THE CONFLICT TRAP REVISITED:

Civil Conflict and Educational Achievement

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Abstract

This article analyzes the association between civil conflicts and educational achievement by studying the Turkish case. It combines the 2005 university entrance exam scores of more than 1.6 million students, and a newly constructed data set on the casualties of the Turkish-Kurdish conflict to study the association between the conflict and educational achievement of Turkish students. The results reveal a significant negative association. Combined with the already well-established positive links between education and various measures of socioeconomic development like economic growth, social equality, and public health, the results in this article demonstrate that education is one of the channels through which civil conflicts damage the well-being of societies thereby creating the conditions that perpetuate them.

Author's Note: This study was partly conducted while I was visiting the Political Science Department of Duke University. I thank the members of this institution for their warm hospitality. I also thank Ahmet Alkan for sharing his amazing data set with me. And finally, I thank Michael Ward for all the helpful comments, and for his mentorship.

Replication materials, and the online Appendix are available on http://jcr.sagepub.com/.

1. INTRODUCTION

Civil conflicts perpetuate themselves by changing in certain ways the societies experiencing them. These conflicts pull societies into a "conflict trap" by destroying their economic development (Collier, 1999; Collier et al., 2003), by crippling their political institutions and rendering them unable to address the underlying grievances (Collier et al., 2003; Wood, 2008; Kibris, 2012), and by damaging the "life chances" of their civilian populations (Hoeffler and Reynal-Querol, 2003; Ghobarah et al., 2003; Carlton-Ford and Boop, 2010). In this article, I argue that a significant part of this trap is created by the adverse effects of civil conflicts on education. I empirically study the effects of the civil conflict in Turkey on the educational achievement of Turkish high school students. The results reveal a significant negative impact, and thus, demonstrate an important mechanism through which civil conflicts exert long-term damage on the well-being of host societies. Moreover, combined with the well-established results in the literature on the positive association between education and socioeconomic development, and on the negative association between development and civil conflicts, these results show that education is an important channel through which civil conflicts perpetuate themselves.

This article is both a first to explore the effects of civil conflicts on educational achievement, and also a first to empirically analyze how the Kurdish-Turkish ethnic conflict that has been going on for 29 years affected education in Turkey. I combine two novel and interesting data sets to do so. The first data set consists of the test scores of more than 1.6 million students who took the Turkish university entrance exam (OSS) in 2005, along with information on the students' gender, place of residency, and educational history including the highschools they had attended and the classes they had taken (Alkan et al., 2008).

The second data set is composed of the date and place of death of nearly 7000 Turkish security force casualties that the conflict claimed between 1984 and 2012. I develop a measure of the severity of the conflict based on the number of these casualties at the county level.

Relying on these two data sets I study the impact of the conflict on the amount of learning high school students achieve which I measure by students' test scores in the university entrance exam. I construct a multilevel linear model to study the association between the OSS scores of students and the severity of the armed conflict in their county during their schooling period while controlling for a large number of personal traits; for county level socioeconomic conditions; and also for possible unobserved school-specific, county-specific and province-specific factors. The results reveal a significant negative association between the armed conflict and the educational achievement of students.

In the following section, I look into the literature on the effects of armed conflicts on education, and into the literature on the association between education and socioeconomic well-being of societies. In the third section, I present the Turkish case. In the fourth section, I present my models and introduce my variables. The fifth section discusses the data. I present my results in the sixth, and finally, conclude in the seventh section.

2. EDUCATION, DEVELOPMENT, AND CIVIL CONFLICT

Civil conflicts are humanitarian disasters. And unfortunately, the immediate sufferings are only "the tip of the iceberg of their longer-term consequences for human misery" (Ghobarah et al., 2003). The adverse consequences of civil conflicts extend well beyond the period of active warfare. In their cross-national study, Ghobarah et al.(2003) empirically demonstrate the long term damaging effects of civil conflicts on public health. Guha-Sapir and van Panhuis (2002) demonstrate that mortality rates are higher after civil conflicts than they were before in host societies. Akresh et al. (2009) study the Rwandan case, and reveal the stunting effect the conflict has on the pyhsical development of children. Collier et al. (2003) analyze how the adverse effects of civil conflicts like increased military spending, capital flight, loss of social capital, and physical and mental public health deterioration continue even after the fighting is over. Carlton-Ford and Boop (2010) sum these long-term adverse consequences as the negative impacts of civil conflicts on "life chances" by

which they mean the well-being of civilian populations and the development of human capabilities., and among which they include education.

The benefits of education to individuals and to society are well documented. Studies on the economic returns to educational attainment for individuals have uniformly shown that more schooling is associated with higher individual earnings (for excellent reviews of this literature see Psacharopoulos and Patrinos, 2004; Heckman, Lochner, and Todd, 2006; and Hanushek and Woessmann, 2008). Education appears also to help achieve both greater social equality and greater equity in the distribution of economic resources (Lee, 2002; Hanushek, 2009).

Social benefits of education are argued to be even greater than the sum of its benefits to individuals (Hanushek, 2009). Following the classical contributions by Barro (1991, 1997) and Mankiw et al. (1992), a vast literature of cross-country growth regressions has found a significant positive association between level of and changes in educational attainment and economic growth (for detailed reviews of the literature see Krueger and Lindahl, 2001; Sianesi and Van Reenen, 2003).

Education is also argued to promote democracy both because it enables a "culture of democracy" to develop, and because it leads to greater prosperity, which is also thought to cause political development. The most celebrated version of this argument is the modernization theory, popularized by Lipset (1959). Empirical works, for example, by Barro (1999) and Przeworski et al. (2000), provide evidence consistent with this view. Glaeser et al. (2004) argue that differences in schooling are a major factor explaining not only differences in democracy but also in political institutions. Studies by Dee (2004) and Mulligan et al. (2004) demonstrate the positive association between educational attainment and voter participation, support for free speech, and the quality of civic knowledge.

Researchers have also investigated the association between education and other measures of social well-being and development. At the very basic level, a more educated society is likely to be more healthy (Evans et al. , 2000). Breierova and Duflo (2002) and Jamison et al. (2007) show the

dampening effect of education on child mortality rates. Currie and Moretti (2003) find a positive association between maternal education and infant health. Machin et al. (2010), and Lochner and Moretti (2003) present evidence that education is also is negatively related to criminal activity.

The positive association between education and socioeconomic well-being of societies implies that any factor hindering education in a society gives severe long-term damage to the development of the society in many respects. Civil conflicts are one such factor. Recent studies provide empirical evidence that civil conflicts are indeed negatively associated with educational attainment, school enrollment, and educational spending in host societies. Chamarbagwala and Moran (2011) demonstrate the strong negative impact of the Guatemala's 36-year-long civil war on the educational attainment of the most disadvantaged social and ethnic groups of the Guatemalan society. De Walque (2006) finds that the Cambodian genocide had a lasting impact on the educational attainment of the population. Blattman and Annan (2010) find that young males who were recruited into armed groups in Uganda received less schooling, are less likely to have a skilled job, and more likely to earn lower wages. Merrouche evaluates the long run impact of Cambodia's 30 years of war on education levels and earnings. Akresh and De Walque (2008) study the impact of Rwandan genocide on children's schooling and find a strong negative impact. Lai and Thyne (2007) find that both educational spending and enrollment decline during periods of civil war. Poirier (2012) shows that periods of conflict have a strong positive impact on the number of children not attending school, and a strong negative impact on secondary school enrollment rates in Africa. Shemyakina (2011) finds that the civil war in Tajikistan had a dampening effect on educational attainment and school enrollment of girls. Singh and Shemyakina (2013) report a substantial negative effect of the Punjab insurgency on the educational attainment of girls.

