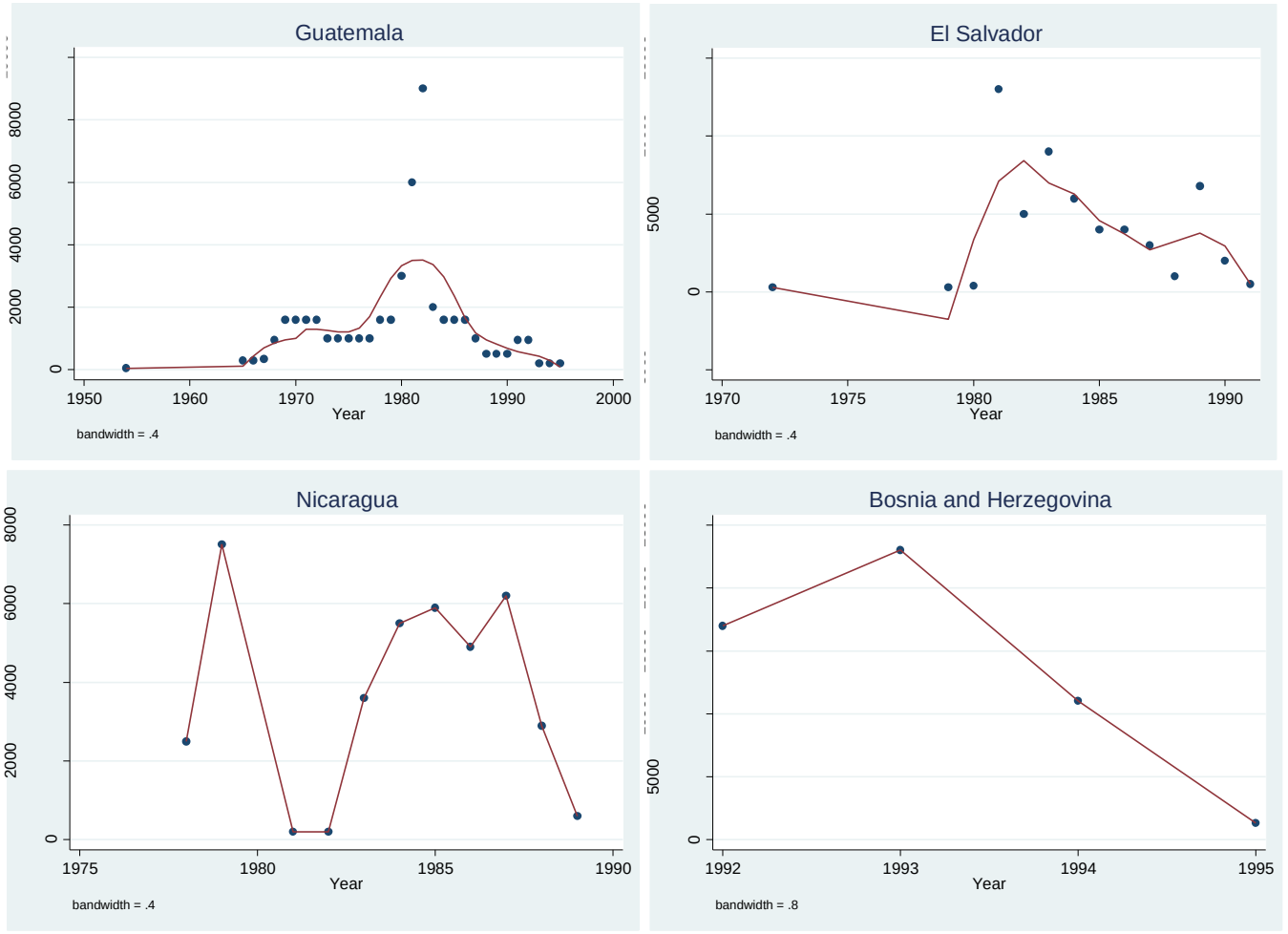
Online Appendix A

Death Toll Estimates for Guatemala, El Salvador, Nicaragua, and Bosnia and Herzegovina in the dataset used in the paper

FIGURE A1 *Death Toll Estimates for Guatemala, El Salvador, Nicaragua, and Bosnia and Herzegovina*



Note: Locally-weighted-regression (lowess) fits, varying bandwidths

Online Appendix B

Do Positive Terms of Trade Shocks Increase the Onset Risk for Civil War?

