a small difference-in-differences estimate for males (-0.13) but a large one for females (-0.55).

The exposed cohort was at least 25 years old in 2002 and had completed their school age by 2002, the Census year. The results in Table 3 therefore show that the exposed cohort in high intensity war departments did not simply delay their education but actually completed less schooling during their entire school age years. Tables 4 and 5 confirm this by examining the proportion of individuals completing grades 1 to 12. The difference-in-differences estimate is positive and statistically significant at the 1 percent level for grades 1 and 2, indicating that the exposed cohort in high war intensity departments had a higher probability of completing the two lowest grades. For grades 4 to 12, however, the difference-in-differences estimate is negative and statistically significant at the 1 percent level, showing a decrease in the proportion of the exposed cohort in high war intensity departments in completing grade 4 onwards. The largest impact of the civil war appears to have occurred for children in grade 6, which is the last year of primary school in Guatemala. For grade 6 completion, the difference-in-differences estimator shows a decline of 11 percentage points for the exposed cohort in high war intensity departments.

Tables 3 to 5 illustrate an empirical identification strategy that relies on the comparison between educational attainment among cohorts who were school age and those who had completed school age between 1979 and 1984 in low and high war intensity departments. The change in educational attainment between exposed and unexposed cohorts in low war intensity departments therefore acts as a control group for what the difference in educational attainment between the cohorts should have looked like in the absence of the civil war. Building on this preliminary analysis, we estimate Equation

1.¹⁰

$$Y_{icjt} = \alpha + \beta HWI_j + \gamma(HWI_j * Exposure_t) + \phi X_{icjt} + \delta_t + \lambda_c + \epsilon_{icjt} \quad (1)$$

Y_{icjt} is the number of years of education attained by individual i in county c in department j who was born in year t . HWI_j is an indicator for living in a high war intensity department and $Exposure_t$ is an indicator for being born between 1961 and 1977. The interaction of these two indicators is the key variable of interest, $(HWI_j * Exposure_t)$. X_{icjt} includes individual-specific controls for gender, sector of residence (urban or rural), and ethnicity (Mayan or non-Mayan) and ϵ_{icjt} is a random, idiosyncratic error term.

In order to control for unobserved correlation of observations within counties and for a specific birth cohort, we include county and year of birth fixed effects, λ_c and δ_t respectively. Including county fixed effects purges all observed and unobserved county characteristics that are constant across individuals from the same county, thereby removing any bias that is generated by county characteristics. Year of birth fixed effects control for cohort-specific shocks that may bias our results. Since correlation among the error terms of all individuals in a given location experiencing the same shocks may bias the OLS standard errors downward, all standard errors are clustered by an individual's county (Moulton 1986, 1990, Bertrand et al. 2004).

As discussed in Blattman & Miguel (2008), the validity of difference-in-differences methods to examine the impact of war on microeconomic outcomes relies on the assumption of similar underlying human development trends in war-affected and peaceful regions of countries. The difference-in-differences estimator in Equation 1 relies on the assumption that there were similar underlying trends in human development in high and low war intensity departments and that in the absence of the civil war, trends in educational attainment would have been similar in high and low war intensity departments. If, however, high war intensity departments had systematically lower levels of

¹⁰This estimation equation is similar to the one used by Duflo (2001). We estimate all regressions with a linear probability model. Alternatively, one can use a logit or probit model, which provide us with consistent results that are available upon request.

development than low war intensity departments prior to 1979, then poor educational attainment of the exposed cohort in high war intensity departments may not reflect the direct impact of the war but the declining socio-economic conditions that contributed to the civil war in the first place. Given the availability of census data both before and after the 1979-1984 period of Guatemala's civil war, we use data on pre-war levels of human development from the 1973 Census to examine the effect of the war on human capital accumulation despite varying pre-war trends in high and low war intensity departments.

Figure 4 plots the proportion of households without any basic service (water, sanitation, and electricity) in a department in 1973 against the rank of each department with respect to the number of victims and the number of human rights violations per 1000 population. The negative relationship between these two variables shows that departments with a higher proportion of households without any basic service in 1973 had a larger number of victims and human rights violations per 1000 population during the civil war. Thus, the level of human development in a department is highly correlated with the war intensity in that department and any decline in educational attainment that exposed cohorts experienced in high war intensity departments may be the result of pre-war disparities in development rather than a consequence of the war itself. In Equation 1, we therefore include interactions between year of birth indicators and a department's level of development before the worst period of the war. We use the proportion of households without any access to water, sanitation, and electricity in a department in 1973 to measure the level of development in each department prior to 1979. These interactions explicitly control for different trends in human development in high and low war intensity departments for individuals born in each year between 1950 and 1977, the inclusion of which constitutes a contribution of our paper to the existing literature.

4 Results

4.1 Baseline Difference-in-Differences Estimation

Table 6 presents regression results for Equation 1 using years of education as the dependent variable. The difference-in-differences estimate is the coefficient of the interaction between an indicator for the exposed cohort (individuals born between 1961 and 1977) and an indicator for whether or not the individual lives in a high war intensity department. We restrict our analysis to individuals who have the same department of birth and residence in 2002 and limit the sample to individuals who were born between 1950 and 1977.¹¹

Columns (1), (3), (5), and (7) of Table 6 present results of regressions that don't control for differential human development trends in high and low war intensity departments whereas columns (2), (4), (6), and (8) show results of regressions that explicitly control for these differential trends by including interactions between year of birth indicators and the availability of basic services in a department in 1973. There is very little difference in the magnitude and significance of the difference-in-differences estimates with and without controls for differential trends in human development across the 22 departments. This suggests that our results are not being driven by different pre-war trends in human development in high and low war intensity departments.

Column (2) Table 6 shows a negative impact of the civil war of -0.24 years of education, which is slightly smaller than the corresponding estimate in Table 3 that was obtained without any controls. The difference-in-differences regression coefficient is significant at the 1 percent level. Within a given department and for an individual of a given age, being of school age in a high war intensity department during the worst

¹¹Restricting the sample to those who had the same county of birth and county of residence in 2002 provides qualitatively similar results. We don't include individuals born after 1977 because they may not have completed their education by the census year, 2002. The youngest individuals in our sample – those born in 1977 – were 25 years old in 2002 and therefore had the opportunity to complete even college education. The results are qualitatively similar if we increase the sample to include individuals born between 1940 and 1977 or between 1930 and 1977.

period of Guatemala’s civil war (1979-1984) implies significantly lower schooling. That this effect is robust to the inclusion of interactions between year of birth indicators and the availability of basic services in a department in 1973, suggests that this effect is not driven by differential human development trends in high and low war intensity departments that existed prior to the 1979-1984 period of the war. Rather, the civil war between 1979 and 1984 appears to have contributed to lower educational attainment of exposed cohorts in high war intensity departments.

In order to explore the heterogeneity of the impact of the civil war , in columns (3) and (4) we interact the difference-in-differences variable with female, rural, and Mayan indicators. According to the CEH and REMHI, rural areas and Mayan communities experienced the worst effects of the war, which suggests that these groups may have fared particularly badly with respect to educational attainment. As explained in Section 2.2, there may be gender differences in the effect of civil war on education outcomes. Since males become combatants, boys may be more likely to receive less schooling. On the other hand, due to less participation in market work as adults and lower expected returns to education for females as well as the security risks that are borne disproportionately by females, schooling of girls may be affected more by civil war.

Columns (3) and (4) show that the civil war only had an effect on the years of schooling of females and no effect on males. Moreover, we find no statistically significant difference between the years schooling of urban and rural individuals or between Mayans and non-Mayans for the exposed cohort. We explore this result further by estimating separate regressions for females and males in columns (5) to (8) and find that females who were of school age in high war intensity departments between 1979 and 1984 received 0.44 less years of schooling, which given an average of 3.65 years of schooling for females in the entire census (see Table 1 column 4), represents a decline of 12 percent. The interactions of the difference-in-differences variable with rural and Mayan indicators are

statistically insignificant, showing that rural and Mayan females did not receive less schooling than their urban and non-Mayan counterparts. Our results therefore contrast with those of Stewart et al. (2001), de Walque (2006) and Akresh & de Walque (2008), who find a more pronounced effect of civil war on the education of boys, but are similar to Shemyakina (2006)'s findings for Tajikistan.

That we find no effect of the civil war on years of schooling of males suggests that even though boys may be expected to attain less schooling during a civil war as a result of becoming combatants, girls may receive less education when household property is lost and economic resources become more scarce. Parents may redistribute scarce resources away from girls, who are more likely to engage in household chores and child-rearing as adults, and towards boys, who as adults are more likely to engage in market work and become sole or principal income earners in their families. Parents may also stop sending their daughters to school due to security fears since females are at greater risk of being sexually assaulted, raped, and harassed during a civil war.