These studies demostrate that one way civil conflicts "maim people long after the shooting stops" (Ghobarah et al., 2003) is by interrupting their education thereby preventing them from improving their human capabilities and fulfilling their potential. Relatedly, they also help us identify an important channel through which civil conflicts perpetuate themselves, and thus, provide

crucial information to governments about how to shape policies to block such dynamics more effectively. The positive association between education and individual earnings, economic growth, political development, democratization, political participation, support for human rights, public health measures, and social security and order as discussed above means that by hindering education civil conflicts hurt development in a society in many ways. And lack of development is a key root cause of conflict (Collier et al., 2003; Fearon and Laitin, 2003). Moreover, those populations whose educational opportunities are destroyed by the conflict find themselves trapped with no skills or tools to improve their socioeconomic and political situations, and consequently become potential recruits for further violence. It is in that sense no wonder that the people who join rebel organizations are overwhelmingly young, uneducated males (Collier et al., 2003; Blattman and Annan, 2010). In other words, what these studies reveal to us is a vicious cycle of conflict, a "conflict trap" (Collier et al., 2003) in which the conflict feeds the very own dynamics that are responsible for its onset in the first place.

Note that all the above studies on the asociation between civil conflicts and education as well as a great deal of those about the assocation between education and socioeconomic development focus on the same measure of education, namely, on the time amount of education host societies receive. However, there is now a growing consensus among scholars that quality of schooling is more important than quantity. Hanushek argues that quantity of schooling is actually a poor measure of the amount of learning that takes place in schools and that it is the amount of learning acquired in schools that determines the quality of the labor force in a society (Hanushek, 2009). Measuring eduation through school attainment assumes a year in school in the United States is the same as a year in school in Afghanistan in terms of cognitive development of students. This assumption is very unlikely to hold. Scholars have dealt with this problem by employing standardized test scores of students as measures of educational quality, and achievement. These scores are argued to be a direct measure of the amount of learning that has taken place after a given number of years of schooling (Jamison et al., 2007; Hanushek et al., 2008). There is now

considerable evidence that compared to educational attainment, educational achievement measured by test scores is more significantly and directly related to measures of social and economic well-being (Boissiere et al., 1985; Bishop, 1989; Lee and Lee, 1995; Barro, 1999; Mulligan, 1999; Murnane et al., 2000; Hanushek and Kimko, 2000; Barro, 2001; Lazear, 2003; Bosworth and Collins, 2003; Ciccone and Papaioannou, 2005; Behrman et al., 2008; Hanushek and Zhang, 2009; Woessmann, 2003; Hanushek and Woessmann, 2007, 2011; Jamison et al., 2007; Hanushek and Woessmann, 2012).

In this article I employ a broader perspective on the possible impacts of civil conflicts on education. I argue that civil conflicts can hurt not only the educational attainment of host populations but also their educational achievement as well through their negative impact on the quality of education given, and the amount of learning achieved by students. Aside from their destructive impacts on infrastructure, and educational spending, civil conflicts also create security concerns, damage economic and social life, and consequently, make it very difficult for schools in the conflict zone to attract qualified, experienced teachers and/or keep them for long. Civil conflicts also disrupt daily life and make it difficult for teachers and students to follow the normal curriculum. They can also hurt students and teachers psychologically. The extraordinary conditions created by civil conflicts may also lead school administrations and teachers to loosen their standards for success. They may expect less from their students.

Note that such effects will not be detected by just analyzing educational attainment data. Students may still attend to and graduate from their schools even in the midst of a civil conflict, but it is highly likely that they will not be learning as much as they would under normal conditions in peaceful environments. As the literature I have discussed above demonstrates, such a negative impact of the conflict on educational achievement will then translate into further substantial damage on various important dimensions of social and economic well-being of the society including economic growth, democratization, social equality, and public health, and will aggrevate the societal grievances that are associated with the onset of the conflict in the first place.

3. THE TURKISH CASE

Turkey has a centralized university entrance system. Each year in spring, a 3-hour, standardized, multiple choice test prepared by the Center of Student Assessment and Placement (OSYM), which is a state agency designated to conduct centralized evaluations of students, is administered to hundreds of thousands of students simultaneously all over the country. Those students who get high enough scores earn the chance to enroll in their preferred university programs. But unfortunately many students fail to do well in the test, and consequently part with their plans about university education. Because the test is centralized, standardized, and administered simultaneously to everyone who wants to have a university education, and because the curricula for primary and highschool education are also centrally determined by the ministry of education, the results are amenable to comparisons of educational quality and student learning across schools, and localities.

One very important aspect of the Turkish scene that needs to be considered in such a comparison is the civil conflict that has been going on in the country for the last three decades. Since late 1984, Turkey has been suffering from an insurgency campaign led by the Kurdish separatist guerilla organization Kurdistan Workers' Party (Partiya Karkaren Kurdistan), the PKK. The organization was first founded with the goal of establishing an independent Kurdish state in southeastern Turkey, though later on in the 1990s, it appeared to have rolled back on its goal to a federational structure that would grant more autonomy to the Kurdish population in Turkey. Armed activities of the PKK are almost completely concentrated in southeastern and eastern Turkey which is a poor, and underdeveloped part of the country, and which has traditionally been inhabited by ethnic Kurds. The conflict deepened further the economic and social disparity between the conflict zone and the rest of the country. The area has lost its economic and social appeal for business and people, and has come to be considered as exile by public employees like doctors and teachers who, by law are under a mandatory service requirement for a certain amount of time in locations chosen by the state.

Financially, the conflict has cost the country billions of dollars. But more importantly, it has cost more than 40 thousand lives (Şener, 2010). Our knowledge about civilian and insurgent casualties is limited to aggregate numbers sporadically released by contending sources as there is no credible and publicly available dataset on them. Nevertheless, as part of this study, I constructed a unique database on security force (*i.e.* soldiers and police officers) casualties (SFCs).

As can be clearly seen in Chart 1 above which depicts the total number of SFCs over the years, the 90s has been the most bloody period of the conflict. The PKK received a major blow when its leader Abdullah Öcalan was captured in Africa in 1999, brought back to Turkey, tried and sentenced to life in prison. Headless and divided, the PKK ceased its attacks in the early 2000s. Unfortunately, peace in the area did not last long. The PKK resumed its attacks in 2004.

Chart 2 below depicts the geographical distribution of SFCs in the 1990-2005 period. The red areas show the counties with the highest number of SFCs (more than 500)[i].

Chart 2: Geographical Distribution of SFCs in the 1990-2005 period

4.THE DATA

In this study, I employ two novel data sets from Turkey to study the association between civil conflicts and educational achievement. The first one includes the scores and background information of 1,619,770 students who took the 2005 OSS exam. The data set is from the Center of Student Evaluation and Placement (OSYM). The exam includes 4 tests that students can take, namely science (physics, chemistry, biology); mathematics; Turkish language and literature; and humanities (philosophy, geography, history). Each student then gets three scores which are weighted averages of her/his scores from these four tests with different weights assigned to each. She/he gets a "quantitative" score which assigns the most weight to the science and mathematics tests; a "Turkish and math (TM)" score that assigns the most weight to the mathematics and the Turkish language and literature tests; and a "verbal" score that assigns the most weight to the humanities and the Turkish language and literature tests. University programs admit students based on one of these weighted scores depending on the subject of the program. Engineering programs, for example, admit students based on quantitative scores; economics programs admit students based on TM scores; history programs admit students based on verbal scores, *etc.*. Consequently, students focus on the tests that the programs they pursue require. Thus, in evaluating student performance in the OSS, I compare those students who focused on the same group of tests[ii].

Along with the quantitative, TM, and verbal scores, the OSS data set includes information on the gender of the student; the highschool she/he is about to graduate or has graduated from; her/his major in highschool; and her/his graduation status. Because I am interested in the association between students' performance in the OSS and the level of violence in their localities during their schooling years, I limit the data set to students who are either about to graduate or have recently graduated from highschool, and are taking the exam for the first time which means those included in the analyses are students who were born around 1987, started school around 1993, and

were about 18 years old in 2005[iii]. I also exclude from the data set those students with missing data. These exclusions bring the number of observations to 1,353,339[iv].