In the main paper, we argue that the determinants of the onset and intensity of civil wars can differ. In order to test this idea, we combine our dataset with the dataset for the *onset* of civil wars in Janus and Riera-Crichton (2015). The latter paper shows that commodity terms of trade declines predict the onset of civil wars in countries with intermediate ethnic diversity, ethnic dominance, and high polarization. Civil war onset is measured with a dummy that equals zero in peace years, one in the onset year, and missing otherwise. Since the ongoing-conflict observations are excluded except for the onset years, there is almost no overlap in the country-year coverage in the two datasets. The onset and intensity data both come from the UCDP/PRIO (v. 4) civil conflict coding project, so in principle every onset in the onset data (Gleditsch et al. 2002; Themnér & Wallensteen 2011) has a corresponding battle-deaths time series in the intensity dataset (Lacina and Gleditsch 2005) and vice versa. The onset dummy switches to one when the annual battle-related death toll reaches a threshold of either 25 (for a minor conflict onset) or 1000 (a civil war onset).

In the main paper, we find that positive fossil fuel terms of trade shocks increase the battle-related death toll in intermediately fractionalized net fuel exporters. In order to test whether these shocks also increase the *onset* risk for civil conflict, we estimate equation (1') in Janus and Riera-Crichton (2015) for the intermediately ethnically fractionalized countries. Additionally, we (a) decompose the commodity terms of trade growth rate into its positive and ne gative fossil fuel and non-fuel components and (b) add an interaction between positive fossil fuel terms of trade shocks and the dummy for fossil fuel exporters we define in the main paper.

The estimates in Table A1, Column (2), do not support the idea that positive fossil fuel terms of trade shocks increase the onset risk. Columns (4), (6), and (8) show that using the three

alternative onset dummies in Janus and Riera-Crichton (2015) gives similar results. The evidence therefore suggests that determinants of the onset and intensity of civil wars can differ.

TABLE A1

Commodity terms of trade shocks and civil war onsets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation Method	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV
Sample	IF	IF	IF	IF	IF	IF	IF	IF
Onset measure	UCDP War	UCDP War	UCDP Conflict	UCDP Conflict	COW War	COW War	FL War	FL War
ΔTOT(t-1)	-0.604*		-0.715**		-0.427**		-0.375*	
	[0.306]		[0.310]		[0.189]		[0.200]	
Pos fuel ΔTOT(t-1)		-0.945		-1.473		-1.549		-1.637
		[1.618]		[1.779]		[1.269]		[1.352]
Pos fuel ΔTOT(t-1)*nfe		0.351		-0.130		0.694		1.201
		[1.645]		[1.917]		[1.229]		[1.403]
Pos non-fuel ΔTOT(t-1)		1.100*		0.360		-0.085		0.671
		[0.589]		[0.640]		[0.429]		[1.096]
Neg fuel ΔTOT(t-1)		-0.169		0.382		0.587		0.164
		[0.688]		[0.865]		[0.590]		[0.333]
Neg non-fuelΔTOT(t-1)		-6.552**		-1.244		-2.276***		-2.919**
		[2.746]		[1.296]		[0.608]		[1.361]
Observations	2,149	2,149	2,238	2,238	2,454	2,454	1,504	1,504
R-squared	0.088	0.100	0.061	0.063	0.047	0.051	0.115	0.117
No. of countries	70	70	70	70	70	70	68	68
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Country time tr.	Y	Y	Y	Y	Y	Y	Y	Y
p-val(Posfuel+Pf*nfe)		0.14		0.13		0.20		0.40

Note: Robust standard errors clustered at the country-level in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Δ denotes the change in the three-year moving average. IF denote intermediately fractionalized. Columns (1) estimates the effects of the growth rate of the three-year moving average commodity terms of trade shock on the onset of civil wars in the Janus and Riera-Crichton (2015) civil war onset dataset. The onset variable equals one in a civil-war onset year and zero in peace years. The dummy is based on the Uppsala Conflict Data Program(UCDP). Column (2) separately estimates the effects of the positive and negative fuel and non-fuel terms of trade shocks as and allows the effects of positive fuel terms of trade shocks to differ for net fuel exporting countries.. Columns (3)-(4), (5)-(6), and (7)-(8) report the corresponding estimates for Janus and Riera-Crichton's (2015) three alternative conflict onset dummies based on the Correlates of War dataset, Fearon and Laitin (2003), and the UCDP onset measure when the battle deaths threshold required for an onset is 25 instead of 1000 battle-related fatalities per year. We refer to Janus and Riera-Crichton (2015) for the detailed variable definitions and further discussion.

Online Appendix C

A graphical analysis of terms of trade shocks

Figure A2 provides an example of the Standard Trade Model in Krugman et al. (2014, Chapter 6). The figure depicts a neoclassical economy with two goods (x and y), two factors (capital and labor), different capital intensity in the two sectors, and imperfect capital-labor substitution. The lack of perfect substitution of factors creates an outward bending production possibilities frontier (PPF), that is, the opportunity cost of increasing x production - the absolute slope of the PPF - is increasing. The economy trades both goods on the world market and takes the dollar-denominated goods prices p_x and p_y as given.

