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Polarized Education Levels and Civil War

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Polarized Education Levels and Civil War

Abstract

This paper suggests that societies exhibiting a large degree of educational polarization among its populace are systematically more likely to slip into civil conflict and civil war. Intuitively, political preferences and beliefs of highly educated citizens are likely to differ fundamentally from those of uneducated citizens. We propose an index of educational polarization and test its predictive power in explaining the likelihood of civil conflict and civil war, analyzing 146 countries (equivalent to over 93 percent of the world population) from 1950 to 2014. Our results produce strong evidence for a positive, statistically powerful, and economically sizeable relationship. In our benchmark estimation, a one standard deviation increase in educational polarization is associated with a 4.6 and 3.8 percentage point rise in the chances of civil conflict and civil war, respectively. These results are robust to the inclusion of the conventional control variables, country-fixed effects, and country-specific time trends.

JEL-Codes: D630, D740, I240, O150.

Keywords: civil conflict, civil war, educational polarization, panel data.

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1 Introduction

A polarized society is more likely to experience civil unrest, as recently pointed out in a series of papers by Joan-María Esteban and Debraj Ray (e.g., see [Esteban and Ray, 1994, 1999, 2008, 2011](#); [Esteban et al., 2012](#), but also [Reynal-Querol and Montalvo, 2005](#)). “[T]he phenomenon of polarization is closely linked to the generation of tensions, to the possibilities of articulated rebellion and revolt, and to the existence of social unrest in general” ([Esteban and Ray, 1994](#), p.820).” Similarly, [Collier and Hoeffler \(2004, p.571\)](#) argue that “the source of inter-group tension is not diversity but polarization”.

In particular, polarization along ethnic or religious dimensions has been found to matter (e.g., see [Bhavnani and Miodownik, 2009](#), [Klasnja and Novta, 2014](#), [Reynal-Querol and Montalvo, 2005](#), [Montalvo and Reynal-Querol, 2010](#), or [Bosker and de Ree, 2014](#)). Extending and complementing this literature, the following pages introduce *educational* polarization (*EduP* from hereon) as a meaningful predictor of civil conflict and civil war. What is our hypothesis based on, i.e., why would *educational* polarization matter? In the most general sense, common education levels can represent one “identity” along which unsatisfied citizens can organize themselves, similar to ethnicity or religion. A populace that is sharply divided among highly educated citizens on the one end and mostly uneducated citizens on the other end is more likely to hold fundamentally different preferences and beliefs, in addition to their understanding of how society should operate and what governments should do.

Recent popular examples can be found in the “Brexit” movement in the United Kingdom (UK) or the presidential election process of 2016 in the United States (US). In the UK, 27 of the 30 areas with the fewest graduates voted to leave the European Union ([BBC News, 2016](#)), whereas the vast majority of university graduates was voting to remain.¹ Such fundamental differences along the lines of educational attainment also became apparent in the 2016 US presidential elections. The election revealed a sharp contrast in preferences between those with little formal education (voting largely for Trump) and those with a college degree (voting largely for Clinton).²

¹Those with only secondary education or a similar degree were more likely to support “Brexit” ([The Telegraph, 2016](#)). Only three out of 35 areas in which more than half of the residents have a degree voted to leave the European Union.

²These voting differences along the lines of education have been documented and discussed on numerous

Luckily, we did not observe a civil conflict erupt in either of these two countries, although rising violence has been well-documented, especially during and after the US election campaign (e.g., see [Okeowo, 2016](#), [Lanyon, 2016](#), or [Nagesh, 2016](#)). But history has also shown us a number of cases where countries exhibiting largely polarized education levels within society eventually slid into civil conflict or even civil war. In general, if *EduP* is substantial, individuals with very little education are easier marginalized in terms of political and economic rights and opportunities. This can express itself in political power, as well as job opportunities and wages. Such discrepancies define political outcomes and can give rise to grievances.

For instance, [Stewart et al. \(2002\)](#); [Stewart \(2005\)](#) presents nine illustrative cases where inequalities between groups have led to political instability, and in some cases civil wars. Almost all of them feature educational differences as a determining factor. For example, in Sri Lanka the Tamils were favored by the British colonial administration, receiving relatively privileged access to education and university places. When the Sinhalese majority gained power, they appealed for equalizing policies, such as educational quotas on university access. These actions eventually provoked the Tamils to start a civil war seeking political independence in the 1980s.

Other examples can be found in South Africa under Apartheid, where state expenditure on education per white student was 14 times the expenditure per black student in 1980. The resulting educational polarization, combined with economic factors, led to an armed rebellion in 1976 ([Stewart, 2005](#)). Similarly, the Sudanese civil war was in large part caused by the inadequate provision of educational resources by the state. Historically, a more general expression of social tensions along the lines of education levels can be found in book burnings and organized violence targeted at scholars and academics (e.g., in 210 BC China, Christian burnings in AD 325, Nazi Germany).

This paper first derives an index of *EduP* and then provides empirical evidence for a strong relationship between *EduP* and the incidence of civil conflict and civil war. Using data for 146 countries (equivalent to over 93 percent of the world population) from 1950 to 2014, we find a systematically positive link that is meaningful both in statistical and economic terms. To be clear, the goal of our paper is not to argue that other forms of polarization, such as along ethnic or religious dimensions, do not matter. Rather, we posit that *EduP* can create an environment

occasions. For examples, see [Puglise \(2016\)](#), [Peters et al. \(2016\)](#), and [Kirk and Scott \(2016\)](#).

in which civil conflict becomes more likely.