4.2 Younger and Older Exposed Cohorts

The previous section showed that the civil war decreased schooling of females but not males, indicating a reallocation of scarce household resources towards safer and higher expected returns, namely the education of boys. In this section, we examine how the civil war affected younger and older cohorts that were exposed to it, allowing us to understand the mechanism of this reallocation. To explore the heterogeneity of the impact of the war on older and younger exposed cohorts, we divide the cohort exposed to the civil war during school age into two groups. The older cohort consists of individuals born between 1961 and 1966, who were secondary and/or high school age between 1979 and 1984. The younger cohort consists of individuals who were born between 1967 and 1977 and therefore were in primary school during at least part of the worst period of the civil war from 1979 to 1984. The majority of individuals in Guatemala obtain either

no education or some primary education, with less than 25 percent of the population receiving more than primary education. Moreover, completion of primary school is necessary for post-primary education. Thus, individuals who were primary school age – i.e. those born between 1967 and 1977 – may have experienced a larger negative impact of the war.

Table 7 reports results of estimating an equation similar to Equation 1 with indicators for two groups of exposed cohorts – one born between 1961 and 1966 and the other born between 1967 and 1977. The difference-in-differences variables include interactions of these two cohorts with the indicator for whether or not the individual lives in a high war intensity department. Column (2) shows a smaller effect of the civil war on the older cohort (-0.24) and a slightly larger effect for the younger cohort (-0.34), a result which is not surprising given that the majority of the population does not attain post-primary schooling. In columns (3) and (4) we interact the difference-in-differences variables with female, rural, and Mayan indicators. Similar to the results in Table 6, we find a statistically significant negative impact of the war only for females and on both older and younger female cohorts, both coefficients of which have similar magnitudes (-0.21 and -0.25). Also similar to the results presented in Table 6, we find no statistically significant difference between the schooling of urban and rural individuals or between Mayans and non-Mayans for both older and younger exposed cohorts.

Estimating separate regressions for females and males in columns (5) to (8), we find no effect of the war on the schooling of males. For females, we find a large effect for those born between 1961 and 1966 and a statistically insignificant effect for those born between 1967 and 1977. This result contrasts with those reported in columns (3) and (4) for the full sample and is also contrary to our expectation that primary school age children may have fared worse than post-primary school age children. Females born between 1961 and 1966 who lived in high war intensity departments received 0.64 less years of schooling,

a decline of 17 percent. Again, we find no statistically significant difference between the schooling of urban and rural females and males or between Mayans and non-Mayans for both older and younger exposed female and male cohorts.

That the civil war had the most pronounced negative impact on the schooling of older girls exposed to the war suggests that the war imposed a negative shock on affected households, and that scarce household resources were redistributed towards safer investments, such as the education of boys and basic education for young girls. We explore this hypothesis further in the next section by examining grade completion separately for males and females.

4.3 Grade Completion

Following the same logic as Table 7, Tables 8 and 9 report results for completion of each grade from 1 to 12. The objective of this analysis is to determine at which grade level the civil war had the largest negative impact and for which groups.

Individuals born between 1961 and 1966 had already completed grades 1 to 6 and were secondary and/or high school age during the 1979-1984 period of the war. We therefore expect to find a strong negative impact of the war on completion of secondary and high school grades for this cohort, but not on completion of primary grades. Row (1) in Tables 8 and 9 shows that males born between 1961 and 1966 in high war intensity departments had a higher probability of completing grades 1 to 3 and a lower probability of completing grades 7 to 12. While females born between 1961 and 1966 in high war intensity departments had a higher probability of completing grades 1 and 2, they were less likely to complete grades 4 to 12. The magnitude of these coefficients is larger for females than for males and peak for females completing grades 7 to 9. These results are consistent with those found in Table 7 where older females exposed to the war received 0.64 less years of schooling. However, unlike the results reported in Table 7, where no impact of the war was found on males, these results show that older males also

experienced less schooling, being less likely to complete each grade in secondary and high school by roughly 4 percentage points.

The coefficient on the interaction between the difference-in-differences indicator for the older cohort and the rural dummy variable (row (3) in Tables 8 and 9) shows that older rural males were less likely to complete grades 1 to 5. This result is not surprising given that rural areas experienced more fighting than urban ones and that males usually become combatants. Since males born between 1961 and 1966 were of primary school age before 1979, this result cannot be attributed to the effect of the worst period of the civil war, but instead may be due to the deteriorating situation in rural areas during the period leading up to 1979-1984. Among the older cohort exposed to the war, rural females were less likely to complete grades 1 to 3 and more likely to complete grades 7 to 11 compared to their urban counterparts.

The coefficient on the interaction between the difference-in-differences indicator for the older cohort and the Mayan dummy (row (5) in Tables 8 and 9) shows that Mayan boys were less likely to complete grades 1 to 3 whereas Mayan girls were less likely to complete grades 1 and 2. Again, this result cannot be attributed to the effect of the worst period of the civil war since the older cohort was of primary school age before 1979, and like the result for rural areas (row (3)) most likely reflects the deteriorating circumstances of the Mayan population prior to their 1979-1984 period. This effect reverses at higher grades, which is surprising. The likelihood of completing grades 7 to 12 was higher for Mayan girls compared to non-Mayans among the older exposed cohort.

The finding that at higher grades, rural and Mayan females were more likely to complete secondary and high school grades compared to their urban and non-Mayan counterparts among the older exposed cohort is surprising for two reasons. First, the urban and non-Mayan population in Guatemala are wealthier and more privileged than the rural and Mayan population. Second, according to the CEH and REMHI, the

majority of victims of the civil war were rural and Mayan people (Commission for Historical Clarification 1999, Archdiocese of Guatemala 1999).¹² The war therefore appears to have narrowed the gap between urban and rural as well as between Mayan and non-Mayan schooling outcomes among older girls who were exposed to the war. This result, however, may be driven by our focus on only non-displaced and non-migrant individuals. It is likely that those individuals who were displaced or chose to move away as a result of the war were more affected by the fighting and violence. If non-displaced and non-migrant rural and Mayan families were socio-economically better off than their displaced and migrant counterparts, then the effect of the war on these individuals may indeed be smaller than on their urban and non-Mayan counterparts.

Moving on to the younger exposed cohort, namely those who were born between 1967 and 1977 in high war intensity departments, these individuals were primary school age during the worst period of the war. They may have, therefore, not only received less primary schooling but also received less secondary and high school education due to less primary schooling. Row (2) in Tables 8 and 9 show that boys in the younger exposed cohort were more likely to complete grades 1 to 3 but less likely to complete grades 9 to 12. The coefficient of the difference-in-differences variable for the younger exposed male cohort is statistically insignificant for all other grades. Girls in the younger exposed cohort were more likely to complete grade 1 but less likely to complete grades 4 to 6. Completion of secondary and high school grades were not affected for the younger exposed female cohort. The interaction of the difference-in-differences variable for the younger exposed cohort with the rural dummy (row (4) in Tables 8 and 9) shows that rural females were less likely to complete grades 1 to 4, thus widening the urban-rural schooling gap for younger females. Similar to the results presented in Table 7, the effect of the war on grade completion of the younger exposed cohort is smaller in magnitude

¹²This result is similar to Akresh & de Walque (2008), who find the strongest negative shock of Rwanda's genocide on schooling of children in non-poor households.

compared to the older exposed cohort.

The results for grade completion reinforce the hypothesis that the civil war acted as a negative shock on households and show that in addition to reallocating resources away from older girls in grades 4 and above, households also diverted resources away from educating older boys in secondary and high school. These results also show that households shifted resources towards educating younger boys in grades 1, 2, and 3 and younger girls in grade 1.

Using the difference-in-differences coefficients for older and younger exposed cohorts (from rows (1) and (2) of Tables 8 and 9) and the average proportion of males and females who completed each grade, Table 10 presents the percent decline in the proportion of males and females who completed each grade that is predicted by our estimation.¹³ The percent decline in grade completion is larger for the older exposed cohort than the younger one and largest for older exposed females. Older males exposed to the war were less likely to complete grades 7 to 12, the largest decline of 33 percent occurring for completion of grade 11. Older females were less likely to complete grades 4 to 12, their decline in completing grades 7 to 12 being much larger than those for older males and ranging from a 10 percent fall in completing grade 4 to a 49 percent decrease in completing grade 11.

4.4 Results for Migrant and Non-Migrant Individuals

As discussed in Section 3.1, restricting our estimation sample to only non-displaced and non-migrant individuals allows us to identify the department in which they lived during their school age but may lead us to underestimate the effect of the civil war on schooling outcomes. This may happen if displaced and migrant individuals were more negatively affected by the war than non-displaced and non-migrant people.

To check the validity of this argument, we estimated all regressions using the full

¹³A percent change of 0 corresponds to a statistically insignificant difference-in-differences coefficient from Tables 8 and 9.

sample – i.e. both displaced/migrant and non-displaced/non-migrant individuals – and report the results for years of schooling in Tables 11 and 12. The results are very similar for the full sample. While the magnitude of the difference-in-difference coefficients is smaller with the full sample, the level of significance is the same.