As firms devote more factor inputs to x production, they move the economy down along the PPF. Although the firms earn additional revenues equal to $p_x dx$, devoting fewer inputs to y production costs them $-p_y dy$ Thus, they move the economy down along the PPF as long as $p_x dx \geq -p_y dy$. The economy therefore produces where $-dy/dx = p_x / p_y$, that is, where the absolute slope of the PPF is equal to the relative price of the x good.

.If the relative price of x is equal to $p \equiv p_x / p_y$ the economy produces at point P, where the dollar-denominated GDP level is $g = p_x x + p_y y$. When households earn income g and face the price vector (p_x, p_y), assume without loss that they consume less of good x than the country produces. The difference is exports. The export revenues pay for imported y goods. We denote the export and import quantities in the figure by, respectively, X and M. Since the country exports x and imports y, its export-import price ratio – its international terms of trade – equal p.

Assume now that, due to global events, the relative price of the x good decrease and the country suffers a terms of trade decline. The new terms of trade are $\hat{p} < p$. Note that it does not matter whether export prices fall or import prices increase. For example, a 10% decrease in export prices and a 10% increase in import prices both decrease the terms of trade by about 10%, that is, $\hat{p} = 0.90p$ is consistent with both $\hat{p} = 0.90 p_x / p_y = 0.90p$ and $\hat{p} = p_x / (1.10 p_y) \approx 0.90p$ The country now produces at $\hat{P}$. Assuming that it continues to export good x, its new consumption point must be above $\hat{P}$ on the new budget line. It might be $\hat{C}$.

Finally, note that any consumption point above $\hat{P}$ on the new budget line was also affordable under the old budget. In contrast, a point like $\tilde{C}$, which contains more of both goods,

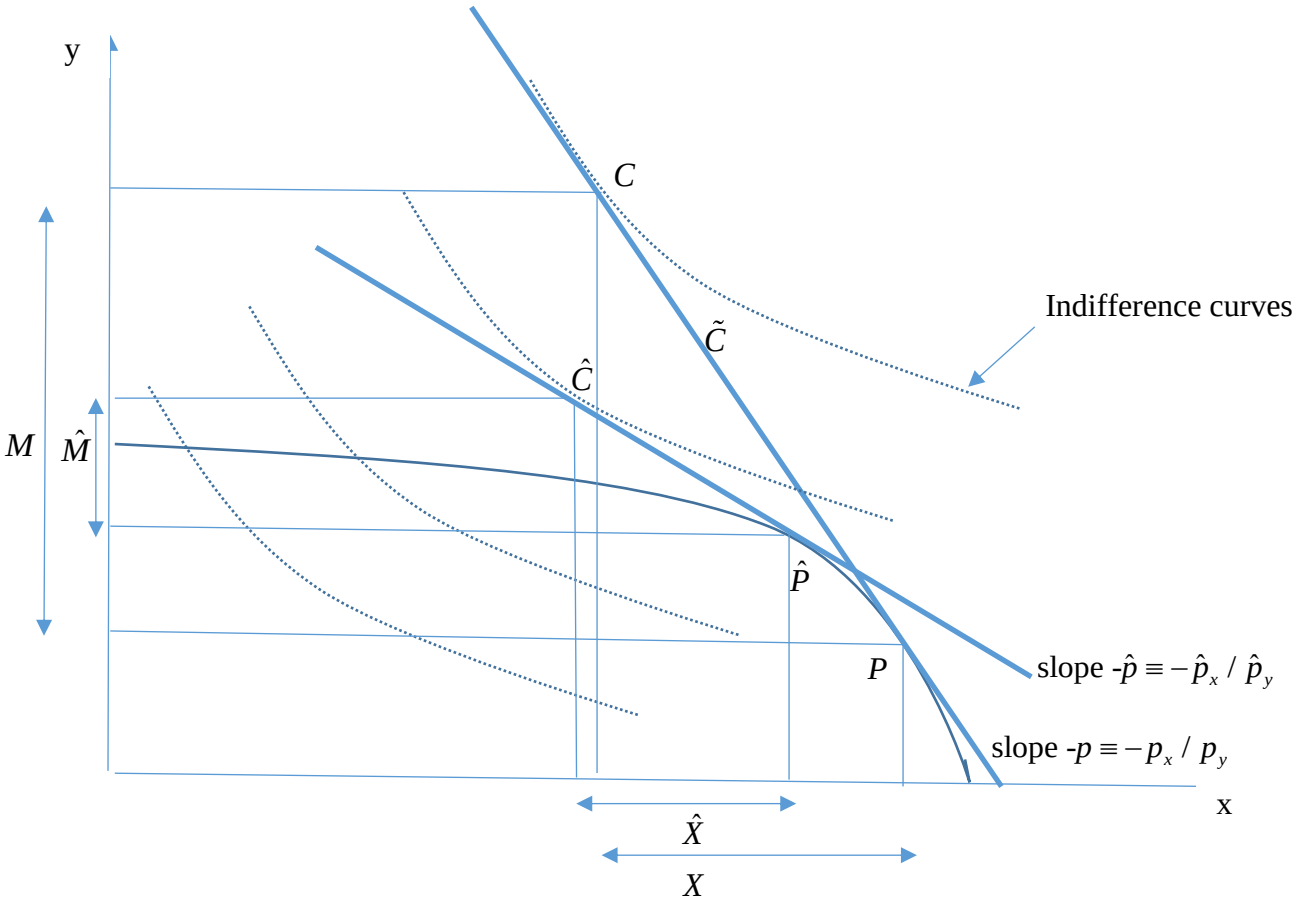
is no-longer affordable. Since the country spends its entire income along each of the budget lines and the new income level cannot finance the old consumption spending, its income must have decreased. Equivalently, GDP decreased. Note that if we allow for labor market rigidities that hinder the adjustment to the terms of trade shock, the economy is even worse off.