Our work aims to contribute to two distinct streams of literature. First, we aim to improve our understanding of the conditions under which civil conflicts and civil wars are likely to erupt. The closest study to ours is developed by Østby (2008), who explores social polarization in terms of several economic and social aspects (including education) in the context of civil war onset. Her index considers years of education and is based on two artificial groups given by the mean. Our analysis goes deeper, deriving a more precise index for *EduP* by incorporating four distinct levels of educational attainment. We also consider country fixed effects, thereby controlling for any time-invariant unobservables on the country level, and a substantially larger sample.³ Second, we aim to pull *EduP* into the spotlight as an important societal factor that has previously been neglected. Thus, studies that analyze political developments per se, and political violence specifically, may find it useful to consider *EduP*, both in terms of theoretic modelling and empirical analyses.

The paper proceeds with introducing a measure of *EduP*, followed by a description of the data and the empirical methodology in Section 3. Section 4 presents our benchmark findings, whereas Section 5 discusses a series of robustness checks and extensions. Section 6 concludes with a brief discussion.

2 A Polarization Index of Educational Attainment Levels

2.1 Construction of the Index

The first contribution of this paper consists in deriving a polarization index for educational attainment on the country level. We access the database introduced by Barro and Lee (2013) for information on the population shares of four distinct categories of educational attainment for everybody over the age of 25 and under the age of 60: no schooling, complete primary schooling, complete secondary schooling, and completed tertiary schooling. Barro and Lee (2013) feature this information for 146 countries on a five year basis, beginning in 1950. This gives us 13 time periods (1950 – 1954, 1955 – 1959, ..., 2010 – 2014). Note that our results are virtually

³Østby (2008) analyzes 36 developing countries between the years 1986 to 2004, including 519 observations. Our full sample employs 1,897 observations and 1,240 observations after including all relevant control variables.

identical when using the entire population (up to the age of 99) or when using seven categories: no schooling, some primary schooling, complete primary schooling, some secondary schooling, complete secondary schooling, some tertiary schooling, and completed tertiary schooling.

Our strategy to create the *EduP* index is based on Apouey (2007) who explores polarization within ordinal variables. Given four distinct levels of education, we consider education as an ordinal variable because a priori it is not clear *how much* education is added when moving from no schooling to primary schooling, as opposed to moving from completed secondary to completed tertiary schooling, for example. This becomes even clearer when considering a global sample, as every country features different educational structures. Thus, our index is median-based and independent of a cardinalization process, avoiding the problem of assigning a scale to calculate the mean.

In particular, with c categories (where $1 \leq c \leq 4$) the index takes on the following form for country i in the five-year period t :

$$P_{it} = 1 - \frac{2^\alpha}{C-1} \sum_{c=1}^{C-1} |F_{cit} - \frac{1}{2}|^\alpha, \quad (1)$$

where F_{cit} denotes the cumulative proportion of people in category c , country i , and period t . C represents the total number of categories, in our case four. Following Apouey (2007, p.885), “ α reflects the importance that is given to the median category” and we choose a value of 1.58, as recommended when $C = 4$ (equivalent to $\frac{\ln(4)-\ln(3)}{\ln(2)}$, see Table I in Apouey, 2007).⁴ The index is continuous and, in order to facilitate interpretation, we re-scale it so it can reach a maximum value of one.

Intuitively, if everybody shares the same level of education (e.g., everybody possesses complete secondary education), the index equals zero. If half of the populace exhibits no formal education, but the other half has completed tertiary education, the index equals one. In general, the index increases when the proportion of people at extremes increases or if the shares around the median category decrease.

⁴Intuitively, $\alpha = 1.58$ ensures that the polarization index takes on the value of $\frac{1}{2}$ when the distribution is uniform. We refer to Apouey (2007) for a more detailed discussion.

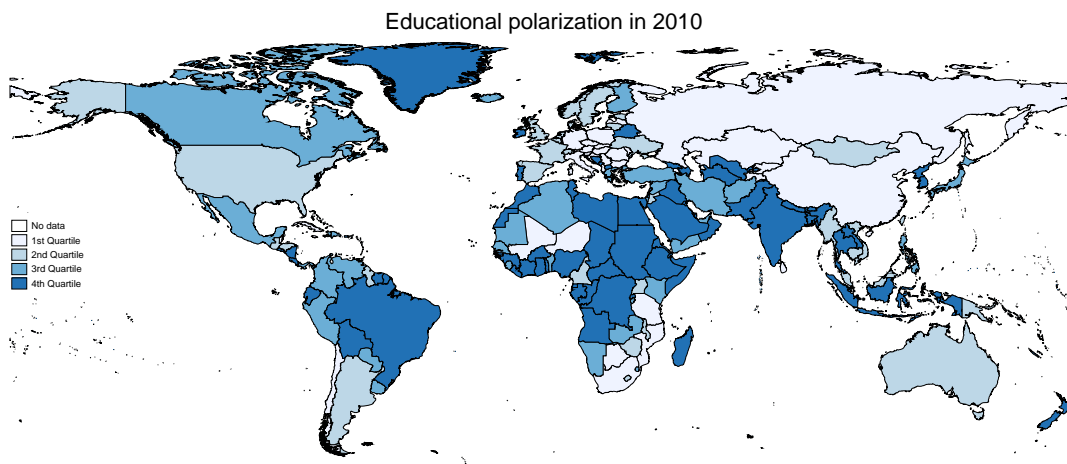


Figure 1: Educational polarization in 2010, where darker coloring indicates larger levels of polarization.