The coefficient estimates being smaller for the full sample compared to the non-migrant sample suggests that the civil war did not have a worse effect on the schooling of displaced and migrant individuals and that we are not underestimating the educational impact of the war by restricting our sample to the non-displaced and non-migrant population.

5 Conclusion

In this paper, we investigate the impact of the worst period of Guatemala’s civil war (1979-1984) on educational outcomes of individuals. The empirical identification strategy uses a difference-in-differences approach by comparing the difference in the schooling of cohorts who were school age between 1979 and 1984 with those who had completed school age by 1979 in departments that experienced high and low war intensity. Besides including fixed effects for an individuals department of residence and year of birth, we also include interactions between year of birth indicators and the availability of basic services in a department prior to the war. These interactions allow us to control for differences in pre-war levels of human development in high and low war intensity departments, that may have influenced levels and trends in educational attainment in these departments even in the absence of the war.

We find that females who were born between 1961 and 1977 in high war intensity departments experienced 0.44 years less schooling, a 12 percent decline relative to the average educational attainment. This impact is stronger for older female cohorts exposed to the war (those born between 1961 and 1966), who completed 0.64 years less schooling,

a decline of 17 percent. Older males exposed to the war were less likely to complete grades 7 to 12. However, older females exposed to the war experienced a larger decline in completing grades 4 to 12.

Understanding the mechanisms by which civil war affects human capital formation and accumulation is important in formulating effective post-war policies to protect individuals from the negative consequences of wars. While our analysis does indicate some likely mechanisms through which households responded to the civil war, our data does not allow us to address whether or not it was through orphanhood that exposed school age children received less education. As discussed in 2.2, civil war can result in the displacement of families and the loss of property and means of livelihood. It can cause the destruction of schools and infrastructure and delay the construction of new schools due to the loss of capital and human resources. It can also heighten security fears, especially for girls. Moreover, the destruction of existing industries and lack of development of new ones may reduce the expected returns to education for both boys and girls. All these factors may discourage investment in human capital during a civil war and result in low levels of human capital formation and accumulation among individuals exposed to war.

Our results suggest that the worst period of Guatemala's civil war may have acted as a negative shock to households in high war intensity departments. Due to loss of property and the massive displacement of families, households may have reallocated limited resources towards providing young boys, and to a less extent young girls, with at least some primary education. While both boys and girls received less secondary and high school education as a result of the war, this effect was more pronounced for females for whom expected returns to education are generally lower and security fears higher. That the war had its worst effect on females indicates that it worsened the position of women amongst the poorest groups by deteriorating their educational attainment. Our

results also show that at higher grades, rural and Mayan females were better off than their urban and non-Mayan counterparts. The war therefore appears to have narrowed the gap between urban and rural as well as between Mayan and non-Mayan schooling outcomes among older girls who were exposed to the war, thus reducing the educational gaps between these groups.

Even though the destruction of schooling infrastructure may be responsible for worse educational outcomes during and after a civil war, we find that young boys exposed to the war were more likely to complete grades 1 to 3. Moreover, the largest negative effects of the war are found for older males and females in completing high school grades. Both these results indicate that it was not the destruction of schooling infrastructure that was primarily responsible for the decline in educational attainment. More likely, a lower probability of progressing from one grade to another rather than not attaining any education appears to have driven lower schooling as a result of Guatemala's civil war.

Our results indicate that exposure to the 1979-1984 period of Guatemala's civil war had a large, negative, and long-term effect on the education of boys and particularly girls who were of secondary and high school age. These results can be explained by a combination of factors. First, a large number of educated individuals were killed during the war. Second, and more importantly, households experienced a negative shock through the loss of property, their means of livelihood and wealth, and the death of income-earning family members. As a result, resources may have been diverted from education in general and the schooling of older boys and particularly older girls.

If the civil war in Guatemala disproportionately killed educated individuals, we would overestimate the true effect of the war on the educational attainment of survivors. According to the CEH, REMHI, and Perera & Chauche (1995), a large proportion of college students were killed during the earlier years of the war since they supported the rural Mayans. Our results could therefore be partly a result of this. However, college

students were mostly targeted during the 1960s and early 1970s, the period leading up to and well before the worst period of the civil war in 1979 (Commission for Historical Clarification 1999, Archdiocese of Guatemala 1999, Perera & Chauche 1995). As the war progressed during the mid-1970s and peaked between 1979 and 1984, uneducated rural Mayans became the focus of military operations and constituted roughly 83 percent of all victims of the war. Since our analysis focuses on individuals who were born between 1961 and 1977, the oldest cohort was between 18 and 23 years old from 1979 to 1984 and was school age before 1979. There is no evidence that school age children were disproportionately killed between 1979 and 1984, making it unlikely that the death of educated individuals are driving our results. Rather, the disproportionate killing of uneducated rural and Mayan civilians, together with the killing of college students *before* 1979-1984, suggests that our results are, at least to some extent, due to negative income shocks experienced by families during the war. These families appear to have reallocated scarce household resources away from educating older children, especially older girls.

Table 13 reveals sharp differences in the average years of schooling and proportion of individuals completing grades 1 to 12 between high and low war intensity departments even in 2002, 18 years after the worst period of the civil war ended.¹⁴ While gender differences exist in all departments, they are stronger in those that experienced a high level of conflict between 1979 and 1984. Regional disparities between high and low war intensity departments also exist, the greatest differentials being for females in primary school grades. Given the already unbalanced levels of human development and educational attainment in high and low war intensity departments that existed prior to 1979, the worst period of the war between 1979 and 1984 appears to have intensified both regional and gender disparities in human capital accumulation, which still existed at the time of the census in 2002.

¹⁴Data for all cohorts and migrant and non-migrant individuals are used to construct Table 13.

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Figure 1: Map of Guatemala

Figure 2: Number of Killings and Disappearances in Guatemala: 1960-1996

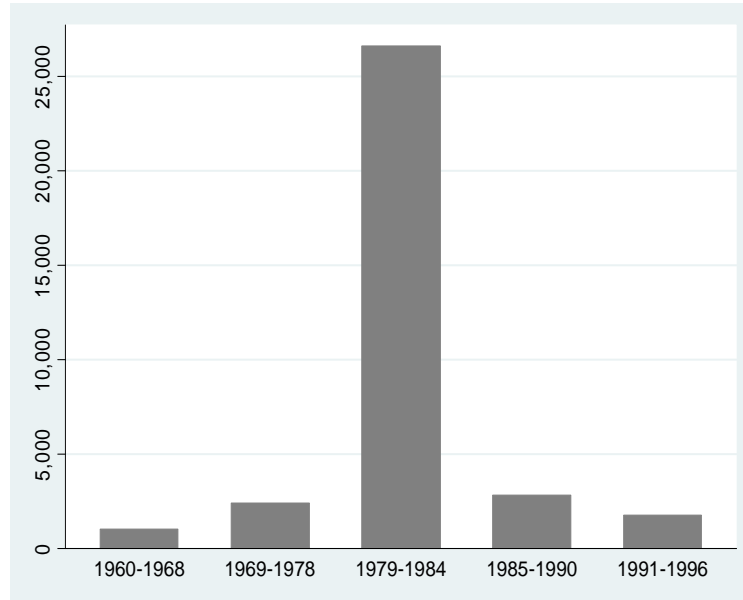


Figure 3: Number of Victims and Human Rights Violations Per 1000 Population in Departments

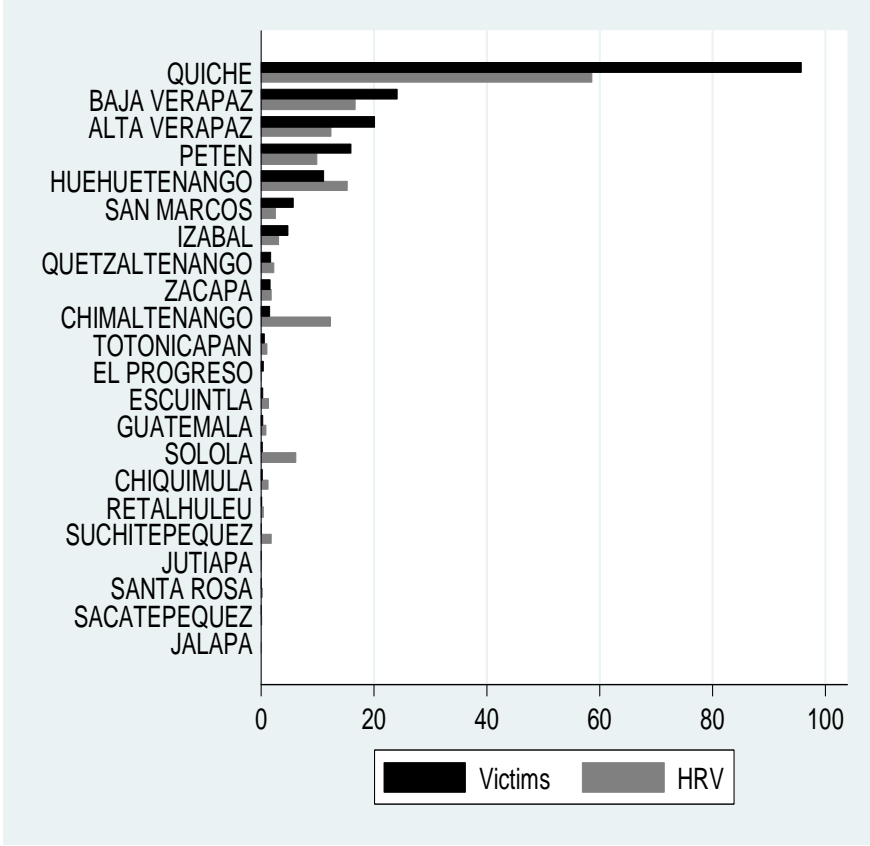


Figure 4: Availability of Basic Services in 1973 and Rank of Departments: By Number of Victims and Number of Human Rights Violations