Dal Bó and Dal Bó (2011) add a conflict sector to a similar model and show that when the conflict sector is more labor-intensive than the economy as a whole, increases in the relative price of the capital-intensive good increases conflict. Consistent with our focus on relative price shocks, however, the conflict level only responds to the *relative* price of the capital-intensive good.

References (not cited in the main paper)

Dal Bó, Ernesto, and Pedro Dal Bó.(2011). 'Workers, warriors, and criminals: social conflict in general equilibrium.' *Journal of the European Economic Association* 9(4): 646-677.

FIGURE A2 A Terms of Trade Decline in the Standard Trade Model



Online Appendix D

The estimation of linear compared to interval regressions and national vs. subnational data

Instead of using the linear fixed-effects model in the paper, we could alternatively follow Bazzi and Blattman (2014), who estimate the effects of export price changes on battle-related fatalities with an interval regression. This methodology, which is a non-linear estimation procedure, has the advantage that it is precisely designed for situations where the researcher observes either an interval or a specific value for the dependent variable. In our context, about a third of the battle deaths observations are intervals. However, the interval regression model shares the potential limitations of many other non-linear models. In particular, it does not allow us to include country fixed effects, which are usually considered to be important in cross-country estimation. Moreover, compared to the linear model it is more important, but it appears to be harder, to test whether the errors are normally distributed. The reason why the error distribution is more important than in the linear model is that the likelihood contribution of each interval observation is the probability that the realized error term puts the dependent variable in the observed interval,

$$pr(y_{lit} < \beta x_{it} + \varepsilon_{it} < y_{hit}) = \Phi\left(\frac{y_{hit} - x_{it}\beta}{\sigma}\right) - \Phi\left(\frac{y_{lit} - x_{it}\beta}{\sigma}\right), \quad \text{(a1)}$$

where y_{lit} and y_{hit} are the low and high estimates for battle deaths in country i in year t and $\Phi(.)$ is the standard normal CDF. Therefore, the likelihood contribution and the likelihood maximizing

value of β depend on assuming normality. In contrast, non-normally distributed errors do not bias the linear estimates (Arabmazar and Schmidt 1982; Lewbel and Linton 2002).[1]

The fact that we estimate conflict intensity at the country level contrasts with the growing study of subnational conflict outcome in the empirical conflict literature. data. Nonetheless, there are three reasons why we doubt that the country-level approach will bias the estimates. First, the main concern with cross-country studies is probably that countries have highly persistent but unobservable cultural, historical, institutional, geographic, etc. conflict characteristics (Blattman and Miguel 2010; Djankov and Reynal-Querol 2010; Cotet and Tsui 2013). In this paper, however, we estimate a fixed-effects panel and not a cross-section of countries. The fixed effects control for the mean effect of time-invariant, country-specific conflict determinants. Since the fixed-effects estimator only uses the within-country deviations from the means to identify the coefficients, *ceteris paribus*, it should only increase the bias compared to subnational panels if the within-country deviations from the means are, loosely speaking, more highly correlated with the error term than the subnational deviations from the means.