2.2 Countries With Large Educational Polarization

To provide an intuition of educational polarization around the world, Figure 1 maps the index for all 146 countries available in the 2010-2014 period. The largest degrees of polarization are reached in Pakistan and India with values of 0.46 and 0.39, respectively. As it happens, both countries have experienced not only civil conflict (25 or more battle-related deaths in a given year) between 2010 and 2014, but also civil war (1,000 or more battle-related deaths). In general, educational attainment is much more polarized in the Middle East, Central African countries, and South America.

Table 1 presents some basic correlations of the *EduP* index with other prominent country-level characteristics, such as years of schooling, income levels, the degree of democracy, as well as ethnic and religious polarization indices. We will introduce these variables formally (with respective sources) in the following section. It is interesting, and maybe somewhat surprising, to see that large *EduP* particularly occurs in richer countries with better schooling. Further, other dimensions of societal polarization, such as by ethnicity or religion, are not related to *EduP*.

To get a better understanding of which countries tend to exhibit large *EduP* levels, Table 2 presents results from regressing *EduP* on the respective variables. Columns (1) to (5) present results from pooled regressions, whereas column (6) introduces country-fixed effects. It is interesting to see that ethnic and religious polarization are not related to *EduP* (column 5), but

Table 1: Correlations between *EduP* and other prominent country-level variables. Sample: 780 observations (13 observations for 60 countries).

Variables	Educational polarization	Schooling	Ln(GDP/cap)	Polity	Ethnic polarization	Religious polarization
Educational polarization	1.000					
Schooling	0.206	1.000				
Ln(GDP/cap)	0.231	0.752	1.000			
Ln(population size)	0.067	0.089	0.079	1.000		
Polity	-0.004	0.586	0.482	1.000		
Ethnic polarization	-0.008	-0.055	-0.101	-0.060	1.000	
Religious polarization	-0.083	-0.018	0.018	-0.042	0.282	1.000

large and less democratic nations are those with larger *EduP*. (Note that since information on ethnic and religious polarization levels are only available once per country, these variables fall out in the fixed effects estimation.)

Although researchers have created alternative measures of educational inequality, (e.g., [Thomas et al., 2001](#), [Castelló and Doménech, 2002](#), or [Ferreira and Gignoux, 2014](#)), few studies have explicitly considered educational *polarization* or, more generally, the ordinal nature of education (as discussed, [Østby, 2008](#), is a notable exception).⁵ This is particularly the case when considering potential drivers of civil conflict and civil war.

3 Data and Methodology

3.1 Data

All our data come from standard sources in the associated literature, as summarized in [Table 3](#). Our analysis focuses on explaining two standard definitions of large-scale organized violence on the country level: civil conflicts, which are characterized by at least 25 battle-related deaths in a given year, and civil wars, corresponding to country-year observations that witness at least 1,000 battle-related deaths.

⁵For example, educational inequality has been analyzed (e.g., by creating a Gini index) or closely related proxies, such as the standard deviation of the years of schooling. In this context, [Morrisson and Murtin \(2013\)](#) compare differences in income inequality to educational inequality between 1870 and 2010, concluding the latter has decreased markedly since 1870, whereas income inequality has increased.

Table 2: Results from OLS regressions, predicting educational polarization. All variables constitute 5-year averages.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable: Educational polarization</i>						
Schooling	0.006*** (0.001)	0.004* (0.002)	0.003 (0.002)	0.004 (0.003)	0.006 (0.004)	0.006 (0.004)
Ln(GDP/cap)		0.009 (0.006)	0.011* (0.007)	0.014* (0.008)	0.001 (0.013)	-0.018 (0.012)
Ln(Population size)			0.005* (0.003)	0.004 (0.003)	0.007* (0.004)	0.086*** (0.015)
Polity				-0.002*** (0.001)	-0.001 (0.001)	-0.002** (0.001)
Ethnic polarization					0.014 (0.025)	
Religious polarization					-0.013 (0.018)	
Country-fixed effects						yes
# of countries	146	128	127	127	74	127
# of time periods	13	13	13	13	13	13
N	1,897	1,535	1,503	1,311	768	1,311
Adjusted R^2	0.042	0.064	0.068	0.059	0.052	0.487

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Summary statistics of main variables.