In order to measure the intensity of the conflict I refer to a casualty database that I constructed. This is a unique data set on the Turkish military and police force casualties (SFCs) that the Kurdish insurgency claimed since the beginning of armed attacks in 1984. The data set includes the date, and place of death at the county level for a total of 6788 SFCs. I explain my sources for the data and the data collection process in detail in the Appendix[v].

I derive my socioeconomic indicators from a county-level development study conducted by the State Planning Agency based on the 2000 census (Dincer and Ozaslan, 2004).

Finally, the data set contains an estimate of the ethnically Kurdish population percentage in each county. The Appendix includes a detailed explanation of how I derived these estimates.

5. THE ANALYSES

Note that the data exhibits a multilevel character: the students are nested within schools, which in turn are geographically nested within counties that are nested within provinces. The presence of layers may violate the standard OLS assumption of independent error terms as it is highly likely that the error terms for the students from the same school will be correlated due to school level unobserved factors, similarly error terms within a county will be correlated due to unobserved factors at the county level, and error terms within a province will be correlated due to unobserved factors at the province level. Ignoring the multilevel character of data risks erroneously low coefficient standard errors, and consequently, increases the risk of declaring significant effects for predictors which in fact have none (Steenbergen and Jones, 2002). In order to account for the unobserved school, county and province level factors, I use the following multilevel linear model in which these factors are incorporated as random effects:

$$T_{\{s,i,j,p\}} = \alpha + \gamma N_{\{s,i,j,p\}} + \Omega M_{\{i,j,p\}} + \beta C_{\{j,p\}} + \varphi K_{\{j,p\}} + \gamma X_{\{j,p\}} + \omega_{\{p\}} + \rho_{\{j,p\}} + u_{\{i,j,p\}} + \varepsilon_{\{s,i,j,p\}}$$

where $\omega_{\{p\}}$ is the province level error component, $\rho_{\{j,p\}}$ is the county level error component, $u_{\{i,j,p\}}$

is the school level error component and $\varepsilon_{\{s,i,j,p\}}$ is the individual observation level error component, with $E(\varepsilon_{\{s,i,j,p\}})=0$, $Var(\varepsilon_{\{s,i,j,p\}})=\sigma^2$; $E(u_{\{i,j,p\}})=0$, $Var(u_{\{i,j,p\}})=\tau^2$; $E(\rho_{j,p\}})=0$, $Var(\rho_{\{j,p\}})=\varsigma^2$; $E(\omega_{\{p\}})=0$, $Var(\omega_{\{p\}})=\nu^2$, and Cov $[\varepsilon_{\{s,i,j,p\}},u_{\{i,j,p\}}]=0$, Cov $[\varepsilon_{\{s,i,j,p\}}, \rho_{\{j,p\}}]=0$, Cov $[\varepsilon_{\{s,i,j,p\}}, \omega_{\{p\}}]=0$, Cov$[u_{\{i,j,p\}}, \rho_{\{j,p\}}]=0$, Cov$[u_{\{i,j,p\}}, \omega_{\{p\}}]=0$, and Cov$[\rho_{\{j,p\}},\omega_{\{p\}}]=0$.

$T_{\{s,i,j,p\}}$ is the test score of student s from school i in county j of province p. I have three runs of the model with quantitative scores, Turkish-math (TM) scores, and verbal scores as the dependent variable.

$N_{\{s,i,j,p\}}$ is a vector of student characteristics including gender (a dummy variable that takes on the value 1 for female students, and 0 for male students), and dummy variables indicating the student's major in highschool.

$M_{\{i,j,p\}}$ is a vector of dummy variables indicating the type of the highschool that student s is graduating or has graduated from. There are 12 types of highschools[vi] leading to 11 dummy variables with vocational schools being the omitted type.

$C_{\{j,p\}}$ is the number of SFCs in county j of province p and in counties neighboring j in the 1990-2005 period[vii]. Note that the data set is restricted to those students who had recently graduated or were about to gradute from highschool. While it is possible that this group includes students who had repeated grades, it is safe to argue that, on the average, these students were born around 1987, and started primary school around 1993. Because violence is likely to have a lagged effect, and because the data may include kids who had repeated grades (or had started school at a younger age) I use the number of SFCs in the 1990-2005 period rather than the 1993-2005 period[viii].

I have several reasons to argue that the number of SFCs provide a good measure of conflict intensity in a locality. First of all, even though the number of SFCs does not correspond to the total number of casualties, which is a commonly used measure of conflict intensity in the literature, one can expect a high correlation between the two. In fact, the yearly aggregates I have for the number

of SFCs is 84% correlated with the yearly total casualties and 98% correlated with the yearly total number of PKK attacks reported by the Turkish General Staff (Şener, 2010). The correlation between the yearly total casualty numbers reported by the Federation of American Scientists (www.fas.org) and the yearly aggregates of SFCs in my database is even higher at 96%, while the correlation between SFCs and other casualties (civilians, insurgents and village guards) is 95%. Also, as the correlation between the number of SFCs and PKK attacks clearly demonstrate, SCFs in a county is a good measure of the PKK presence in the area. The presence of PKK insurgents and activity in an area cause a great deal of inconvenience for the civilian residents. Not only it means that they can get caught in crossfire, or become a landmine victim, it also means that their daily lives are disturbed by the heightened security measures like the increased number of security personnel in the area, and the frequent security checks and controls that are imposed on the civilians, and also by the frequent interruption of normal day-to-day life as a result of attacks and armed skirmishes between security forces and the PKK. In many cases it also means that they will be pressured, threatened or even killed by PKK militants searching for hide-outs, shelters, supplies or political support. Thus, I argue that SFCs provide a good measure of the level of conflict civilians are exposed to.

$K_{\{j,p\}}$ is the percentage of ethnically Kurdish population in county j of province p in year 2000. I expect ethnic distribution to affect test scores because the language of education in primary schools is Turkish and many ethnically Kurdish kids start their education with either poor or no knowledge of the Turkish language. This linguistic disadvantage is likely to have a negative impact on the educational achievement of ethnically Kurdish students. Unfortunately, I do not have information on ethnic background at the student level. Consequently, I can not study the association between the ethnic background of students and their educational achievement. Nevertheless, I control for the Kurdish percentage of the population at the county level which allows me to study the association between the ethnic composition of localities and educational success.

$X_{\{j,p\}}$ is a vector of socioeconomic, and demographic control variables at the county level for

the year 2000. I control for unemployment rate, share of agricultural employment, and population growth rate. Unemployment rate is included to control for the general economic conditions across counties. Share of agricultural employment is expected to affect student performance since in agricultural localities kids tend to spend time working in the family farm. Moreover, agricultural employment is a good indicator of the level of development in a county. Population growth rate is included to control for migration flows which reflect the economic attractiveness of counties. I also include a dummy variable indicating whether the county is a provincial center (city) which is usually the most developed county of a province.

Table 1 below presents the mean values of variables for counties with and without SFCs. As can be seen the average test score is higher in counties with no SFCs for all score types. The difference is around 1.5 points. As I will discuss in the next section, due to excess demand for university education and the resulting competitiveness of the system, a 1.5-point difference corresponds to thousands in rankings, and thus, is quite substantial.

The average percentage of Kurdish population is higher in the counties within the conflict zone. These counties are also economically backward, with higher shares of agricultural sector, and higher levels of unemployment.

Table 1: Summary statistics
(C) gives the mean value for counties with SFCs in the 1990-2005 period.
(NC) gives the mean value for counties with no SFC in the same period.
Values in parentheses are standard deviations.