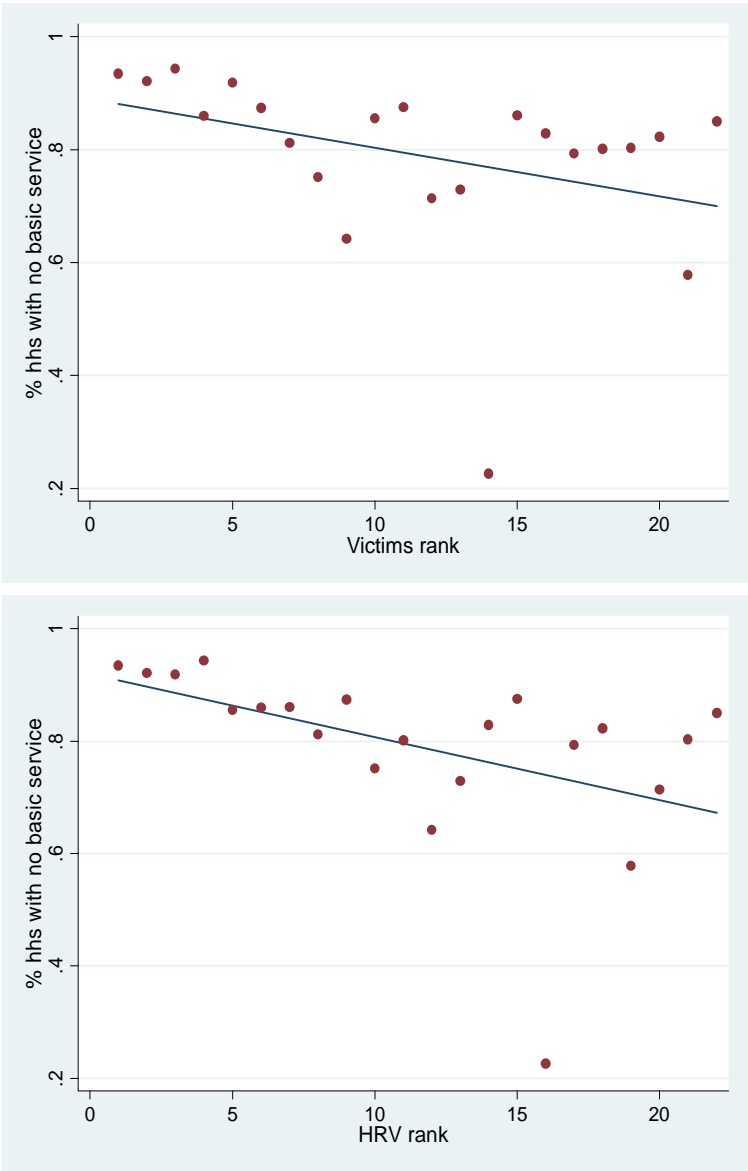


Table 1: Educational Attainment in Guatemala

| Educational Attainment | Born Between 1950 and 1960 | Born Between 1961 and 1966 | Born Between 1967 and 1977 | Born Between 1904 and 2002 |
|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Panel A: All Individuals | | | | |
| Years of Schooling | 3.60 | 4.42 | 5.20 | 3.92 |
| Grade 1 | 0.56 | 0.64 | 0.73 | 0.71 |
| Grade 2 | 0.52 | 0.61 | 0.70 | 0.65 |
| Grade 3 | 0.44 | 0.53 | 0.62 | 0.55 |
| Grade 4 | 0.34 | 0.43 | 0.51 | 0.45 |
| Grade 5 | 0.30 | 0.38 | 0.46 | 0.38 |
| Grade 6 | 0.28 | 0.36 | 0.42 | 0.34 |
| Grade 7 | 0.17 | 0.22 | 0.27 | 0.22 |
| Grade 8 | 0.16 | 0.21 | 0.26 | 0.20 |
| Grade 9 | 0.15 | 0.19 | 0.24 | 0.18 |
| Grade 10 | 0.12 | 0.16 | 0.19 | 0.14 |
| Grade 11 | 0.12 | 0.15 | 0.18 | 0.13 |
| Grade 12 | 0.10 | 0.13 | 0.15 | 0.11 |
| Observations | 761,571 | 536,754 | 1,332,867 | 8,176,500 |
| Panel B: Males Only | | | | |
| Years of Schooling | 4.23 | 5.05 | 5.79 | 4.21 |
| Grade 1 | 0.65 | 0.73 | 0.80 | 0.76 |
| Grade 2 | 0.61 | 0.69 | 0.77 | 0.69 |
| Grade 3 | 0.51 | 0.60 | 0.69 | 0.59 |
| Grade 4 | 0.40 | 0.49 | 0.58 | 0.48 |
| Grade 5 | 0.35 | 0.43 | 0.52 | 0.41 |
| Grade 6 | 0.33 | 0.41 | 0.48 | 0.36 |
| Grade 7 | 0.19 | 0.24 | 0.30 | 0.23 |
| Grade 8 | 0.18 | 0.23 | 0.28 | 0.21 |
| Grade 9 | 0.17 | 0.21 | 0.26 | 0.18 |
| Grade 10 | 0.14 | 0.17 | 0.20 | 0.15 |
| Grade 11 | 0.13 | 0.16 | 0.19 | 0.14 |
| Grade 12 | 0.11 | 0.14 | 0.16 | 0.12 |
| Observations | 366,797 | 253,455 | 617,530 | 3,987,492 |
| Panel C: Females Only | | | | |
| Years of Schooling | 3.02 | 3.86 | 4.69 | 3.65 |
| Grade 1 | 0.47 | 0.56 | 0.66 | 0.67 |
| Grade 2 | 0.43 | 0.53 | 0.63 | 0.61 |
| Grade 3 | 0.37 | 0.46 | 0.55 | 0.51 |
| Grade 4 | 0.29 | 0.37 | 0.46 | 0.41 |
| Grade 5 | 0.26 | 0.33 | 0.40 | 0.35 |
| Grade 6 | 0.24 | 0.31 | 0.38 | 0.31 |
| Grade 7 | 0.14 | 0.19 | 0.25 | 0.21 |
| Grade 8 | 0.14 | 0.19 | 0.23 | 0.19 |
| Grade 9 | 0.13 | 0.17 | 0.22 | 0.17 |
| Grade 10 | 0.11 | 0.14 | 0.18 | 0.14 |
| Grade 11 | 0.10 | 0.14 | 0.17 | 0.13 |
| Grade 12 | 0.09 | 0.12 | 0.14 | 0.11 |
| Observations | 394,774 | 283,299 | 715,337 | 4,189,008 |

Data Source: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala). Only individuals who had the same department of birth as their current department of residence in 2002 were included in computing these figures.