Variable	Mean (Std. Dev.)	Min. (Max.)	N	Source ^a	Description (if necessary)
<i>Dependent variables</i>					
Conflict (25+ deaths)	0.19 (0.39)	0 (1)	1,897	UCDP	= 1 if at least 1 year with 25+ battle-related deaths
War (1,000+ deaths)	0.13 (0.34)	0 (1)	1,897	UCDP	= 1 if at least 1 year with 1,000+ battle-related deaths
<i>Variable of interest</i>					
Educational polarization	0.17 (0.09)	0 (0.54)	1,897	B&L	Educational polarization index (see section 2)
<i>Control variables</i>					
Schooling	5.06 (3.28)	0 (13.42)	1,897	B&L	Years of schooling
GDP/cap	8.73 (13.11)	0.10 (82.88)	1,313	Maddison	GDP/capita in thousand US\$, applying the natural logarithm
Population size	33.05 (118.91)	0.06 (1,350.84)	1,578	Maddison	Population size in million, applying the natural logarithm
Oil production	19.29 (64.53)	0 (603)	1,513	Ross	Oil production in million metric tons, applying the natural logarithm
Polity	1.28 (7.48)	-10 (10)	1,453	Polity IV	Variable <i>polity2</i> , ranging from -10 (total autocracy) to +10 (full democracy)

Notes: UCDP = Uppsala Conflict Data Program (UCDP, 2015); B&L = Barro and Lee (2013); Maddison = The Maddison-Project (2013); Ross = Ross (2006, 2013); Polity IV = Marshall and Jaggers (2002).

We access the Uppsala Conflict Data Program (UCDP, see [UCDP, 2015](#)) to derive yearly country-level information since 1950.⁶ Following the convention in the literature (e.g., [Esteban et al., 2012](#)) and the data availability of our educational categories (from [Barro and Lee, 2013](#)), we create five year averages and code a country as being in a civil conflict (war) if at least one of the corresponding years has produced 25 (1,000) or more battle-related deaths. Overall, this gives us 13 periods of observation for 146 countries, producing 1,897 observations. As [Table 3](#) reveals, civil conflict has occurred in approximately 19 percent of our observations, whereas civil war has taken place in 13 percent of the sample (equivalent to 247 of the 1,897 observations). With respect to our control variables, we follow the literature in considering those factors that have continuously been pointed out as robust correlates of civil conflict. These will be discussed shortly.

3.2 Methodology

Since the dependent variables are binary indicators, we begin by estimating logit regressions. However, in order to better accommodate country-fixed effects, we then move to a conventional OLS framework.⁷ Specifically, for country i in period t , we estimate

$$Conflict_{it} = \alpha_0 (EduP)_{it} + \mathbf{X}_{it}\alpha_1 + \gamma_i\alpha_2 + \epsilon_{it}. \quad (2)$$

The dependent variable denotes a binary indicator for civil conflict (and later on civil war) that takes on a value of one if the country experiences at least one year with at least 25 battle-related deaths in the respective five year span. $EduP_{it}$ represents our index of educational polarization. Further, \mathbf{X}_{it} incorporates a set of control variables, capturing important factors that may independently affect the incidence of civil conflict. First, we follow [Esteban et al. \(2012\)](#) by considering the natural logarithm of GDP per capita and population, the volume of oil produced, and the *polity2* variable from the Polity IV dataset, measuring the degree of

⁶The UCDP states that data before 1960 can be subject to measurement error. Nevertheless, our findings are virtually identical when excluding data before 1960.

⁷By design, fixed effects estimations are difficult to conduct and interpret in a logit or probit framework (e.g., see [Greene, 2004](#), or [Cameron and Trivedi, 2005](#)), and the literature then usually moves to the more conventional strategy of employing OLS regressions.

democracy.⁸ For a deeper analysis of civil war and its determinants, we refer to [Blattman and Miguel \(2010\)](#). In addition, as our focus lies on education, we control for average years of schooling. This ensures that our results are not driven by the overall level of schooling, but rather the distribution of educational attainment.

γ_i represents country fixed effects that are intended to control for factors that are time-invariant or only change very slowly over time. For example, geographical aspects are sometimes discussed as independent drivers of conflict, such as mountainous terrain (e.g., see [Fearon and Laitin, 2003](#), [Reynal-Querol and Montalvo, 2005](#), or [Collier et al., 2009](#)). In general, introducing country-fixed effects allows us to exploit within-country variation only, substantially reducing the likelihood of a potential omitted variable bias. Finally, ϵ_{is} denotes the usual error term and we cluster error terms at the country level throughout all our estimations.

In extensions, we also consider the influence from other potential determinants, such as the lagged dependent variable, natural resources, ethnic and religious polarization and fractionalization, alternative measures for political institutions (political rights and executive constraints), as well as military capabilities of the respective government. The respective summary statistics are referred to the appendix [Table A1](#). Finally, we also incorporate time trends (global and then country-specific) into our specification.

4 Main Results

4.1 Civil Conflict

We begin by analyzing civil conflict in [Table 4](#), where column (1) displays results from a univariate regression that only considers *EduP* as a regressor to explain the occurrence of a civil conflict in a logit regression framework. Columns (2) to (4) then add further control variables, before switching to an OLS structure in column (5). Column (6) incorporates country-fixed effects.

In column (1), educational polarization emerges as a positive and statistically meaningful

⁸Regarding the importance of income levels and population size, we refer to [Collier and Hoeffler \(1998\)](#) and [Cotet and Tsui \(2013\)](#), for example. Oil has been highlighted as a potential driver of civil conflict by [Fearon and Laitin \(2003\)](#), among other scholars (also see [Cotet and Tsui, 2013](#)). Democracy, or the absence thereof, has consistently been associated with conflicts, for example by [Conconi et al. \(2014\)](#) or [Fearon and Laitin \(2003\)](#).