Number of counties	C: NC:	382 529
Number of schools	C: NC:	3055 5075

Number of students	C: NC:	594,179 759,160
Quantitative score in the 2005 OSS	C: NC:	156.1 (44.5) 157.7 (45.4)
TM score in the 2005 OSS	C: NC:	172.1 (46.7) 173.5 (47.1)
Verbal score in the 2005 OSS	C: NC:	182.1 (50.6) 183.4 (50.3)
SFCs in the 1990-2005 period	C: NC:	86.54 (185.18) 0 (0)
Percentage of Kurdish population	C: NC:	26.17 (26.75) 3.15 (2.90)
Population growth rate (%)	C: NC:	0.49 (2.70) 2.94 (12.19)
Share of agricultural employment (%)	C: NC:	71.26 (18.38) 62.20 (23.67)
Unemployment rate (%)	C: NC:	7.23 (4.76) 6.26 (4.04)

6. RESULTS

I estimate my model using the restricted maximum likelihood (REML) estimation technique. REML and unrestricted/full maximum likelihood estimation (MLE) produce identical fixed effects estimates. Their estimates for variance components will also be the same for large samples, but because REML corrects for the degrees of freedom consumed by estimation of the fixed effects, for small samples, MLE is biased toward lower variance estimates (Steenberger and Jones, 2002; Albright and Marinova, 2010).

Table 2 below presents the results of the regression analyses testing the association between the armed conflict and the 2005 OSS scores of students. The columns present the results for models where the quantitative, TM, and verbal test scores are the dependent variable respectively.

TABLE 2: Effects of the Armed Conflict on the 2005 University Entrance Exam Scores

	Dependent variable: Quantitative score	Dependent variable: Turkish-Math score	Dependent variable: Social sciences score

Results from the mixed effects REML regression	Number of obs.:480655 Number of schools:6979 Number of counties: 887 Number of provinces:81	Number of obs.:645772 Number of schools:6873 Number of counties: 908 Number of provinces:81	Number of obs.:347480 Number of schools:6755 Number of counties: 909 Number of provinces:81
Constant	105.16*** (5.74)	135.81*** (1.83)	167.86*** (2.16)
SFCs in the 1990-2005 period	**-0.013***** **(0.005)**	**-0.014***** **(0.004)**	**-0.023***** **(0.005)**
Gender	-4.43*** (0.14)	2.82*** (0.10)	4.87*** (0.17)
Science major	41.58*** (5.34)	36.03*** (0.72)	-0.88 (1.07)
Turkish-math major	25.80*** (5.37)	12.37*** (0.70)	20.31*** (0.89)
Social sciences major	31.08*** (5.40)	13.21*** (0.76)	-10.18*** (0.89)
Percentage of ethnically Kurdish population	-0.03 (0.03)	-0.05 (0.03)	0.003 (0.03)
Population growth rate	0.035 (0.19)	0.002 (0.02)	0.02 (0.02)
Unemployment rate	-0.15 (0.11)	-0.07 (0.09)	-0.02 (0.1)
Share of agricultural employment	-0.20*** (0.02)	-0.12*** (0.02)	-0.12*** (0.02)
Provincial center	5.06*** (0.90)	3.66*** (0.75)	4.18*** (0.86)
School type dummies (excluded type: vocational highschool):			
Anatolian highschool	96.05***(1.06)	72.87***(0.92)	61.16***(1.16)
Science highschool	127.5***(2.74)	97.03***(3.32)	61.95**(27.60)
Private highschool	61.82***(1.22)	44.39***(1.02)	30.37***(1.38)
Private science highschool	93.22***(2.72)	60.87***(2.87)	35.45** (18.07)
Evening highschool	-6.82(6.75)	-5.59 (4.41)	-16.59***(3.37)
Military highschool	25.11*** (4.80)	30.14*** (5.71)	-0.50 (11.42)
Teacher training highschool	93.23***(2.05)	67.67***(1.78)	50.83***(1.84)
Art highschool	47.52 (46.16)	23.22***(2.42)	25.52***(3.53)
Religious highschool	53.95***(2.10)	42.56***(1.24)	31.71***(0.97)
Regular public highschool	47.73*** (0.62)	38.40***(0.57)	29.96***(0.69)
Multiple program public highschool	16.68***(0.98)	16.30***(0.82)	16.41***(0.99)
Random Effects (standard deviations)			
Province level (ν)	3.35	2.51	3.33
County level (ς)	1.08	0.51	1.14
School level (τ)	18.91	15.57	15.29
Student level (σ)	42.07	36.80	45.23
***:significant at 1% level; **:significant at 5% level; *:significant at 10% level.			

For all score types the estimated coefficients for SFCs are negative and highly significant. Each additional SFC, on the average, is associated with a 0.013, 0.014, and 0.023 points decrease in the quantitative, TM, and verbal scores respectively. Considering that the average number of SFCs in the 312 counties that has more than a single casualty in the 1990-2005 period is 105, and that there are 84 counties with more than 100 casualties, 15 with more than 500, and 3 with more than 1000, these results demonstrate how substantial the association between the PKK insurgency and the educational acheivement of students in the conflict zone is. For example, the quantitative score of a student from Sirnak, a county with 1210 SFCs in the 1990-2005 period, is on the average expected to be 16 points less than the score of a student with similar characteristics from a county with similar socioeconomic conditions but outside the conflict zone with no SFCs. A difference of 16 points corresponds to about 55 thousand students in quantitative scores ranking. The expected difference in verbal scores is even more pronounced at 28 points which corresponds to about 76 thousand students in verbal ranking. Note that because of excess demand for university education (each year only about one third of students who take the entrance exam are able to enroll in a university program) entrance is very competitive. University programs, on average, accept about 50 students each year, and as a result of the high demand, the difference between the score of the most succesful student they can attract and the lowest score they accept is usually only about 4 or 5 points.

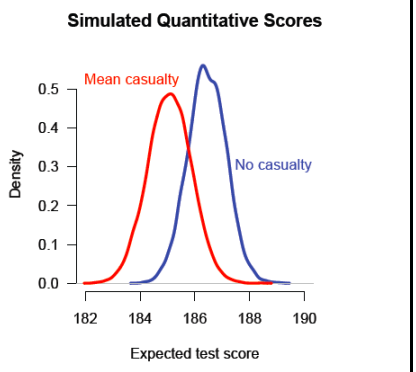
The plots in Table 3 below visualize these results for a better grasp of the association between the conflict and the students' performance. The plots in the first row show respectively the densities of expected quantitative, TM, and verbal scores of a student from a public highschool who majored in science under two casualty scenarios. For each type of score the bell shaped curve on the left is the density of expected test score in a county with 105 SFCs, which is the mean value of SFCs in counties with more than a single casualty in the 1990-2005 period, and with mean values of unemployment rate, share of agricultural employment, population growth rate, and

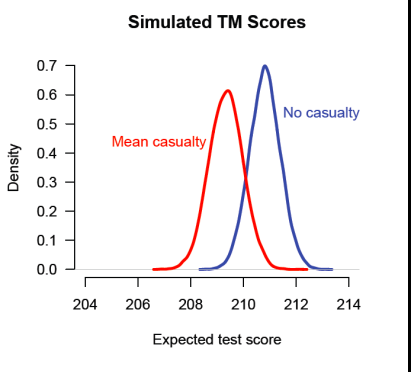
percentage of ethnically Kurdish population, while the curve to the right plots the density of expected test score when the number of SFCs is zero holding everything else constant.

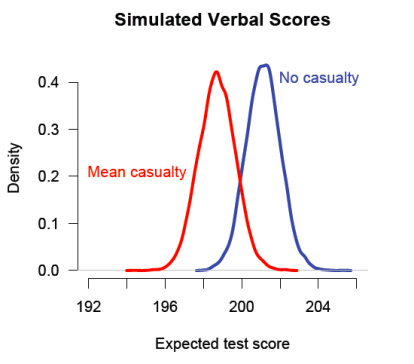
As these plots demonstrate, expected test scores are significantly higher in counties with no casualties. The means of the distributions of expected quantitative, TM and verbal test scores when the number of SFCs is set at its average value is statistically significantly lower than the means of the distribution of expected scores when the number of SFCs is set at zero. The fact that these differences correspond to about 7000 students in quantitative ranking, 14000 students in TM ranking, and 11000 students in verbal ranking is telling in terms of the detrimental impact of the conflict on the educational achievement of the students from the conflict zone.