Table 2: Educational Attainment in Guatemala: Low and High War Intensity Departments

| Educational Attainment | Low War Intensity Departments | | | High War Intensity Departments | | |
|---------------------------------|-------------------------------|----------------|----------------|--------------------------------|----------------|----------------|
| | Born 1950-1960 | Born 1961-1966 | Born 1967-1977 | Born 1950-1960 | Born 1961-1966 | Born 1967-1977 |
| <u>Panel A: All Individuals</u> | | | | | | |
| Years of Schooling | 4.21 | 5.08 | 5.93 | 1.63 | 2.20 | 2.94 |
| Grade 1 | 0.63 | 0.71 | 0.79 | 0.32 | 0.41 | 0.54 |
| Grade 2 | 0.59 | 0.67 | 0.76 | 0.29 | 0.38 | 0.51 |
| Grade 3 | 0.50 | 0.59 | 0.68 | 0.23 | 0.31 | 0.41 |
| Grade 4 | 0.40 | 0.49 | 0.58 | 0.16 | 0.22 | 0.31 |
| Grade 5 | 0.35 | 0.44 | 0.52 | 0.13 | 0.18 | 0.25 |
| Grade 6 | 0.33 | 0.41 | 0.49 | 0.12 | 0.16 | 0.22 |
| Grade 7 | 0.20 | 0.26 | 0.32 | 0.06 | 0.09 | 0.12 |
| Grade 8 | 0.19 | 0.24 | 0.30 | 0.06 | 0.08 | 0.11 |
| Grade 9 | 0.18 | 0.23 | 0.28 | 0.05 | 0.08 | 0.10 |
| Grade 10 | 0.14 | 0.19 | 0.22 | 0.04 | 0.06 | 0.08 |
| Grade 11 | 0.14 | 0.18 | 0.21 | 0.04 | 0.06 | 0.07 |
| Grade 12 | 0.12 | 0.15 | 0.18 | 0.04 | 0.05 | 0.06 |
| Observations | 582,689 | 413,355 | 1,008,633 | 178,882 | 123,399 | 324,234 |
| <u>Panel B: Males Only</u> | | | | | | |
| Years of Schooling | 4.85 | 5.69 | 6.46 | 2.21 | 2.91 | 3.68 |
| Grade 1 | 0.72 | 0.79 | 0.85 | 0.44 | 0.56 | 0.68 |
| Grade 2 | 0.67 | 0.75 | 0.81 | 0.40 | 0.52 | 0.64 |
| Grade 3 | 0.58 | 0.66 | 0.74 | 0.31 | 0.41 | 0.53 |
| Grade 4 | 0.45 | 0.55 | 0.64 | 0.21 | 0.29 | 0.39 |
| Grade 5 | 0.40 | 0.49 | 0.58 | 0.17 | 0.24 | 0.32 |
| Grade 6 | 0.38 | 0.46 | 0.55 | 0.15 | 0.21 | 0.28 |
| Grade 7 | 0.22 | 0.28 | 0.35 | 0.08 | 0.11 | 0.14 |
| Grade 8 | 0.21 | 0.27 | 0.33 | 0.07 | 0.10 | 0.13 |
| Grade 9 | 0.20 | 0.25 | 0.30 | 0.07 | 0.09 | 0.12 |
| Grade 10 | 0.16 | 0.20 | 0.24 | 0.06 | 0.07 | 0.09 |
| Grade 11 | 0.16 | 0.19 | 0.23 | 0.05 | 0.07 | 0.08 |
| Grade 12 | 0.13 | 0.16 | 0.19 | 0.05 | 0.06 | 0.07 |
| Observations | 279,896 | 194,767 | 467,868 | 86,901 | 58,688 | 149,662 |
| <u>Panel C: Females Only</u> | | | | | | |
| Years of Schooling | 3.62 | 4.54 | 5.46 | 1.07 | 1.56 | 2.31 |
| Grade 1 | 0.55 | 0.64 | 0.74 | 0.20 | 0.28 | 0.42 |
| Grade 2 | 0.51 | 0.61 | 0.71 | 0.18 | 0.26 | 0.40 |
| Grade 3 | 0.44 | 0.53 | 0.63 | 0.15 | 0.21 | 0.32 |
| Grade 4 | 0.35 | 0.44 | 0.53 | 0.10 | 0.15 | 0.23 |
| Grade 5 | 0.31 | 0.39 | 0.47 | 0.09 | 0.13 | 0.19 |
| Grade 6 | 0.29 | 0.37 | 0.44 | 0.08 | 0.12 | 0.17 |
| Grade 7 | 0.17 | 0.23 | 0.29 | 0.04 | 0.07 | 0.10 |
| Grade 8 | 0.17 | 0.22 | 0.28 | 0.04 | 0.06 | 0.09 |
| Grade 9 | 0.16 | 0.21 | 0.26 | 0.04 | 0.06 | 0.08 |
| Grade 10 | 0.13 | 0.17 | 0.21 | 0.03 | 0.05 | 0.07 |
| Grade 11 | 0.12 | 0.16 | 0.20 | 0.03 | 0.05 | 0.06 |
| Grade 12 | 0.11 | 0.14 | 0.17 | 0.03 | 0.04 | 0.06 |
| Observations | 302,793 | 218,588 | 540,765 | 91,981 | 64,711 | 174,572 |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Only individuals who had the same department of birth as their current department of residence in 2002 were included in computing these figures.

Table 3: Difference-in-Differences Comparing Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Years of Schooling

| | High War Intensity Departments | Low War Intensity Departments | Difference (High - Low) |
|----------------------------------|---|--|------------------------------------|
| <u>Panel A: All Individuals</u> | | | |
| Born 1961-1977 (Exposed) | 2.74 (3.92) | 5.68 (5.31) | -2.94*** (0.0073) |
| Born 1950-1960 (Unexposed) | 1.63 (3.31) | 4.21 (5.11) | -2.58*** (0.0102) |
| Difference (Exposed - Unexposed) | 1.11*** (0.0097) | 1.47*** (0.0080) | -0.36*** (0.0126) |
| <u>Panel B: Males Only</u> | | | |
| Born 1961-1977 (Exposed) | 3.47 (4.06) | 6.24 (5.30) | -2.77*** (0.0110) |
| Born 1950-1960 (Unexposed) | 2.21 (3.67) | 4.85 (5.29) | -2.64*** (0.0159) |
| Difference (Exposed - Unexposed) | 1.26*** (0.0153) | 1.39*** (0.0119) | -0.13*** (0.0194) |
| <u>Panel C: Females Only</u> | | | |
| Born 1961-1977 (Exposed) | 2.10 (3.67) | 5.2 (5.27) | -3.10*** (0.0096) |
| Born 1950-1960 (Unexposed) | 1.07 (2.81) | 3.62 (4.86) | -2.55*** (0.0128) |
| Difference (Exposed - Unexposed) | 1.03*** (0.0119) | 1.58*** (0.0107) | -0.55*** (0.0160) |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 4: Difference-in-Differences Comparing Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Completion of Grades 1 to 6

| | High War Intensity Departments | Low War Intensity Departments | Difference (High - Low) |
|----------------------------------|---|--|------------------------------------|
| <u>Grade 1</u> | | | |
| Born 1961-1977 (Exposed) | 0.51 (0.50) | 0.77 (0.42) | -0.26*** (0.0008) |
| Born 1950-1960 (Unexposed) | 0.32 (0.47) | 0.63 (0.48) | -0.31*** (0.0012) |
| Difference (Exposed - Unexposed) | 0.19*** (0.0013) | 0.14*** (0.0007) | 0.05*** (0.0015) |
| <u>Grade 2</u> | | | |
| Born 1961-1977 (Exposed) | 0.47 (0.50) | 0.73 (0.44) | -0.26*** (0.0008) |
| Born 1950-1960 (Unexposed) | 0.29 (0.45) | 0.59 (0.49) | -0.30*** (0.0012) |
| Difference (Exposed - Unexposed) | 0.18*** (0.0013) | 0.14*** (0.0007) | 0.04*** (0.0014) |
| <u>Grade 3</u> | | | |
| Born 1961-1977 (Exposed) | 0.39 (0.49) | 0.66 (0.48) | -0.27*** (0.0008) |
| Born 1950-1960 (Unexposed) | 0.23 (0.42) | 0.50 (0.50) | -0.27*** (0.0011) |
| Difference (Exposed - Unexposed) | 0.16*** (0.0012) | 0.16*** (0.0007) | 0.00 (0.0014) |
| <u>Grade 4</u> | | | |
| Born 1961-1977 (Exposed) | 0.28 (0.45) | 0.55 (0.50) | -0.27*** (0.0007) |
| Born 1950-1960 (Unexposed) | 0.16 (0.36) | 0.40 (0.49) | -0.24*** (0.0010) |
| Difference (Exposed - Unexposed) | 0.12*** (0.0010) | 0.15*** (0.0007) | -0.03*** (0.0013) |
| <u>Grade 5</u> | | | |
| Born 1961-1977 (Exposed) | 0.23 (0.42) | 0.50 (0.50) | -0.27*** (0.0007) |
| Born 1950-1960 (Unexposed) | 0.13 (0.33) | 0.35 (0.48) | -0.22*** (0.0010) |
| Difference (Exposed - Unexposed) | 0.10*** (0.0010) | 0.15*** (0.0007) | -0.05*** (0.0012) |
| <u>Grade 6</u> | | | |
| Born 1961-1977 (Exposed) | 0.20 (0.40) | 0.47 (0.50) | -0.27*** (0.0007) |
| Born 1950-1960 (Unexposed) | 0.17 (0.32) | 0.33 (0.47) | -0.16*** (0.0009) |
| Difference (Exposed - Unexposed) | 0.03*** (0.0009) | 0.14*** (0.0007) | -0.11*** (0.0012) |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5: Difference-in-Differences Comparing Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Completion of Grades 7 to 12