Table 4: Results from logit and OLS regressions, estimating the occurrence of civil conflict (0/1), indicating at least one year with 25+ battle-related deaths. All variables constitute 5-year averages and results from logit regressions display marginal effects.

	Logit regressions				OLS regressions	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable: Civil conflict (25+ deaths)</i>						
Educational polarization	0.320** (0.155)	0.565*** (0.157)	0.654*** (0.167)	0.477*** (0.178)	0.473** (0.185)	0.514** (0.208)
Years of schooling		-0.030*** (0.008)	-0.011 (0.011)	-0.033** (0.013)	-0.029*** (0.011)	-0.041*** (0.015)
Ln(GDP/cap)			-0.066** (0.027)	-0.060** (0.031)	-0.069** (0.028)	0.048 (0.038)
Ln(population size)				0.066*** (0.020)	0.072*** (0.019)	0.157*** (0.057)
Oil production				0.003 (0.003)	0.003 (0.002)	-0.003 (0.004)
Polity				0.006** (0.003)	0.007** (0.003)	0.005 (0.004)
Country-fixed effects						yes
# of countries	146	146	138	126	126	126
# of time periods	13	13	13	13	13	13
<i>N</i>	1,897	1,897	1,535	1,240	1,240	1,240
Adjusted <i>R</i> ²					0.161	0.416

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

correlate of the likelihood that a country experiences a civil conflict. In terms of magnitude, a one standard deviation increase of $EduP$ (equivalent to 0.09) would be associated with a 3.2 percent increase in the likelihood to experience civil conflict. As control variables are included, this coefficient strengthens, both in terms of statistical precision and magnitude. Other insights from these first estimations reveal that more schooling and higher income levels relate to a smaller likelihood of conflict. These results are consistent with our intuition and previous findings in the associated literature. Interestingly, democracy is *positively* associated with the chances of conflict, although we will shortly see that once country-fixed effects are accounted for no statistically meaningful relationship prevails.

Column (5) replicates the logit regression considered in column (4) in an OLS structure and we can see that the derived coefficients only change marginally. It is interesting to see that the inclusion of country-fixed effects in column (6) actually *strengthens* the implied relationship between $EduP$ and the chances of a conflict. This provides additional confidence that results from pooled cross-sectional regressions are not spurious and country-specific characteristics are unlikely to drive this relationship. A quantitative interpretation of the coefficient related to $EduP$ in the most complete estimation indicates that a one standard deviation increase of $EduP$ corresponds to a 4.6 percentage point increase in the likelihood of experiencing a civil conflict.

4.2 Civil War

With these results in mind, we now move to analyzing the occurrence of civil war in Table 5. We follow the same sequence of regressions and find very similar results to Table 4. When we consider $EduP$ as the only regressor, a jump from no polarization ($EP = 0$) to complete polarization ($EP = 1$) would raise the chances of a civil war by as much as 29 percentage points.

As with civil conflict, this relationship is confirmed and further gains statistical importance when adding the conventional control variables. Including country-fixed effects re-enforces this result, indicating that, if anything, unobservable factors on the country level may introduce a downward bias in a pooled analysis of the link between $EduP$ and civil war. In our most complete estimation, a one standard deviation increase in $EduP$ is suggested to raise the chances of a

Table 5: Results from logit and OLS regressions, estimating the occurrence of civil war (0/1), indicating at least one year with 1,000+ battle-related deaths. All variables constitute 5-year averages and results from logit regressions display marginal effects.

	Logit regressions				OLS regressions	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable: Civil war (1,000+ deaths)</i>						
Educational polarization	0.290** (0.139)	0.418*** (0.136)	0.509*** (0.150)	0.334** (0.158)	0.403** (0.166)	0.427** (0.165)
Years of schooling		-0.017** (0.007)	0.002 (0.010)	-0.011 (0.012)	-0.010 (0.010)	-0.012 (0.011)
Ln(GDP/cap)			-0.066** (0.026)	-0.060** (0.027)	-0.067** (0.026)	0.008 (0.032)
Ln(population size)				0.055*** (0.019)	0.064*** (0.019)	0.124** (0.052)
Oil production				0.002 (0.002)	0.002 (0.002)	-0.003 (0.003)
Polity				0.002 (0.003)	0.003 (0.003)	0.001 (0.003)
Country-fixed effects					yes	yes
# of countries	146	146	138	126	126	126
# of time periods	13	13	13	13	13	13
<i>N</i>	1,897	1,897	1,535	1,240	1,240	1,240
Adjusted <i>R</i> ²					0.121	0.474

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

civil war by 3.8 percentage points. This is a substantial change, given that we witness civil war in “only” ten percent of our sample observations.

We now move to a series of robustness checks, departing from the most complete estimation for civil conflict and civil war, displayed in column (6) of Tables 4 and 5.

5 Robustness Checks

5.1 Dynamics and Resource Rents

Our first robustness check, displayed in columns (1) and (4) of Table 6, incorporates the lagged dependent variable. Naturally, the best predictor of conflict today may be the occurrence of conflict yesterday and civil unrest tends to be path-dependent (see Miguel and Satyanath, 2011, Esteban et al., 2012, Nunn and Qian, 2012, 2014, or Hull and Imai, 2013). Indeed, the lagged dependent variable emerges as a strong predictor for conflict and civil war. However, our main result associated with the role of *EduP* remains largely unaffected.