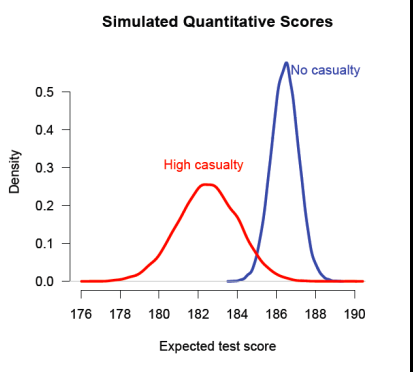
The plots in the second row depict the simulation exercise when the number of SFCs is set at one standard deviation above the mean. Note that there are 32 counties with a higher number of SFCs. The magnitude of the negative association between the conflict and educational success is again clear.

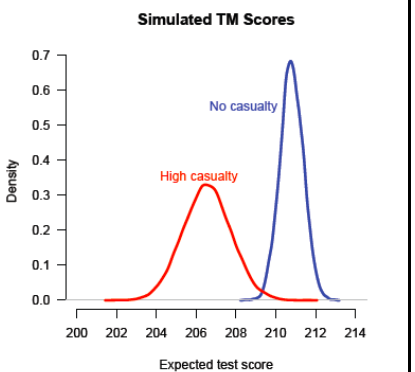
Table 3 : Densities of expected test scores

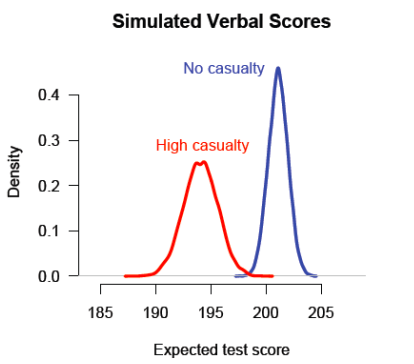












I have also examined the predictive performance of my model by conducting two-fold cross-validation tests. I have randomly set aside 1% of the observations, and fit the model on the remaining 99%. Then I used the observations I had excluded as a test-bed to see how accurately my model can predict them. Chart A1 in the Appendix depicts the results for quantitative, TM, and verbal test scores respectively. Evidently the model has a tendency to overestimate the scores of students who got zero points, nevertheless, the fit is much better for those who were more successful.

Finally, I conducted a robustness check and reestimated the model excluding students from counties within the metropolitan municipalities of Istanbul, Ankara, and Izmir, the three most developed provinces in Turkey. These counties are "outliers in terms of socio-economic development" (Dincer and Ozaslan, 2004), and they have the best schools in the country. Moreover, they are all far from the conflict zone, and consequently have zero SFCs within the 1990-2005 period. Table A1 in the Appendix presents the results when students from these developmental outliers are excluded from the data set to make sure that the results are not driven by them. As can be seen the negative association between the conflict and test scores is robust to the exclusion of developmentally outlier counties.

One interesting question that remains is whether the association between the conflict and test scores varies by gender[ix]. Note that the results in Table 2 reveal a clear gender gap in test scores. While male students are, on the average, more successful in the quantitative test, female students do better in the TM and social sciences tests. These gaps are not very surprising given that the majority of research on gender differences in school performance has highlighted boys' advantage on standardized math tests, and girls' advantage in standardized reading tests. Similar gaps have been commonly observed in other standardized tests across countries, like the Program for International Student Assessment (PISA), the SAT in the United States, and the National Program for Literacy and Numeracy (NAPLAN) in Australia (Heilbronner, 2013; Kim and Law, 2012; Forgasz and Hill,

2013; Downey and Yuan, 2005). Researchers argue that the female disadvantage in maths arises mainly from gender differences in career preferences, lifestyle choices, and activities outside the classroom; and from gender stereotypes and discrimination (Ceci and Williams, 2010; Downey and Yuan, 2005; Gunderson et al., 2012). Gunderson et al. (2012) argue that parents' and teachers' expectancies for children's math competence are often gender-biased, and they can influence children's math attitudes and performance. And children's math attitudes and performance are powerful determinants of their subsequent behaviors which then come back to influence the very social outcomes, like gender stereotypes, gender roles, and women's underrepresentation in math-intensive fields that are responsible for the gender gap in math achievement in the first place (Cheryan, 2012).

A gender differentiation in the association between civil conflicts and educational achievement indicates that civil conflicts have direct implications for gender gaps in educational achievement. In order to test whether such a differentiation exists, I reestimated my model with the inclusion of an interaction variable between gender and the number of SFCs. Table 4 below presents the results, which indicate that the conflict has a significantly more detrimental impact on the quantitative test scores of female students compared to males students[x]. A similar, albeit small differential impact is observed upon Turkish-math scores as well. However, we do not observe any gender differentiation for the impact of the conflict on social sciences test scores. It seems the conflict worsens the female disadvantage in math and math-intensive fields.

TABLE 4: Differential Effects of the Armed Conflict on theTest Scores of Male and Female Students

	Dependent variable: Quantitative score	Dependent variable: Turkish-Math score	Dependent variable: Social sciences score
Results from the mixed effects REML regression	Number of obs.:480655 Number of schools:6979 Number of counties: 887 Number of provinces:81	Number of obs.:645772 Number of schools:6873 Number of counties: 908 Number of provinces:81	Number of obs.:347480 Number of schools:6755 Number of counties: 909 Number of provinces:81
Constant	105.03*** (5.73)	135.75*** (1.83)	167.87*** (2.16)
Gender	-4.05*** (0.14)	2.89*** (0.10)	4.85*** (0.18)

SFCs in the 1990-2005 period	**-0.008* (0.005)**	**-0.012*** (0.004)**	**-0.024*** (0.005)**
Gender*SFCs in the 1990-2005 period	**-0.023*** (0.002)**	**-0.003*** (0.001)**	**0.001 (0.002)**
Science major	41.53*** (5.34)	36.04*** (0.72)	-0.88 (1.07)
Turkish-math major	25.73*** (5.38)	12.37*** (0.70)	20.31*** (0.89)
Social sciences major	30.95*** (5.40)	13.21*** (0.76)	-10.17*** (0.89)
Percentage of ethnically Kurdish population	-0.03 (0.03)	-0.05** (0.03)	0.001 (0.03)
Population growth rate	0.035* (0.02)	0.002 (0.01)	0.02 (0.02)
Unemployment rate	-0.15*** (0.11)	-0.07 (0.09)	-0.015 (0.10)
Share of agricultural employment	-0.20*** (0.02)	-0.12*** (0.02)	-0.11*** (0.02)
Provincial center	5.09*** (0.90)	3.67*** (0.75)	4.18*** (0.86)
Estimated coefficients for school type dummies are not reported.			
Random Effects (standard deviations)			
Province level (ν)	3.353	2.51	3.33
County level (ς)	1.08	0.52	1.14
School level (τ)	18.91	15.57	15.28
Student level (σ)	42.07	36.80	45.22
***:significant at 1% level; **:significant at 5% level; *:significant at 10% level.			

A possible explanation for this observed gender differentiation is that those factors that create the gender gap in math achievement in the first place might also make it more difficult for girls to make up for the math and science classes they miss due to disruptions caused by the conflict. Gender biases and stereotypes their parents and teachers may have might lead these girls to get less help in math-intensive subjects. Also boys are more likely to be involved in outside activities that can improve their math skills, like helping with the family business, or having a part time clerical job, whereas girls are often confined to helping their mothers with house-chores.

The gender differentiation in the association between the conflict and math-intensive test scores highlight another long term influence civil conflicts exert on host societies. It seems by disadvantaging female students even more in math and science achievement, civil conflicts foster gender biases, and traditional gender roles in these societies. This is a novel finding, and it points to an important dynamic that future studies should look into. For the Turkish case, it can be argued that the conflict, by further disadvantaging female highschool students in math achievement, reenforces the gender biases and roles in a society that already suffers severely from gender discrimination against women[xi].