Second, due to the fact that subnational units are part of the national economy, they can be exposed to correlated shocks, general equilibrium effects, and externalities. In that case, the panel units lose their independence and the errors terms can become spatially correlated. The creation of refugee flows and infrastructure destruction as well as supply and demand changes in capital, labor, and goods markets can generate spillovers between neighboring municipalities or provinces. Finally, it is important to note that the standard empirical civil war definitions in the literature define a civil war as an armed conflict between the central government and a non-governmental

[1]Greene (2004) finds that adding fixed effects in the Tobit model might not bias the estimates, but the error variance and standard errors are incorrectly estimated.

organization that kills a significant number of individuals (Lacina and Gleditsch 2002; Fearon and Laitin 2003; Blattman and Miguel 2010). The fact that the central government is involved suggests that there is a country-level unified actor that plays a strategic war-game in which it engages strategically in several subnational battle theaters, and that operates under an integrated national budget constraint. If a civil war is a strategic game that is played in the country as a whole, the subnational units may be as inter-dependent as the battle theaters of World War II.[2]

References (uncited in the main paper)

Arabmazar, A., and Schmidt, P. (1982). 'An investigation of the robustness of the Tobit estimator to non-normality.' *Econometrica* 50 (4): 1055-1063.

Ashraf, Q, and Galor, O. (2013). 'The 'Out of Africa' hypothesis, human genetic diversity, and comparative economic development.' *American Economic Review* 103 (1): 1-46.

Greene, W. (2004). 'Fixed effects and bias due to the incidental parameters problem in the Tobit model.' *Econometric Reviews* 23 (2): 125-147.

Lewbel, A., and Linton, O. (2002). 'Nonparametric censored and truncated regression.' *Econometrica* 70 (2): 765-779.

[2]However, there are also examples of subnational violence where the central government is not obviously an important decision maker (Dube and Vargas 2013; Bazzi and Gudgeon 2017).

Online Appendix E

Robustness of the Table 3 estimates to alternative ethnicity measures and control variables

In Table A2, we re-estimate the Table 3, Column (2) specification in the main paper with alterative ethnicity measures: a dummy for ethnic diversity in the 15-85th instead of 25-75th percentile; a dummy for high ethnic polarization with value one when the polarization measure proposed in Esteban and Ray (1994) exceeds the sample median, under the assumption made in Montalvo ad Reynal-Querol (2005) and Esteban et al. (2012) that the social distance between the ethnic groups is one and zero otherwise; dummies for defining a dominant ethnic group as a group that covers 50-85, 40-90, 45-90, ad 45-85 percent of the population; an above-median polarization dummy using the alternative Alesina et al. (2003) ethnicity dataset; and a dummy for ethnic diversity in the 25th-76th percentile using the alternative Soviet Atlas Narodov Mira dataset. The results remain robust.

In Table A3, we re-estimate the Table 3, Column (2) specification in the main paper but control for other factors - other than ethnicity - that could mediate the effects of commodity terms of trade shocks. Column (1) includes an interaction between the terms of trade shocks and a dummy for above-median mountainous terrain land cover, Column (2) adds an interaction with a dummy for a non-contiguous state. Columns (3)-(4) interact the shock with dummies for above-median and intermediate (1st-3rd quartile) religious fractionalization (Fearon and Laitin 2003). Columns (5)-(6) interact the shock with dummies for above-median and intermediate (1st-3rd quartile) predicted genetic diversity (Ashraf and Galor 2013). Column (7) interact the shock with dummies for British and French colonies (Fearon and Laitin 2003). Column (8) includes the controls jointly except for including just one of the two religious diversity and one of the two

predicted genetic diversity measures. Except for the predicted genetic diversity measure, which comes from Ashraf and Galor (2013), all the controls come from Fearon and Laitin (2003).

TABLE A2

Robustness to alternative ethnicity measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation Method	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV
Dep. Variable:	Ln (battle deaths)							
ΔTOT(t)	-31.302	-15.914*	-15.975*	-32.470***	-17.872*	-15.975*	-34.180***	-17.107*
	[19.082]	[8.755]	[9.300]	[11.296]	[10.277]	[9.300]	[9.222]	[9.583]
ΔTOT*EF1585	33.252							
	[20.016]							
ΔTOT*High polar		18.024*						
		[9.799]						
ΔTOT*Plural5085			18.812*					
			[10.770]					
ΔTOT*Plural4090				35.404***				
				[12.291]				
ΔTOT*Plural4590					20.515*			
					[11.428]			
ΔTOT*Plural4585						18.812*		
						[10.770]		
ΔTOT*Hi polar Ales							39.112***	
							[9.749]	
ΔTOT*IF(Sovi.dta)								20.116*
								[10.995]
Duration	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013
	[0.022]	[0.022]	[0.023]	[0.022]	[0.023]	[0.023]	[0.021]	[0.022]
First Year Dummy	-0.952***	-0.926***	-0.939***	-0.952***	-0.945***	-0.939***	-0.919***	-0.927***
	[0.158]	[0.160]	[0.167]	[0.162]	[0.166]	[0.167]	[0.162]	[0.165]
Observations	900	904	893	893	893	893	899	900
R-squared	0.518	0.518	0.519	0.521	0.519	0.519	0.523	0.519
# countries	79	80	78	78	78	78	79	79
p-val shocks	0.11	0.07	0.09	0.01	0.09	0.09	0	0.08
p-val interac.	0.10	0.07	0.08	0.01	0.08	0.08	0	0.07
p-val shocks+interac.	0.62	0.57	0.47	0.42	0.48	0.47	0.09	0.43
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Cntry/conf time trnds	Y	Y	Y	Y	Y	Y	Y	Y