Following Bewley (1979), we can calculate the long-run link between *EduP* and the chances of civil conflict in this dynamic estimation: $\frac{\beta_{EduP}}{1-\beta_{lagged\ conflict}} = 0.543$. A quantitative interpretation of this coefficient indicates that a one standard deviation increase of *EduP* corresponds to a 4.9 percentage point increase in the likelihood of experiencing a civil conflict. The corresponding magnitude for civil war, analyzed in column (4), takes on a value of 5.8 percentage points.

Further, columns (2) and (3), as well as (5) and (6), consider the role of natural resource rents and in particular oil rents. Although our baseline regression already controls for oil production, we want to ensure that oil, a commodity that has consistently been linked to civil unrest, is not driving our findings related to *EduP*. However, once we include the respective variables derived from the World Development Indicators, the benchmark result prevails and *EduP* remains a powerful predictor of civil unrest, both in terms of statistical and economic relevance.

5.2 Ethnic Polarization and Fractionalization

As our focus lies on the *polarization* of society along the line of education levels, it is important to test whether our results can be explained by other forms of polarization or fractionalization. Thus, Table 7 replicates our benchmark estimation, including ethnic polarization and fraction-

Table 6: Results from logit and OLS regressions, testing for the influence of past conflicts, natural resource rents, and oil rents. All variables constitute 5-year averages.

Dependent variable:	Civil conflict (25+ deaths)			Civil war (1,000+ deaths)		
	(1)	(2)	(3)	(4)	(5)	(6)
Educational polarization	0.396** (0.159)	0.635** (0.258)	0.628** (0.255)	0.468** (0.186)	0.617*** (0.215)	0.621*** (0.213)
Lagged dependent variable	0.271*** (0.042)			0.241*** (0.046)		
Natural resource rents		0.005** (0.002)			0.006*** (0.002)	
Oil rents			0.003 (0.002)			0.003* (0.002)
Control variables ^a	yes	yes	yes	yes	yes	yes
Country-fixed effects	yes	yes	yes	yes	yes	yes
# of countries	126	124	125	126	124	125
# of time periods	12	9	9	12	9	9
<i>N</i>	1,211	932	951	1,211	932	951
Adjusted <i>R</i> ²	0.467	0.453	0.461	0.448	0.531	0.538

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^aIncludes schooling, GDP/capita, population size, oil production, and the Polity IV index of democracy (variable *polity2*).

alization values.⁹ Note that, since these values are only available once for every country (from [Montalvo and Reynal-Querol, 2005](#), or previously [Alesina et al., 2003](#)), we are forced to exclude country-fixed effects. However, since the results from a pooled regression in Tables 4 and 5 are, if anything, *weaker* than those from including fixed effects, we are confident that a pooled regression is able to reveal whether ethnic shares are driving our findings.

Table 7: Results from logit and OLS regressions, considering ethnic polarization and fractionalization. All regressions estimate the occurrence of civil conflict and civil war (0/1), indicating at least one year with 25+ or 1,000+ battle-related deaths, respectively. All variables constitute 5-year averages.

Dependent variable:	Civil conflict (25+ deaths)			Civil war (1,000+ deaths)		
	(1)	(2)	(3)	(4)	(5)	(6)
Educational polarization	0.473** (0.228)	0.476** (0.232)	0.472** (0.227)	0.327* (0.176)	0.338* (0.177)	0.321* (0.176)
Ethnic polarization	-0.011 (0.108)	-0.036 (0.178)		-0.059 (0.101)	-0.161 (0.164)	
Ethnic fractionalization		0.036 (0.180)			0.145 (0.172)	
Control variables ^a	yes	yes	yes	yes	yes	yes
# of countries	73	73	73	73	73	73
# of time periods	13	13	13	13	13	13
<i>N</i>	732	732	732	732	732	732
Adjusted <i>R</i> ²	0.158	0.157	0.159	0.112	0.117	0.111

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^aIncludes schooling, GDP/capita, population size, oil production, and the Polity IV index of democracy (variable *polity2*).

In Table 7, we begin with analyzing civil conflict in columns (1) to (3). We subsequently include ethnic polarization and fractionalization, before re-estimating our benchmark regression with only those observations for which we have data on ethnic shares. Note that our sample

⁹Ethnic polarization has received a lot of attention in the literature on civil war determinants. Examples can be found by [Bhavnani and Miodownik \(2009\)](#), [Klasnja and Novta \(2014\)](#), [Reynal-Querol and Montalvo \(2005\)](#), [Montalvo and Reynal-Querol \(2010\)](#).

size decreases by over 40 percent from 1,240 to 732, due to the availability of information on ethnicity. Columns (4) to (6) then follow the same sequence of regressions for civil war.

The results produce at least two insights. First, we find no evidence that ethnic polarization or fractionalization are driving the results related to *EduP*. Second, and potentially interesting outside our immediate research question here, ethnic shares do not appear as meaningful predictors of civil conflict or civil war *per se*. This stands in contrast to previous findings by [Collier and Hoeffler \(1998, 2004\)](#), [Fearon and Laitin \(2003\)](#), [Reynal-Querol and Montalvo \(2005\)](#), [Esteban et al. \(2012\)](#), or [Cotet and Tsui \(2013\)](#).