Another important question is whether the negative association between the conflict and educational achievement varies by the timing of exposure to violence. Understanding when the most serious "damage" on educational achievement is done is very important for understanding both the public health and educational effects of civil conflicts, for figuring out the dynamics behind these effects, and for devising policies to deal with those mechanisms. A substantial impact of violence in early childhood, for example, indicates that psychological and developmental mechanisms might be playing a leading role. In her 2002 study McDonald presents a striking example of these mechanisms. She argues that neglect in early childhood, which is very common in conflict environments, inhibits brain development in children. Similarly, Briggs-Gowan et al. (2010) present evidence that violence exposure in early childhood is associated with depression, separation anxiety, post-traumatic stress, and conduct problems in children. There are also studies which show that even being exposed to violent media in early childhood leads to adverse mental health effects and lower academic achievement (Fitzpatrick et al., 2012; Gentile et al., 2011). On the other hand, if it is violence during adolescence that has the most impact on educational achievement, then changes in the school and social environment should also be given priority as possible mechanisms alongside psychological ones.

Unfortunately, the available data does not allow me to explore the impact of the timing of exposure to conflict. Because I only have the 2005 test results, I am able to observe a single age

cohort of students. Consequently, I am not able to control for cohort effects[xii]. This important question remains open for future studies.

7. CONCLUSION

This study analyzes the effects of the ongoing civil conflict in Turkey on educational achievement by studying the results of the 2005 university entrance exam. The results demonstrate a significant negative association between the conflict and the test scores of students. Students from the conflict zone fall significantly behind in the race. The negative impact of the conflict amount to a drop of thousands in rankings for these kids, which prevents many of them from having a university education. Coupled with high levels of unemployment, and low levels of economic opportunity in their hometowns, such a dismissal from the education system leaves these kids without much hope for the future, and creates a fertile recruitment ground for further violence and conflict. Even for those students who make the cut and manage to enroll in some university program, it is highly likely that it will not be a high ranked one. With the adverse effects of the conflict weighing their educational success down, it is very difficult (if not impossible) for students from the conflict zone to make it to the top universities of the country.

Performance of students on standardized tests is a direct measure of a country's human capital, something that might be called "the average level of cognitive skills among those entering the work force" (Hanushek, 2008). The results in this study reveal that the conflict is severely hurting the cognitive skills of students in the conflict zone. Combining these results with the already established link in the literature between education and socioeconomic well-being of societies, I argue that education is a major channel through which civil conflicts exert their long-term detrimental impacts on host societies.

Understanding the mechanisms by which civil conflict affects education is important in formulating effective policies to counteract these effects. My analysis empirically demonstrates the existence of a negative association between the civil conflict and educational achievement in Turkey, but does not address the mechanisms behind this association. Nevertheless, the recent

history of the country provides us with some insights. Early in the 90s, the PKK burned down some 238 schools in Eastern and Southeastern Turkey. Moreover, due to security concerns more than 2000 village schools were closed down in the area[xiii] and their students were transfered to schools in nearby villages. Thus, the destruction of infrastructure is likely to be one mechanism through which the conflict hurt education. But, the damage is not limited to the schools that ceased to exist and to the students of these schools. The conflict also damaged the attractiveness of these areas by dampening social and economic life, and by creating security concerns for their inhabitants. Such concerns were especially heightened by PKK attacks on public employees, including teachers. In the early 90s the PKK killed 136 primary and highschool teachers in eastern and southeastern provinces. Consequently, it became difficult for the schools in the conflict zone to attract and keep skilled, experienced teachers, and to run regular class schedules. A parliamentary inquiry in 2012 about the shortage of teachers in eastern and southeastern Turkey reveals the magnitude of this difficulty: Between 2003 and 2008, of the 5129 teachers who were appointed to public schools in Sirnak (the province with the highest number of SFCs in the 1990-2005 period) by the Ministry of Education, 4605 resigned. In other words, almost 90% of them refused to work in Sirnak (Guclu, 2010). Similarly, in 1997, the governor of the martial law zone was complaining that at least half of the 10 thousand teachers appointed to the area had not shown up for their posts (Sabah daily newspaper, October 30, 1997). A columnist in a local Hakkari newspaper explains how offended he was in seeing young teachers crying upon learning that they were appointed to Hakkari: “Those of you who accept the appointment and come to our town do so unwillingly. Your unwillingness reflect in your performance in class, and take away your productivity. This is why our kids always rank bottom in all centralized exams.”(Tas, 2011). Hakkari is a province at the southeast corner of Turkey, bordering Iraq, with the second highest number of SFCs after Sirnak in the 1990-2005 period. A recent interview conducted in Hakkari with highschool students who actually scored zero points in the 2012 university entrance exam clearly reveals that students also blame the lack of experienced, skilled teachers for their failure: “A major problem is that teachers do not stay in

Hakkari. I do not remember my primary school teacher because I had seven different teachers from grade one to grade five..."; "All the teachers (in my school) were new graduates, and they all wanted to leave this place as soon as possible..."; "There is a world of difference between the east and the west in this country. Here sometimes teachers do not come to class for two-three months..." (T24, April 30, 2012).

Evidently, the lack of skilled and experienced teachers, and high teacher absence and turnover rates are important mechanisms through which the conflict hurt education. Teacher quality is argued in the literature to be the most important determinant of educational quality. (Hanushek, 2002; Hanushek, 2011). The magnitude of estimated differences in student achievement due to teacher quality is impressive. Hanushek (1992) shows that teachers near the top of the quality distribution can get an entire year's worth of additional learning out of their students compared to those near the bottom (for a detailed review of the literature on teacher quality see Hanushek and Rivkin (2006)). And not surprisingly teacher absence is also detrimental for student success. Duflo and Hanna (2005), show that a randomized intervention that reduced teacher absence from 42 to 22 percent led to a 0.17 standard deviation improvement in student test scores. A high turnover rate, because it does not allow students to bond with their teachers, is also expected to impact educational quality negatively.

One can also argue that the disruptions in daily life in the conflict zone reflects negatively on education. Curfews, restrictions on travel, check points, and other security measures imposed by the authorities in such environemtns may disrupt regular schooling.

Finally, the economic, physical, and psychological damages suffered by parents, students, and teachers in the conflict zone are likely to impact negatively on education.

In order to devise appropriate measures to remedy the negative impact of civil conflicts on education, we need a complete understanding of all such possible mechanisms and their relative importance. This remains as an important task for future research.

REFERENCES 1230

Adeola, Francis. 1996. Military Expenditures, Health, and Education: Bedfellows or Antagonists in Third World Development?. *Armed Forces & Society* 22(3): 441–455.

Akresh, Richard, and Damien De Walque. 2008. Armed Conflict and Schooling: Evidence from the 1994 Rwandan Genocide. *Institute For the Study of Labor (IZA)*. Discussion Paper No: 3516.

Akresh, Richard et al..2009. Civil War, Crop Failure, and Child Stunting in Rwanda. *World Bank Policy Research Working Paper*.

Albright, Jeremy J., and Dani M.Marinova. 2010. Estimating Multilevel Models Using SPSS, Stata, SAS, and R. Mimeo. Indiana University

Alkan, Ahmet et al.. 2008. *Turkiye Orta Ogretim Sektorunde Katma Deger Olusumu, Universiteye Giris Yarisi.* TUBITAK. Project No: SOBAG-104K092.

Barro, Robert J. 1991. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics* 106(2): 407–43.

Barro, Robert J. 1997. *Determinants of Economic Growth: A Cross-Country Empirical Study*. Cambridge and London: MIT Press.

Barro, Robert J.. 1999. The Determinants of Democracy. *Journal of Political Economy* 107(S6): S158–83.

Barro, Robert J..1999. Human Capital and Growth in Cross-Country Regressions. *Swedish Economic Policy Review*. Autumn.