Note: Robust standard errors clustered at the country-level (except in Column (1)) in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Δ denotes the change in the three-year moving average. Columns (1)-(8) estimate the Table 3, Column (2) specification in the main paper with alterative ethnicity measures: a dummy for ethnic diversity in the 15-85th instead of 25-75th percentile; a dummy for high ethnic polarization with value one when the polarization measure proposed in Esteban and Ray (1994) exceeds the sample median, under the assumption made in Montalvo ad Reynal-Querol (2005) and Esteban et al. (2012) that the social distance between the ethnic groups is one and zero otherwise; dummies for defining a dominant ethnic group as a group that covers 50-85, 40-90, 45-90, ad 45-85 percent of the population; an above-median polarization dummy using the alternative Alesina et al. (2003) ethnicity dataset; and a dummy for ethnic diversity in the 25th-76th percentile using the alternative Soviet Atlas Narodov Mira dataset.

TABLE A3

Robustness to geographical, historical, and non-ethnic diversity measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation Method	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV	LSDV
Dep. Variable:	Ln (battle deaths)							
ΔTOT(t)	-34.110***	-56.613***	-18.351*	-20.896**	-21.045*	-15.603	-37.573***	-38.500
	[9.669]	[14.136]	[10.292]	[10.268]	[12.048]	[12.164]	[11.466]	[25.998]
ΔTOT*IF(t)	31.104***	52.565***	19.688*	14.819	17.204	21.311	31.975**	67.057***
	[10.332]	[14.800]	[11.557]	[10.998]	[12.986]	[14.340]	[12.244]	[22.844]
ΔTOT*(Hi%Mnts)	-2.541							-31.785
	[6.199]							[26.642]
ΔTOT*(non-contig)		41.859*						44.609
		[22.827]						[28.664]
ΔTOT*(Hi rel.frac)			2.432					
			[7.198]					
ΔTOT*(Int. rel.frac).				9.367				18.627
				[11.020]				[20.914]
ΔTOT*(Hi gen.div)					8.003			
					[10.686]			
ΔTOT*(Int. gen.div).						-2.826		-25.697
						[17.521]		[19.638]
ΔTOT*Brit. colony							2.294	-24.350
							[6.566]	[26.385]
ΔTOT*Fr. colony							15.652	33.512
							[22.677]	[26.074]
Duration	-0.036	-0.035	-0.013	-0.012	-0.012	-0.013	-0.035	-0.031
	[0.030]	[0.030]	[0.022]	[0.022]	[0.022]	[0.022]	[0.030]	[0.029]
First Year Dummy	-0.542***	-0.549***	-0.927***	-0.922***	-0.933***	-0.928***	-0.540***	-0.568***
	[0.147]	[0.144]	[0.165]	[0.166]	[0.165]	[0.164]	[0.147]	[0.147]
Observations	702	702	899	899	900	900	702	701
R-squared	0.637	0.641	0.519	0.519	0.519	0.519	0.638	0.646
# countries	75	75	78	78	79	79	75	74
p-val shock	0	0	0.08	0.05	0.08	0.20	0	0.14
p-val interac.	0	0	0.09	0.18	0.19	0.14	0.01	0
p-val shock+interac.	0.16	0.17	0.85	0.58	0.72	0.76	0.41	0.36
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Cntry/conf time trnds	Y	Y	Y	Y	Y	Y	Y	Y

Note: Robust standard errors clustered at the country-level (except in Column (1)) in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Δ denotes the change in the three-year moving average. Columns (1)-(8) estimate the Table 3, Column (2) specification in the main but paper but controls for other factors than ethnicity that could mediate the effects of commodity terms of trade shocks. Column (1) includes an interaction between the terms of trade shocks and a dummy for above-median mountainous terrain land cover, Column (2) adds an interaction with a dummy for a non-contiguous state. Columns (3)-(4) interact the shock with dummies for above-median and intermediate (1^{st}-3^{rd} quartile) religious fractionalization. Columns (5)-(6) interact the shock with dummies for above-median and intermediate (1^{st}-3^{rd} quartile) predicted genetic diversity. Column (7) interact the shock with dummies for British and French colonies. Column (8) includes the controls jointly except for including just one of the two religious diversity and one of the two predicted genetic diversity measures. Except for the predicted genetic diversity measure, which comes from Ashraf and Galor (2013), all the controls come from Fearon and Laitin (2003).