5.3 Religious Polarization and Fractionalization

Beyond ethnic shares, it is possible that the religious denomination of the populace is able to explain our result pertaining to *EduP*. For example, particular religious denominations may systematically view education differently than others or *EduP* may simply be correlated to religious shares in a society, which may introduce an omitted variable bias into our benchmark estimation.¹⁰

Table 8 first considers the shares of Muslims, Catholics, and Protestants in a society and then also, in the spirit of our analysis, turns to religious polarization and fractionalization. As with ethnic shares, we only have one data point per country and therefore omit country-fixed effects. Here again, the positive association between *EduP* and civil unrest prevails. Independently, religious shares do not seem to be systematically associated with civil conflict or civil war once all control variables are taken into account.

5.4 Political Institutions and Military Power

Our penultimate series of robustness checks considers the political institutions of the respective countries. In our baseline estimation, we employ the *polity2* variable from the Polity IV dataset, but other studies have highlighted varying aspects of political institutions that could be important when explaining conflicts. For example, [Collier and Hoeffler \(2004\)](#) advocate the role of political rights, whereas [Conconi et al. \(2014\)](#) discuss electoral accountability.¹¹

¹⁰For the link between various facets of religion and conflict, we refer to [Basedau et al. \(2016\)](#).

¹¹The paper by [Conconi et al. \(2014\)](#) focuses on term limits, but since this variable is largely time-invariant within a country, our fixed effects estimations control for such characteristics.

Table 8: Results from logit and OLS regressions, considering religious population shares, religious polarization, and religious fractionalization. All regressions estimate the occurrence of civil conflict and civil war (0/1), indicating at least one year with 25+ or 1,000+ battle-related deaths, respectively. All variables constitute 5-year averages.

Dependent variable:	Civil conflict (25+ deaths)			Civil war (1,000+ deaths)		
	(1)	(2)	(3)	(4)	(5)	(6)
Educational polarization	0.630*** (0.223)	0.466** (0.224)	0.464** (0.223)	0.646*** (0.214)	0.315* (0.172)	0.312* (0.169)
% Muslims	-0.001 (0.001)			-0.001 (0.001)		
% Catholic	-0.002 (0.001)			-0.001 (0.002)		
% Protestant	-0.001 (0.002)			-0.000 (0.002)		
Religious polarization		-0.031 (0.082)			-0.028 (0.077)	
Religious fractionalization			-0.044 (0.124)			-0.054 (0.113)
Control variables ^a	yes	yes	yes	yes	yes	yes
# of countries	74	73	73	74	73	73
# of time periods	11	13	13	11	13	13
<i>N</i>	711	732	732	711	732	732
Adjusted <i>R</i> ²	0.201	0.158	0.158	0.135	0.110	0.111

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^aIncludes schooling, GDP/capita, population size, oil production, and the Polity IV index of democracy (variable *polity2*).

Table 9: Results from logit and OLS regressions, considering alternative measures for political institutions. All regressions estimate the occurrence of civil conflict and civil war (0/1), indicating at least one year with 25+ or 1,000+ battle-related deaths, respectively. All variables constitute 5-year averages.

Dependent variable:	Civil conflict (25+ deaths)			Civil war (1,000+ deaths)		
	(1)	(2)	(3)	(4)	(5)	(6)
Educational polarization	0.609** (0.236)	0.575*** (0.211)	0.553** (0.221)	0.579*** (0.192)	0.474*** (0.166)	0.409** (0.166)
Political rights	0.001 (0.012)			0.011 (0.010)		
Executive constraints		-0.001 (0.013)			-0.014 (0.009)	
National capability score			3.153 (4.295)			-0.309 (1.581)
Country-fixed effects	yes	yes	yes	yes	yes	yes
Control variables ^a	yes	yes	yes	yes	yes	yes
# of countries	125	125	123	125	125	123
# of time periods	9	11	10	9	11	10
<i>N</i>	1,012	1,196	1,070	1,012	1,196	1,070
Adjusted <i>R</i> ²	0.480	0.435	0.423	0.551	0.506	0.489

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^aIncludes schooling, GDP/capita, population size, oil production, and the Polity IV index of democracy (variable *polity2*). Columns (1), (2), (4), and (5) exclude the Polity index.

Thus, columns (1) and (2) of Table 9, as well as (4) and (5), incorporate political rights and executive constraints. Most importantly, the result pertaining to *EduP* remains robust. Further, we find no evidence that political rights or better executive constraints are systematically associated with a lower likelihood of civil unrest, at least once country-fixed effects are considered.

We then also consider a military aspect of ruling governments by incorporating the CINC score that measures the military capability of the respective country. Intuitively, a stronger military may deter a violent rebellion, everything else equal, and we want to ensure that such dynamics are not confounding our findings. However, that does not seem to be the case, as revealed by the results displayed in columns (3) and (6) of Table 9.

5.5 Global and Country-Specific Time Trends

For our final robustness check, we consider time trends, first on a global level and then specific to every individual country. For instance, over time, both *EduP* and the likelihood of civil unrest may have changed simultaneously worldwide, potentially driven by the end of the Cold War or other remarkable historical events. If this were the case, then our benchmark findings could be spurious. Similarly, a given country could have taken distinct developments over time that may correlate with both *EduP* and the dependent variable.