| | High War Intensity Departments | Low War Intensity Departments | Difference (High - Low) |
|----------------------------------|---|--|------------------------------------|
| <u>Grade 7</u> | | | |
| Born 1961-1977 (Exposed) | 0.11 (0.31) | 0.30 (0.46) | -0.19*** (0.0006) |
| Born 1950-1960 (Unexposed) | 0.06 (0.24) | 0.20 (0.40) | -0.14*** (0.0007) |
| Difference (Exposed - Unexposed) | 0.05*** (0.0007) | 0.10*** (0.0006) | -0.05*** (0.0009) |
| <u>Grade 8</u> | | | |
| Born 1961-1977 (Exposed) | 0.10 (0.30) | 0.28 (0.45) | -0.18*** (0.0005) |
| Born 1950-1960 (Unexposed) | 0.06 (0.23) | 0.19 (0.39) | -0.13*** (0.0007) |
| Difference (Exposed - Unexposed) | 0.04*** (0.0007) | 0.09*** (0.0006) | -0.05*** (0.0009) |
| <u>Grade 9</u> | | | |
| Born 1961-1977 (Exposed) | 0.09 (0.29) | 0.26 (0.44) | -0.17*** (0.0005) |
| Born 1950-1960 (Unexposed) | 0.05 (0.23) | 0.18 (0.38) | -0.13*** (0.0007) |
| Difference (Exposed - Unexposed) | 0.04*** (0.0006) | 0.08*** (0.0006) | -0.04*** (0.0009) |
| <u>Grade 10</u> | | | |
| Born 1961-1977 (Exposed) | 0.07 (0.26) | 0.21 (0.41) | -0.14*** (0.0005) |
| Born 1950-1960 (Unexposed) | 0.04 (0.20) | 0.14 (0.35) | -0.10*** (0.0006) |
| Difference (Exposed - Unexposed) | 0.03*** (0.0006) | 0.07*** (0.0005) | -0.04*** (0.0008) |
| <u>Grade 11</u> | | | |
| Born 1961-1977 (Exposed) | 0.07 (0.25) | 0.20 (0.40) | -0.13*** (0.0005) |
| Born 1950-1960 (Unexposed) | 0.04 (0.20) | 0.14 (0.35) | -0.10*** (0.0006) |
| Difference (Exposed - Unexposed) | 0.03*** (0.0006) | 0.06*** (0.0005) | -0.03*** (0.0008) |
| <u>Grade 12</u> | | | |
| Born 1961-1977 (Exposed) | 0.06 (0.24) | 0.17 (0.38) | -0.11*** (0.0004) |
| Born 1950-1960 (Unexposed) | 0.04 (0.19) | 0.12 (0.32) | -0.08*** (0.0006) |
| Difference (Exposed - Unexposed) | 0.02*** (0.0005) | 0.05*** (0.0005) | -0.03*** (0.0007) |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Difference-in-Differences Regression Results For Comparing Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Years of Schooling

| Variable | All Individuals | | | Males | | | Females | |
|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| (Born 1961-1977) * (HWI) | -0.2368** (0.0909) | -0.3117*** (0.0549) | -0.1245 (0.2639) | -0.1967 (0.2259) | 0.0025 (0.2634) | -0.1977 (0.2029) | -0.4838* (0.2667) | -0.4416* (0.2459) |
| (Born 1961-1977) * (HWI) * Female | | | -0.2393*** (0.0475) | -0.2399*** (0.0474) | | | | |
| (Born 1961-1977) * (HWI) * Rural | | | -0.1577 (0.2478) | -0.1578 (0.2479) | -0.1873 (0.2635) | -0.1867 (0.2637) | -0.1421 (0.2386) | -0.1418 (0.2385) |
| (Born 1961-1977) * (HWI) * Mayan | | | 0.1731 (0.2916) | 0.1712 (0.2919) | 0.2202 (0.2883) | 0.2150 (0.2893) | 0.1470 (0.2998) | 0.1474 (0.2996) |
| HWI | -2.3464*** (0.5806) | -2.1046*** (0.6718) | -2.3272*** (0.5983) | -2.0852*** (0.6874) | -2.5190*** (0.6297) | -2.5735*** (0.7701) | -2.0309*** (0.6902) | -1.5613** (0.7413) |
| Female | -1.1933*** (0.0212) | -1.1941*** (0.0208) | -1.1527*** (0.0208) | -1.1533*** (0.0206) | | | | |
| Rural | -3.0104*** (0.3453) | -3.011*** (0.3458) | -2.9852*** (0.3425) | -2.9857*** (0.3430) | -3.1731*** (0.3332) | -3.1745*** (0.3335) | -2.8118*** (0.3513) | -2.8116*** (0.3517) |
| Mayan | -2.8690*** (0.4393) | -2.8690*** (0.4393) | -2.8988*** (0.4510) | -2.8984*** (0.4506) | -2.5991*** (0.4423) | -2.5986*** (0.4417) | -3.1739*** (0.4616) | -3.1739*** (0.4615) |
| Observations | 2,626,716 | 2,626,716 | 2,626,716 | 2,626,716 | 1,235,709 | 1,235,709 | 1,391,007 | 1,391,007 |
| Adjusted R-Squared | 0.3644 | 0.3645 | 0.3645 | 0.3647 | 0.3368 | 0.3373 | 0.3791 | 0.3792 |
| FE for Department | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE for Year of Birth | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| (Year of Birth Indicators) * (Services 1973) | No | Yes | No | Yes | No | Yes | No | Yes |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes individuals born between 1950 and 1977 who have the same department of birth and department of residence at the time of the census in 2002.

Table 7: Difference-in-Differences Regression Results For Comparing Younger and Older Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Years of Schooling

| Variable | All Individuals | | | Males | | Females | | |
|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| (Born 1961-1966) * (HWI) | -0.2274*** (0.0383) | -0.2362*** (0.0512) | -0.2641 (0.2394) | -0.2746 (0.2308) | -0.0061 (0.2241) | -0.0874 (0.2117) | -0.6962*** (0.2486) | -0.6428** (0.2484) |
| (Born 1967-1977) * (HWI) | -0.2405** (0.1143) | -0.3417*** (0.0587) | -0.0692 (0.2817) | -0.1677 (0.2276) | 0.0065 (0.2907) | -0.2442 (0.2035) | -0.4030 (0.2813) | -0.3657 (0.2494) |
| (Born 1961-1966) * (HWI) * Female | | | -0.2082*** (0.0482) | -0.2089*** (0.0481) | | | | |
| (Born 1967-1977) * (HWI) * Female | | | -0.2511*** (0.0546) | -0.2505*** (0.0547) | | | | |
| (Born 1961-1966) * (HWI) * Rural | | | -0.0148 (0.2354) | -0.0134 (0.2352) | -0.2140 (0.2539) | -0.2118 (0.2538) | 0.1554 (0.2232) | 0.1562 (0.2229) |
| (Born 1967-1977) * (HWI) * Rural | | | -0.2130 (0.2556) | -0.2128 (0.2556) | -0.1772 (0.2712) | -0.1762 (0.2712) | -0.2533 (0.2480) | -0.2534 (0.2479) |
| (Born 1961-1966) * (HWI) * Mayan | | | 0.2062 (0.2864) | 0.2086 (0.2864) | 0.1208 (0.2841) | 0.1241 (0.2843) | 0.2828 (0.2931) | 0.2838 (0.2930) |
| (Born 1967-1977) * (HWI) * Mayan | | | 0.1593 (0.2958) | 0.1563 (0.2963) | 0.2591 (0.2924) | 0.2531 (0.2935) | 0.0950 (0.3047) | 0.0950 (0.3047) |
| HWI | -2.3465*** (0.5800) | -2.1055*** (0.6718) | -2.3273*** (0.5980) | -2.0859*** (0.6875) | -2.5181*** (0.6291) | -2.5741*** (0.7702) | -2.0316*** (0.6925) | -1.5625** (0.7422) |
| Female | -1.1933*** (0.0212) | -1.1941*** (0.0208) | -1.1527*** (0.0208) | -1.1535*** (0.0206) | | | | |
| Rural | -3.0104*** (0.3454) | -3.0110*** (0.3458) | -2.9852*** (0.3424) | -2.9858*** (0.3429) | -3.1730*** (0.3332) | -3.1745*** (0.3335) | -2.8121*** (0.3512) | -2.8119*** (0.3516) |
| Mayan | -2.8690*** (0.4394) | -2.8689*** (0.4393) | -2.8988*** (0.4510) | -2.8984*** (0.4506) | -2.5991*** (0.4423) | -2.5985*** (0.4417) | -3.1740*** (0.4616) | -3.1740*** (0.4614) |
| Observations | 2,626,716 | 2,626,716 | 2,626,716 | 2,626,716 | 1,235,709 | 1,235,709 | 1,391,007 | 1,391,007 |
| Adjusted R-Squared | 0.3644 | 0.3645 | 0.3645 | 0.3647 | 0.3369 | 0.3373 | 0.3792 | 0.3793 |
| FE for Department | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| FE for Year of Birth | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| (Year of Birth Indicators) * (Services 1973) | No | Yes | No | Yes | No | Yes | No | Yes |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes individuals born between 1950 and 1977 who have the same department of birth and department of residence at the time of the census in 2002.