Barro, Robert. 2001. Human Capital and Growth. *American Economic Review* 91(2): 12-17.

Behrman, Jere R., David R. Ross, and Richard Sabot. 2008. Improving Quality versus Increasing the Quantity of Schooling: Estimates of Rates of Return from Rural Pakistan. *Journal of Development Economics* 85(1–2): 94–104.

Briggs-Gowan, Margaret J., Alice S. Carter, and Julian D. Ford. 2012. Parsing the Effects of Violence Exposure in Early Childhood:Modelling Developmental Pathways. *Journal of Pediatric Psychology* 37(1):11-22.

Bishop, John Hillman. 1989. Is the Test Score Decline Responsible for the Productivity Growth Decline? *American Economic Review* 79(1): 178–97.

Blattman, Christopher, and Jeannie Annan. 2010. The Consequences of Child Soldiering. *Review of Economics and Statistics* 92(4):882-898.

Boissiere, M., John B. Knight, and Richard Sabot. 1985. Earnings, Schooling, Ability, and Cognitive Skills. *American Economic Review* 75(5): 1016–30.

Bosworth, Barry P., and Susan M. Collins. 2003. The Empirics of Growth: An Update. *Brookings Papers on Economic Activity* 2: 113–79.

Breierova, Lucia, and Esther Duflo. 2002.The Impact of Education on Fertility and Child Mortality: Do Father Really Matter Less Than Mothers? *NBER Working Papers* 10513. National Bureau of Economic Research Inc.

Carlton-Ford, Steve, and Donielle Boop. 2010.Civil War and Life Chances. *International Sociology* 25(1):75-97.

Ceci, J. Stephen, and Wendy M. Williams. 2010. Sex Differences in Math-Intensive Fields. *Current Directions in Psychological Science* 10:1-5.

Chamarbagwala, Rubiana, and Hilcias E.Moran. 2011. The Human Capital Consequences of Civil War: Evidence From Guatemala. *Journal of Development Economics* 94:41-61.

Chaudhury, Nazmul et al.. 2006. Missing in Action: Teacher and Health Worker Absence in Developing Countries. *The Journal of Economic Perspectives*. 20(1):91-116.

Cheryan, Sapna. 2012. Understanding the Paradox in Math-Related Fields:Why do Some Gender Gaps Remain While Others Do Not. *Sex Roles* 66:184-190.

Ciccone, Antonio, and Elias Papaioannou. 2005. Human Capital, the Structure of Production, and Growth. *Department of Economics and Business, Universitat Pompeu Fabra Economics Working Papers*.

Collier, Paul. 1999. On the Economic Consequences of Civil War. *Oxford Economic Papers* 51(1):168-83.

Collier, Paul et al..2003. Breaking the Conflict Trap, Civil War and Development Policy. *A World Bank Policy Research Report.* World Bank and Oxford University Press.

Currie, Janet, and Enrico Moretti. 2003. Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from College Openings. *Quarterly Journal of Economics* 118(4): 1495–1532.

Dee, Thomas S. 2004. Are There Civic Returns to Education? *Journal of Public Economics* 88(9–10): 1697–1720.

De Gregorio, Jose, and Jong-Wha Lee. 2002. Education and Income Inequality: New Evidence From Cross-Country Data. Review of Income and Wealth 48(3): 395-416.

De Walque, Damien. 2006. The Socio-demographic Legacy of the Khmer Rouge Period in Cambodia. *Population Studies* 60(2):223-231.

Dinçer, Bülent, and Metin Özaslan. 2004. *İlçelerin Sosyo-Ekonomik Gelişmişlik Sıralaması Araştırması*. Devlet Planlama Teşkilatı.

Downey. Douglas B. and Anastasia S.Vogt Yuan. 2005. Sex Differences in School Performance During High-School: Puzzling Patterns and Possible Explanations. *The Sociological Quarterly* 46: 299-321.

Duflo, Esther, and Rema Hanna. 2005. Monitorin Work: Getting Teachers to Come to School. *NBER Working Paper 11880.*

Evans, David B. et al.. 2000. The Comparative Efficiency of National Health Systems in Producing Health: An Analysis of 191 Countries. *GPE Discussion Paper* No. 29. Geneva: World Health Organization.

Fitzpatrick, Caroline, et al..2012. Early Exposure to Media Violence and Later Child Adjustment. *Journal of Developmental and Behavioral Pediatrics* 33(4):291-297.

Forgasz, Helen J., and Janell C. Hill. 2013. Factors Implicated in High Mathematics Achievement. *International Journal of Science and Mathematics Education*. 11:481-499.

Gentile, Douglas A. et al.. 2011.Media Violence Associations with the Form and Function of

Aggression Among Elementary School Children. *Social Development*. 20(2):213-232.

Glaeser, Edward L. et al..2004. Do Institutions Cause Growth? *Journal of Economic Growth* 9(3):271–303.

Gradstein, Mark. 2003. The Political Economy of Public Spending on Education, Inequality and Growth. *World Bank Policy Research Working Paper* 3162.

Guclu, Abbas. July 7, 2010. Sirnak'a Giden Ogretmenler Neden Orada Kalmiyor? *Milliyet Daily Newspaper.*

Gunderson, Elizabeth, et al..2012. The Role of Parents and Teachers in the Development of Gender Related Math Attitudes. *Sex Roles* 66:153-166

Hanushek, Eric. 2009. The Economic Value of Education and Cognitive Skills. In *Handbook of Education Policy Research*. ed. Gary Sykes, Barbara Schneider and David N. Plank. 39-56.New York: Routledge.

Hanushek Eric A. 2011. The Economic Value of Higher Teacher Quality. *Economics of Education Review* 30:466-479.

Hanushek, Eric A. 2002. Teacher Quality. In *Teacher Quality* edited by T. Izumi and Williamson M. Evers. Hoover Press. 1-13.

Hanushek, Eric A. 1992. The trade-off between child quantity and quality. *Journal of Political Economy* 100 (1): 84–117.

Hanushek, Eric A., and Steven G.Rivkin. 2006. Teacher Quality. In *Handbook of the Economics of Education* edited by Eric A. Hanushek, and Finis Welch. Vol. 2, Amsterdam: North Holland, 742 pages.

Hanushek, Eric A., and Ludger Woessmann. 2007. The Role of Educaiton Quality in Economic Growth. *World Bank Policy Research Working Paper* 4122.

Hanushek, Eric A., and Ludger Woessmann. 2008. The Role of Cognitive Skills in Economic Development. *Journal of Economic Literature* 46:607–668.

Hanushek Eric A., Dean T. Jamison, Elliot A. Jamison, and Ludger Woessmann. 2008. Education

and Economic Growth: It is not Just Going to School, But Learning Something While There That Matters. *Education Next*. Spring: 62-70.

Hanushek, Eric A., and Dennis D. Kimko. 2000. Schooling, Labor-Force Quality, and the Growth of Nations. *American Economic Review*, 90(5): 1184–1208.

Hanushek, Eric A., and Lei Zhang. 2009. Quality-Consistent Estimates of International Schooling and Skill Gradients. *Journal of Human Capital* 3(2):107-143.

Hanushek, Eric A,. Ludger Woessmann. 2011. The Economics of International Differences in Educational Achievement. In *Handbook of the Economics of Education*. Edited by Eric A. Hanushek, Stephen Machin and Ludger Woessmann. Vol. 3:89-200. Amsterdam: North Holland.

Hanushek, Eric A., Ludger Woessmann. 2012. Schooling Educational Achievement, and the Latin American Growth Puzzle. *Journal of Development Economics* 99(2): 497-512.

Heckman, James J., Lance J. Lochner, and Petra E. Todd. 2006. Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond. In *Handbook of the Economics of Education*. Volume 1. ed. Eric A. Hanushek and Finis Welch. 307–458. Amsterdam and Oxford: Elsevier, North-Holland.

Heilbronner, Nancy N.. 2013. The STEM Pathway for Women:What Has Changed? *Gifted Child Quarterly* 57(1): 39-55.