To check whether such dynamics are relevant, Table 10 first includes global time trends in columns (1) and (3) and then considers country-specific time trends in columns (2) and (4). It is interesting to see that our findings remain virtually unchanged in terms of their economic importance, indicating the relationship between *EduP* and civil unrest to be time-independent. Note that we only have 13 time periods available overall, which makes these regressions relatively tight in an econometric sense, leaving less statistical variation to be explained by the respective covariates. It is remarkable that, even in such a regression format, *EduP* remains a statistically powerful predictor, further lending support to a systematic connection between *EduP* and civil unrest.

Table 10: Results from logit and OLS regressions, incorporating general and country-specific time trends. All regressions estimate the occurrence of civil conflict and civil war (0/1), indicating at least one year with 25+ or 1,000+ battle-related deaths, respectively. All variables constitute 5-year averages.

Dependent variable:	Civil conflict (25+ deaths)		Civil war (1,000+ deaths)	
	(1)	(2)	(3)	(4)
Educational polarization	0.482** (0.213)	0.430* (0.221)	0.396** (0.172)	0.454** (0.204)
Time trend	0.002 (0.002)	0.022*** (0.004)	0.000 (0.002)	0.017*** (0.004)
Country-specific time trends		yes		yes
Control variables ^a	yes	yes	yes	yes
Country-fixed effects	yes	yes	yes	yes
# of countries	126	126	126	126
# of time periods	13	13	13	13
<i>N</i>	1,240	1,240	1,240	1,240
Adjusted <i>R</i> ²	0.416	0.501	0.475	0.559

Notes: Standard errors clustered on the country level are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ^aIncludes schooling, GDP/capita, population size, oil production, and the Polity IV index of democracy (variable *polity2*).

6 Conclusions

This paper argues that countries with a large degree of educational polarization (*EduP*) are more likely to experience civil conflict and civil war. Although previous research has highlighted a generally polarized society to be more likely to experience violent conflict on a domestic level, to our knowledge we are the first to highlight *educational* polarization. Intuitively, highly educated citizens are likely to differ fundamentally from uneducated citizens in their political preferences and beliefs, and these educational cleavages can raise the chance of civil conflict, everything else equal.

We first calculate a novel measure of *EduP* and then apply this index to a dataset of 146 countries from 1950 to 2010. Employing five-year averages (i.e., 1950 – 1954, ..., 2010 – 2014), we find a strong link between *EduP* and the likelihood of a country experiencing civil conflict or civil war. This relationship is robust to including the conventional control variables, country-fixed effects, and country-specific time trends.

In terms of magnitude, a one standard deviation increase of *EduP* is associated with a 4.6 percentage point rise in the chances of civil conflict and a 3.8 percentage point rise in the likelihood of civil war. This suggests that, in order to diminish the odds of large civil unrest, policymakers should keep an eye on the polarization of education levels in society. The larger the groups at the extreme ends of no schooling and university education, the more likely we are to see large-scale civil unrest, everything else equal.

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Appendix

Table A1: Summary statistics of additional variables.

Variable	Mean (Std. Dev.)	Min. (Max.)	N	Source ^a	Description (if necessary)
Political stability	-0.11 (0.96)	-2.91 (1.64)	575	WB	Political Stability and absence of violence/terrorism
Natural resource rents	9.77 (13.42)	0 (75.09)	1,114	WB	Natural resource rents in percentage of GDP
Oil rents	4.75 (11.30)	0 (68.85)	1,158	WB	Oil rents in percentage of GDP
Ethnic polarization	0.5 (0.26)	0.02 (0.96)	1,130	M&R-Q	Ethnic polarization index
Ethnic fractionalization	0.43 (0.29)	0.01 (0.96)	1,130	M&R-Q	Ethnic fractionalization index
% Muslims	24.8 (36.57)	0 (99.40)	968	QoG	Share of Muslims in society
% Catholics	33.39 (37.24)	0 (97.30)	968	QoG	Share of Catholics in society
% Protestants	12.21 (21.81)	0 (97.80)	968	QoG	Share of Protestants in society
Religious polarization	0.49 (0.35)	0 (0.98)	1,130	M&R-Q	Religious polarization index
Religious fractionalization	0.31 (0.24)	0 (0.78)	1,130	M&R-Q	Religious fractionalization index
Gini (post-tax & post-transfer)	36.86 (9.45)	16.63 (63.90)	521	Solt	Gini after taxation and transfer payments
Gini (pre-tax & pre-transfer)	45.27 (7.72)	26.14 (73.42)	521	Solt	Gini before taxation and transfer payments
Political rights	3.73 (2.16)	1 (7)	1,191	FH	Political rights, decreasing from 1 to 7
Executive constraints	4.3 (2.28)	1 (7)	1,353	Polity IV	Executive constraints, increasing from 1 to 7
CINC score	0.01 (0.02)	0 (0.21)	1,275	CoW	Composite Index of National Capability

Notes: WB = [Group \(2012\)](#); M&R-Q = [Montalvo and Reynal-Querol \(2005\)](#); Solt = [Solt \(2009, 2016\)](#); QoG = Quality of Government database ([Teorell et al., 2011](#)); FH = [FreedomHouse \(2014\)](#); Polity IV = [Marshall and Jaggers \(2002\)](#); CoW = Correlates of War ([Singer and Stuckey, 1972](#)).