Online Appendix F

Evidence that Indonesia could be considered an intermediately fractionalized country

In the main paper, we argue that it may be appropriate to categorize Indonesia as an intermediately fractionalized country and include it in the intermediately fractionalized country group. In this appendix, we explain why we believe this classification may be appropriate. We first provide an argument based on the coding of the ethnic groups. We then provide an empirical argument that shows that conflict intensity in Indonesia is poorly explained by the linear specification for the non-intermediately fractionalized countries and well explained by the specification for the intermediately fractionalized countries, that is, in Indonesia, both positive and negative income shocks increase the conflict intensity.

In terms of the coding procedure, Indonesia does not quite match our empirical definition of an intermediately ethnically fractionalized country: in order to be intermediately fractionalized, the ethnic fractionalization index must be in the second to third quartiles or between 0.25-0.68. Indonesia's fractionalization index, however, is 0.77. Indonesia, similarly, does not quite satisfy our definition of ethnic dominance: in order to have a dominant ethnic group, we require that the largest ethnic group represents 50-85 percent of the population. The largest group in Indonesia, however (the Javanese) only represent 45% of the population. Nonetheless, Indonesia is clearly close to our somewhat arbitrary cut-off points for being intermediately fractionalized and having ethnic dominance.

More importantly, the case-study of Indonesia's historical civil conflicts in Ross (2005) explains that (a) ethnic dominance is an important source of conflict in Indonesia. Moreover, (b) the Javanese are often grouped with the second-largest group in the country, which is the Sundanese (Ross 2005, 37):

> ‘Indonesia’s ethnic composition poses a civil war risk, however, because of the dominance of the largest “ethnic” group, the Javanese. In 1976, the ethnic Javanese constituted 45 percent of the population; the Sundanese, who are often grouped with the Javanese because they, like the Javanese, are concentrated on the Island of Java, constituted another 15 percent of the population. Whether they are treated as 45 percent or 60 percent of the population, the size of this group has often contributed to antagonism between Indonesians who are indigenous to Java, and those from other islands. Non-Javanese people see Indonesia’s government and military as Javanese-controlled.’

If we group the Javanese and Sundanese together instead of separating the groups like in Fearon’s original (2003) classification, Indonesia’s ethnic fractionalization index falls to 0.63. This index puts it well within the 0.25-0.68 range which defines our intermediately fractionalized countries. Since the largest group ethnic group, which now contains both the Javanese and the Sundanese, now contains 60% of the population, Indonesia also satisfies the ethnic dominance definition.

On the empirical side, if we believe that Indonesia resembles a country with intermediate diversity and ethnic dominance, we should also expect its conflict intensity to follow the model for the intermediately fractionalized rather than the non-intermediately fractionalized countries. Another reason we might expect such a response is that the conflicts in Indonesia in our dataset pitted the central government in Java against ethnic secessionists in East Timor, Aceh, and West Papua. All three areas have natural resources that may be relatively easy to appropriate due to their geographic concentration, and whose extraction process is likely to be capital-intensive and may create relatively few employment opportunities that raise the opportunity cost of rebelling. They include oil in East Timor (Dubois 2000; Le Billon 2007), oil and natural gas in Aceh (Robinson

1998; Dubois, 2000), and timber and minerals in West Papua (Heidbüchel 2007). As a result, we should again expect that positive terms of trade shocks increase conflict in Indonesia rather than decrease it like in the other non-intermediately fractionalized countries.

In order to test this idea, Table A4, Column (1) reports the regressions results for the non-intermediately fractionalized countries when we allow terms of trade shocks in Indonesia to have different effects than in the other countries. The results show that we can reject that terms of trade growth has the same effect in Indonesia as in the other non-intermediately fractionalized countries. Moreover, the -24.3 coefficient for the remaining non-intermediately fractionalized countries is substantially larger in magnitude than the original Table 4, Column (4) estimate of -15.6.