Table 8: Difference-in-Differences Regression Results For Comparing Younger and Older Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Completion of Grades 1 to 6

| Variable | Grade 1 | | Grade 2 | | Grade 3 | |
|----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Males (1) | Females (2) | Males (3) | Females (4) | Males (5) | Females (6) |
| (Born 1961-1966) * (HWI) | 0.1303*** (0.0187) | 0.0787*** (0.0235) | 0.1197*** (0.0181) | 0.0612*** (0.0224) | 0.0913*** (0.0168) | 0.0171 (0.0219) |
| (Born 1967-1977) * (HWI) | 0.0854*** (0.0203) | 0.0456** (0.0200) | 0.0672*** (0.0197) | 0.0311 (0.0189) | 0.0342* (0.0175) | -0.0032 (0.0188) |
| (Born 1961-1966) * (HWI) * Rural | -0.0724*** (0.0142) | -0.0806*** (0.0188) | -0.0704*** (0.0156) | -0.0745*** (0.0187) | -0.0642*** (0.0197) | -0.0465** (0.0197) |
| (Born 1967-1977) * (HWI) * Rural | -0.0135 (0.0132) | -0.0574*** (0.0174) | -0.0117 (0.0143) | -0.0564*** (0.0173) | -0.0131 (0.0187) | -0.0480** (0.0186) |
| (Born 1961-1966) * (HWI) * Mayan | -0.0659*** (0.0182) | -0.0773** (0.0334) | -0.0652*** (0.0186) | -0.0647*** (0.0313) | -0.0600** (0.0224) | -0.0336 (0.0293) |
| (Born 1967-1977) * (HWI) * Mayan | -0.0107 (0.0185) | -0.0429 (0.0326) | -0.0126 (0.0193) | -0.0438 (0.0313) | -0.0177 (0.0235) | -0.0331 (0.0305) |
| Observations | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 |
| Adjusted R-Squared | 0.1683 | 0.3041 | 0.1723 | 0.2997 | 0.2085 | 0.3127 |
| Variable | Grade 4 | | Grade 5 | | Grade 6 | |
| | Males (1) | Females (2) | Males (3) | Females (4) | Males (5) | Females (6) |
| (Born 1961-1966) * (HWI) | 0.0278 (0.0194) | -0.0433* (0.0234) | 0.0066 (0.0219) | -0.0672*** (0.0237) | -0.0014 (0.0227) | -0.0756*** (0.0241) |
| (Born 1967-1977) * (HWI) | -0.0106 (0.0194) | -0.0436* (0.0225) | -0.0199 (0.0214) | -0.0561** (0.0243) | -0.0216 (0.0228) | -0.0585** (0.0248) |
| (Born 1961-1966) * (HWI) * Rural | -0.0582*** (0.0249) | -0.0183 (0.0223) | -0.0493* (0.0257) | 0.0000 (0.0229) | -0.0399 (0.0250) | 0.0121 (0.0225) |
| (Born 1967-1977) * (HWI) * Rural | -0.0256 (0.0239) | -0.0374* (0.0215) | -0.0310 (0.0252) | -0.0308 (0.0222) | -0.0331 (0.0253) | -0.0229 (0.0226) |
| (Born 1961-1966) * (HWI) * Mayan | -0.0128 (0.0328) | 0.0154 (0.0302) | -0.0021 (0.0329) | 0.0341 (0.0282) | -0.0012 (0.0322) | 0.0376 (0.0270) |
| (Born 1967-1977) * (HWI) * Mayan | 0.0012 (0.0335) | -0.0038 (0.0323) | -0.0029 (0.0347) | 0.0094 (0.0309) | -0.0048 (0.0349) | 0.0121 (0.0300) |
| Observations | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 |
| Adjusted R-Squared | 0.2506 | 0.3245 | 0.2766 | 0.3348 | 0.2868 | 0.3363 |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes individuals born between 1950 and 1977 who have the same department of birth and department of residence at the time of the census in 2002. All regressions include indicators for living in a high war intensity department, being a female, living in a rural area, and being a Mayan as well as fixed effects for department of residence, year of birth, and interactions between year of birth indicators and the availability of basic services in a department in 1973.

Table 9: Difference-in-Differences Regression Results For Comparing Younger and Older Exposed with Unexposed Cohorts in High and Low War Intensity Departments: Completion of Grades 7 to 12

| Variable | Grade 7 | | Grade 8 | | Grade 9 | |
|----------------------------------|---------------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|
| | Males (1) | Females (2) | Males (3) | Females (4) | Males (5) | Females (6) |
| (Born 1961-1966) * (HWI) | (1) -0.0456** (0.0173) | -0.0745*** (0.0196) | -0.0461** (0.0171) | -0.0712*** (0.0191) | -0.0457*** (0.0166) | -0.0698*** (0.0181) |
| (Born 1967-1977) * (HWI) | (2) -0.0229 (0.0193) | -0.0299 (0.0210) | -0.0242 (0.0181) | -0.0301 (0.0201) | -0.0289* (0.0163) | -0.0298 (0.0192) |
| (Born 1961-1966) * (HWI) * Rural | (3) 0.0101 (0.0204) | 0.0423** (0.0166) | 0.0110 (0.0197) | 0.0407** (0.0160) | 0.0114 (0.0193) | 0.0399** (0.0153) |
| (Born 1967-1977) * (HWI) * Rural | (4) -0.0289 (0.0252) | -0.0116 (0.0212) | -0.0258 (0.0240) | -0.0099 (0.0205) | -0.0193 (0.0218) | -0.0070 (0.0194) |
| (Born 1961-1966) * (HWI) * Mayan | (5) 0.0280 (0.0211) | 0.0400* (0.0209) | 0.0291 (0.0206) | 0.0386** (0.0205) | 0.0305 (0.0197) | 0.0381* (0.0196) |
| (Born 1967-1977) * (HWI) * Mayan | (6) 0.0217 (0.0229) | 0.0148 (0.0220) | 0.0217 (0.0217) | 0.0157 (0.0211) | 0.0239 (0.0205) | 0.0159 (0.0199) |
| Observations | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 |
| Adjusted R-Squared | 0.2711 | 0.2766 | 0.2615 | 0.2657 | 0.2462 | 0.2493 |

| Variable | Grade 10 | | Grade 11 | | Grade 12 | |
|----------------------------------|----------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Males (1) | Females (2) | Males (3) | Females (4) | Males (5) | Females (6) |
| (Born 1961-1966) * (HWI) | (1) -0.0462*** (0.0158) | -0.0647*** (0.0152) | -0.0443*** (0.0152) | -0.0626*** (0.0150) | -0.0365*** (0.0127) | -0.0501*** (0.0130) |
| (Born 1967-1977) * (HWI) | (2) -0.0268* (0.0138) | -0.0228 (0.0164) | -0.0270* (0.0135) | -0.0240 (0.0158) | -0.0202* (0.0111) | -0.0132 (0.0133) |
| (Born 1961-1966) * (HWI) * Rural | (3) 0.0157 (0.0154) | 0.0407*** (0.0128) | 0.0147 (0.0150) | 0.0392*** (0.0126) | 0.0125 (0.0130) | 0.0322 (0.0111) |
| (Born 1967-1977) * (HWI) * Rural | (4) -0.0105 (0.0180) | -0.0045 (0.0164) | -0.0087 (0.0173) | -0.0029 (0.0158) | -0.0106 (0.0150) | -0.0058 (0.0137) |
| (Born 1961-1966) * (HWI) * Mayan | (5) 0.0301 (0.0179) | 0.0353*** (0.0167) | 0.0287 (0.0171) | 0.0347** (0.0162) | 0.0220 (0.0143) | 0.0256* (0.0139) |
| (Born 1967-1977) * (HWI) * Mayan | (6) 0.0230 (0.0177) | 0.0138 (0.0170) | 0.0218 (0.0169) | 0.0149 (0.0162) | 0.0138 (0.0147) | 0.0074 (0.0138) |
| Observations | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 | 1,235,709 | 1,391,007 |
| Adjusted R-Squared | 0.2055 | 0.2089 | 0.1975 | 0.2005 | 0.1593 | 0.1631 |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes individuals born between 1950 and 1977 who have the same department of birth and department of residence at the time of the census in 2002. All regressions include indicators for living in a high war intensity department, being a female, living in a rural area, and being a Mayan as well as fixed effects for department of residence, year of birth, and interactions between year of birth indicators and the availability of basic services in a department in 1973.