Hoeffler, Anke, and Marta Reynal-Querol. 2003. Measuring the Costs of Conflict. Unpublished working paper.

Jamison, Eliot A., Dean T. Jamison, and Eric A. Hanushek. 2007. The Effects of Education Quality on Income Growth and Mortality Decline. *Economics of Education Review* 26(6): 771–88.

Kibris, Arzu. 2012. *The Polarization Trap*. Unpublished manuscript.

Kim, Doo Hwan, and Helen Law. 2012. Gender Gap in Math Test Scores in South Korea and Hog Kong: Role of Family Background and Single-Sex Schooling. *International Journal of Educational Development*. 32(1):92-103.

KONDA Araştırma ve Danışmanlık, *Biz Kimiz, Toplumsal Yapı Araştırması*, 2006.

Krueger, Alan B., and Mikael Lindahl. 2001. Education for Growth: Why and for Whom? *Journal of Economic Literature* 39(4): 1101–36.

Lai, Brian, and Clayton Thyne. 2007. The Effect of Civil War on Education, 1980-97. *Journal of Peace Research* 44(3):277-292.

Lazear, Edward P. 2003. Teacher Incentives. *Swedish Economic Policy Review* 10(3): 179–214.

Lee, Doo Won, and Tong Hun Lee. 1995. Human Capital and Economic Growth Tests Based on the International Evaluation of Educational Achievement. *Economics Letters* 47(2): 219–25.

Lipset, Seymour Martin. 1959. Some Social Requisites of Democracy: Economic Development and Political Legitimacy. *American Political Science Review* 53 (1): 69–105.

Lochner, Lance J., and Enrico Moretti. 2004. The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports. *American Economic Review* 94(1): 155–89.

Machin, Stephen, Olivier Marie, and Suncica Vujic. 2010. The Crime Reducing Effect of Education. *IZA Discussion Paper Series* No:5000.

Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics* 107(2): 407–37.

McDonald, Laura. 2002. The International Operational Response to the Psychological Wounds of War: Understanding and Improving Psycho-social Interventions. Feinstein International Famine Center. Working Paper No.7.

Merrouche, Ouarda. 2011. The Long Term Educational Cost of War: Evidence from Landmine Contamination in Cambodia. *Journal of Development Studies* 47(3):399-416.

Milligan, Kevin, Enrico Moretti, and Philip Oreopoulos. 2004. Does Education Improve Citizenship? Evidence from the United States and the United Kingdom. *Journal of Public Economics* 88(9–10): 1667–95.

Mulligan, Casey B. 1999. Galton versus the Human Capital Approach to Inheritance. *Journal of Political Economy* 107(6): S184–224.

Murnane, Richard J., John B. Willett, Yves Duhaldeborde, and John H. Tyler. 2000. How Important

Are the Cognitive Skills of Teenagers in Predicting Subsequent Earnings. *Journal of Policy Analysis and Management* 19(4): 547–68.

Mutlu, Servet. 1996. Ethnic Kurds in Turkey. *International Journal of Middle East Studies* 28(4): 517-541.

Poirier, Thomas. 2012. The Effects of Armed Conflict on Schooling in Sub-Saharan Africa. *International Journal of Educational Development* 32:341-351.

Przeworski, Adam et al.. 2000. *Democracy and Development: Political Institutions and Material Well-Being in the World, 1950–1990*. New York: Cambridge University Press.

Psacharopoulos, George, and Harry Anthony Patrinos. 2004. Returns to Investment in Education: A Further Update. *Education Economics*, 12(2): 111–34.

Ritzen, Jo, William Easterly, and Michael Woolcock. 2000. On "Good" Politicians and "Bad" Policies: Social Cohesion, Institutions, and Growth. Paper 2448. Country Economics Department, World Bank.

Sabah Daily Newspaper. October 30, 1997. http://arsiv.sabah.com.tr/1997/10/30/r07.html

Shemyakina, Olga. 2011. The Effect of Armed Conflict on Accumulation of Schooling: Results from Tajikistan. *Journal of Development Economics* 95:186-200.

Sianesi, Barbara, and John Van Reenen. 2003. The Returns to Education: Macroeconomics. *Journal of Economic Surveys* 17(2): 157–200.

Singh, Prakash, and Olga Shemyakina. 2013. Gender-Differential Effects of Conflict on Education: The Case of the 1981-1993 Punjab Insurgency. Mimeo.

Steenbergen, Marco R., and Bradford S.Jones. 2002. Modeling Multilevel Data Structures. *American Journal of Political Science* 46(1): 218-237.

Stewart, Frances et al.. 2001. Internal Wars in Developing Countries: An Empirical Overview of Economic and Social Consequences. In *War and Underdevelopment* edited by Stewart, Frances, and Valpy Fitzgerald. Oxford University Press.

Şener, Nedim. June 24th, 2010. 26 Yilin Kanli Bilancosu. *Milliyet.*

Tas, Hakan. July 11, 2011. Boyle Ogretmen Istemem. *Hakkari HaberTV*. http://www.hakkarihabertv.com/boyle-ogretmen-istemem--7795h.htm

T24, Daily Internet Newspaper. April 30,2012.

Thyne, Clayton L.. 2006. ABCs, 123's, and the Golden Rule: The Pacifying Effect of Education on Civil War, 1980-1999. *International Studies Quarterly* 50:733-754.

Woessmann, Ludger. 2003. Specifying Human Capital. *Journal of Economic Surveys* 17(3): 239-70.

Wood, Elisabeth Jean. 2008. The Social Processes of Civil War: The Wartime Transformation of Social Networks. *Annual Review of Political Science* 11:539-561.

Hausman, Ricardo, Laura D.Tyson, and Saadia Zahidi. 2012. *The Global Gender Gap Report*. World Economic Forum.

ENDNOTES

[i] The red areas have more than 500 SFCs; the purple areas have 250 to 500; the pink areas have 100 to 250; the blue areas have 50 to 100; the green areas have 20 to 50; the orange areas have 10 to 20; the yellow areas have 1 to 10; and gray areas have no SFCs.

[ii] This information is provided in the original data set.

[iii] Primary schooling, which is grade 1 through grade 8, is mandatory in Turkey. Turkish children start primary school at age six. Students then continue on to high school from which they are expected to graduate in 4 years.

[iv] Note that those excluded are distributed randomly over the country.

[v] The Appendix is available online at http://jcr.sagepub.com/.

[vi] The types are regular public highschools, private highschools, evening highschools, public anatolian highschools which give education in English, public science highschools, private science highschools, military highschools, teacher highschools, art highschools, religious highschools, multiple program public highschools, and vocational schools.

[vii] Neighboring counties of county j are those bordering j.

[viii] Neither using the 1993-2005 period nor extending the period to 1987-2005 to cover for longer lags in the effects of violence create any substantial change in the results, except for small scale effects. Results are available upon request.

[ix] I thank the anonymous reviewer for bringing this question to my attention.

[x] At first look it seems the conflict does not really affect male students' quantitative scores much. Nevertheless, I reestimated the model for male and female students separately. The results are presented in Table A3 in the Appendix. As the results demonstrate violence has a significant negative impact on the quantitative scores of both male and female students.

[xi] Turkey ranks 124th among the 135 countries in the 2012 Gender Gap Report of the World Economic Forum.

[xii] Another way to explore the impact of timing of exposure to violence would be to include the number of SFCs in different time periods simultaneously as separate controls in the model. But, because the conflict in Turkey has always been geographically concentrated, casualty series for different periods are very highly correlated. Consequently, having such highly correlated controls in the model leads to severe multicollinearity, and renders the coefficient estimates insignificant and unreliable.

[xiii] According to a formal answer given by the minister of education to a parliamentary questioning conducted on 22 March, 1994, by then the conflict had led to the closure of 2181 schools in eastern and southeastern Turkey (Turkish Grand National Assembly archives, meeting minutes, March 22, 1994).