Table 10: Predicted Percent Decline in Completion of Grades 1 to 12

| Variable | Born 1960 to 1966 | | Born 1967 to 1977 | |
|----------|-------------------|---------|-------------------|---------|
| | Males | Females | Males | Females |
| Grade 1 | 17.15 | 11.82 | 11.24 | 6.85 |
| Grade 2 | 17.26 | 10.08 | 9.69 | 0.00 |
| Grade 3 | 15.42 | 0.00 | 5.78 | 0.00 |
| Grade 4 | 0.00 | -10.44 | 0.00 | -10.51 |
| Grade 5 | 0.00 | -19.02 | 0.00 | -15.88 |
| Grade 6 | 0.00 | -24.22 | 0.00 | -18.74 |
| Grade 7 | -19.49 | -35.83 | 0.00 | 0.00 |
| Grade 8 | -22.05 | -37.83 | 0.00 | 0.00 |
| Grade 9 | -24.74 | -41.63 | -15.64 | 0.00 |
| Grade 10 | -31.53 | -47.13 | -18.29 | 0.00 |
| Grade 11 | -32.74 | -49.39 | -19.95 | 0.00 |
| Grade 12 | -31.35 | -45.93 | -17.35 | 0.00 |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). A percent change of 0 corresponds to a statistically 0.00 difference-in-differences coefficient from Tables 8 and 9.

Table 11: Difference-in-Differences Regression Results For Comparing Exposed with Unexposed Cohorts in High and Low War Intensity Departments Using the Full Sample: Years of Schooling

| Variable | All Individuals | | Males | Females |
|--|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| (Born 1961-1977) * (HWI) | -0.2745*** (0.0459) | -0.2193 (0.1661) | -0.1849 (0.1491) | -0.4191** (0.1873) |
| (Born 1961-1977) * (HWI) * Female | | -0.1592*** (0.0443) | | |
| (Born 1961-1977) * (HWI) * Rural | | -0.1983 (0.2235) | -0.2114 (0.2323) | -0.1932 (0.2203) |
| (Born 1961-1977) * (HWI) * Mayan | | 0.2455 (0.2333) | 0.2927 (0.2328) | 0.2207 (0.2386) |
| HWI | -1.8120*** (0.4744) | -1.7890*** (0.4710) | -2.9485*** (0.5693) | -1.3105*** (0.4457) |
| Female | -1.2493*** (0.0175) | -1.2238*** (0.0205) | | |
| Rural | -3.0660*** (0.3472) | -3.0358*** (0.3468) | -3.2406*** (0.3358) | -2.8463*** (0.3567) |
| Mayan | -2.9270*** (0.4375) | -2.9685*** (0.4462) | -2.6633*** (0.4383) | -3.2553*** (0.4560) |
| Observations | 3,155,413 | 3,155,413 | 1,482,249 | 1,673,164 |
| Adjusted R-Squared | 0.3398 | 0.3399 | 0.3179 | 0.3489 |
| FE for Department | Yes | Yes | Yes | Yes |
| FE for Year of Birth | Yes | Yes | Yes | Yes |
| (Year of Birth Indicators) * (Services 1973) | Yes | Yes | Yes | Yes |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes all individuals born between 1950 and 1977 and is not restricted to those who have the same department of birth and department of residence at the time of the census in 2002.

Table 12: Difference-in-Differences Regression Results For Comparing Younger and Older Exposed with Unexposed Cohorts in High and Low War Intensity Departments Using the Full Sample: Years of Schooling

| Variable | All Individuals | | Males | Females |
|--|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| (Born 1961-1966) * (HWI) | -0.2192*** (0.0429) | -0.3123* (0.1616) | -0.1137 (0.1466) | -0.6247*** (0.1841) |
| (Born 1967-1977) * (HWI) | -0.2970*** (0.0503) | -0.1816 (0.1705) | -0.2163 (0.1545) | -0.3375* (0.1915) |
| (Born 1961-1966) * (HWI) * Female | | -0.1330*** (0.0410) | | |
| (Born 1967-1977) * (HWI) * Female | | -0.1688*** (0.0526) | | |
| (Born 1961-1966) * (HWI) * Rural | | -0.0760 (0.2081) | -0.2571 (0.2179) | 0.0849 (0.2046) |
| (Born 1967-1977) * (HWI) * Rural | | -0.2469 (0.2321) | -0.1922 (0.2409) | -0.3008 (0.2296) |
| (Born 1961-1966) * (HWI) * Mayan | | 0.3105 (0.2227) | 0.2507 (0.2227) | 0.3668 (0.2264) |
| (Born 1967-1977) * (HWI) * Mayan | | 0.2189 (0.2394) | 0.3115 (0.2396) | 0.1629 (0.2452) |
| HWI | -1.8126*** (0.4743) | -2.4535*** (0.5794) | -2.9481*** (0.5696) | -1.3111*** (0.4459) |
| Female | -1.2493*** (0.0175) | -1.2240*** (0.0204) | | |
| Rural | -3.0660*** (0.3472) | -3.0358*** (0.3467) | -3.240641 0.3358795 | -2.8465*** (0.3566) |
| Mayan | -2.9269*** (0.4375) | -2.9686*** (0.4462) | -2.663378 0.4383929 | -3.2554*** (0.4560) |
| Observations | 3,155,413 | 3,155,413 | 1,482,249 | 1,673,164 |
| Adjusted R-Squared | 0.3398 | 0.3399 | 0.3179 | 0.349 |
| FE for Department | Yes | Yes | Yes | Yes |
| FE for Year of Birth | Yes | Yes | Yes | Yes |
| (Year of Birth Indicators) * (Services 1973) | Yes | Yes | Yes | Yes |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Robust standard errors in parentheses are clustered at the county level. * significant at 10%, ** significant at 5%, *** significant at 1%. The sample includes all individuals born between 1950 and 1977 and is not restricted to those who have the same department of birth and department of residence at the time of the census in 2002.

Table 13: Educational Attainment in High War Intensity (HWI) and Low War Intensity (LWI) Departments in 2002: Gender and Regional Differences

| Variable | All Individuals | | Males | | Females | | (Males - Females) | | (LWI - HWI) | | |
|--------------------|-----------------|------------|------------|------------|------------|------------|-------------------|------------|------------------|---------------------|------|
| | LWI (1) | HWI (2) | LWI (3) | HWI (4) | LWI (5) | HWI (6) | LWI (7) | HWI (8) | All Males (9) | All Females (11) | |
| Years of Schooling | 3.78 | 1.95 | 3.99 | 2.23 | 3.58 | 1.68 | 0.41 | 0.56 | 1.83 | 1.76 | 1.90 |
| Grade 1 | 0.80 | 0.66 | 0.84 | 0.72 | 0.77 | 0.61 | 0.07 | 0.12 | 0.14 | 0.11 | 0.17 |
| Grade 2 | 0.75 | 0.61 | 0.78 | 0.67 | 0.72 | 0.56 | 0.06 | 0.11 | 0.14 | 0.11 | 0.16 |
| Grade 3 | 0.68 | 0.53 | 0.71 | 0.58 | 0.65 | 0.48 | 0.06 | 0.10 | 0.14 | 0.13 | 0.16 |
| Grade 4 | 0.59 | 0.45 | 0.62 | 0.49 | 0.56 | 0.41 | 0.06 | 0.08 | 0.14 | 0.13 | 0.15 |
| Grade 5 | 0.54 | 0.40 | 0.56 | 0.44 | 0.51 | 0.37 | 0.05 | 0.07 | 0.13 | 0.13 | 0.14 |
| Grade 6 | 0.50 | 0.37 | 0.52 | 0.40 | 0.47 | 0.34 | 0.05 | 0.06 | 0.13 | 0.12 | 0.13 |
| Grade 7 | 0.38 | 0.31 | 0.40 | 0.32 | 0.37 | 0.29 | 0.03 | 0.03 | 0.07 | 0.08 | 0.07 |
| Grade 8 | 0.36 | 0.30 | 0.38 | 0.31 | 0.35 | 0.29 | 0.03 | 0.03 | 0.06 | 0.07 | 0.06 |
| Grade 9 | 0.34 | 0.29 | 0.35 | 0.30 | 0.33 | 0.28 | 0.03 | 0.02 | 0.05 | 0.05 | 0.05 |
| Grade 10 | 0.31 | 0.27 | 0.32 | 0.28 | 0.30 | 0.26 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 |
| Grade 11 | 0.30 | 0.27 | 0.30 | 0.28 | 0.29 | 0.26 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 |
| Grade 12 | 0.28 | 0.26 | 0.28 | 0.27 | 0.27 | 0.26 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| Observations | 8,376,246 | 2,860,950 | 4,088,789 | 1,408,050 | 4,287,457 | 1,452,900 | | | | | |

Data Sources: 2002 National Population Census (Instituto Nacional de Estadística (INE), Guatemala), Recovery of Historical Memory Project (1999), and Commission for Historical Clarification (1999). Data for all cohorts and both migrant and non-migrant individuals are used to construct these figures.