In Column (2) we add Indonesia to the intermediately fractionalized sample and test whether, as we should expect if Indonesia is effectively intermediately fractionalized, both positive and negative terms of trade shocks increase its conflict intensity. The results support both hypotheses. In Columns (3)-(4), we repeat the analysis when we split the sample according to the presence or absence of ethnic dominance. The results in Colum (3) support that Indonesia responds differently to terms of trade shocks than the other countries without a dominant group. Controlling for the differential Indonesia response increases the coefficient magnitude for the remaining non-dominance countries to -24.8 from -14.7 in Table 5, Column (4). Column (4) suggests that both positive and negative terms of trade shocks increase conflict intensity in Indonesia, so its shock responses resemble the responses of the original ethnic dominance countries. On this basis, we believe that it may be reasonable to either control for the differential Indonesia response in the main paper or to omit it from the non-intermediately fractionalized and non-dominance samples.

TABLE A4

The effects of terms of trade growth in Indonesia

	(1)	(2)	(3)	(4)
Estimation Method	LSDV	LSDV	LSDV	LSDV
Sample	NIF	IF +Indonesia	No ethnic dominance	Ethnic dom. +Indonesia
ΔTOT(t)	-27.268**		-24.768**	
	[10.172]		[9.934]	
ΔTOT(t)*Indonesia	42.678***		37.392***	
	[13.622]		[13.702]	
PosΔTOT(t)		19.267**		17.891**
		[7.684]		[7.801]
NegΔTOT(t)		-34.975***		-34.720***
		[7.302]		[8.062]
PosΔTOT(t))*Indonesia		30.218*		27.834*
		[14.975]		[15.967]
NegΔTOT(t))*Indonesia		-76.787***		-75.869***
		[14.575]		[16.661]
Duration	0.002	-0.050	-0.001	-0.050
	[0.011]	[0.038]	[0.013]	[0.039]
First year	-0.899***	-1.101***	-0.967***	-1.054***
	[0.215]	[0.242]	[0.210]	[0.250]
Observations	491	436	510	410
R-squared	0.617	0.515	0.626	0.502
Number of countries	39	41	41	38
p-val (PosΔTOT+PosΔTOT*Indon.)		0.02		0.01
p-val (NegΔTOT+NegΔTOT*Indon.)		0.00		0.00
Year dummies	Y	Y	Y	Y
Country time trends	Y	Y	Y	Y

Note: Robust standard errors clustered at the country-level in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Δ denotes the change in the three-year moving average. Column (1) replicates the Table 4, Column (3) regression model but allows the effect of terms of trade growth to differ in Indonesia compared to the remaining non-intermediately fractionalized countries. Column (2) reports the estimates when we add Indonesia to the intermediately fractionalized sample and estimate the separate effects of positive and negative terms of trade shocks. Columns (3) repeat the analysis but divide the sample into the countries without and with ethnic dominance.

References (uncited in the main paper)

Dubois, Brian. 2000. ‘The Timor Gap Treaty – where to now?’ Briefing Paper no. 25. Oxford, UK: Oxfam Community Aid Abroad. Based on initial research by Monique Hanley and Kirsty Miller.

Heidbüchel, E. (2007). *The West Papua Conflict in Indonesia: Actors, Issues and Approaches*. Wettenberg: Johannes Herrmann Verlag.

Le Billon, P. (2007). ‘Geographies of war: perspectives on ‘resource wars’. *Geography Compass* 1 (2): 163-182.

Robinson, G. (1998). ‘Rawan is as Rawan Does: The Origins of Disorder in New Order Aceh.’ *Indonesia* 66: 126-57.

Online Appendix G

The role of ethnicity in the conflict observations for NIF fuel exporters

In Section 5 in the main paper, we argue that most of the conflict observations for the fuel exporters outside the intermediate-ethnic-fractionalization range (the 25^{th}-75^{th} percentile of the Herfindahl-Hirschman ethnic fractionalization index) nonetheless included large or dominant ethnic groups. Particularly, 91% or 89 of the total of 98 observations for NIF fuel-exporters in the Table 8, Column (1) regression come from just four countries - Angola (1975-2002, 2004, 2007), Azerbaijan (1992-95, 2005), Indonesia (1975-92, 1997-2005) and Sudan (1976, 1983-2008) - that have a history of ethnic conflict involving large or dominant ethnic groups. The Angola observations reflect the 1975-2005 postcolonial war to control the government and, from 1991, the Cabinda secession war. The Azerbaijan observations come from the Ngorno-Karabakh conflict and two aborted coups in 1993 and 1995. The Indonesia observations come from a mixture of the Acehnese, East Timorese, and West Papuan conflicts. The Sudan observations come from the Islamic Charter Front coup in 1976, the Second Sudanese Civil War (for 1983-2008), and the Western Darfur rebellion (2003-08). Below, we argue that most of these conflict episodes can be characterized as ethnic conflicts and were either partly motivated or partly financed by fossil fuels.

The main Angolan civil war from 1975-2002 started as a conflict between the largest three ethnic groups over controlling the central government upon independence from Portugal. During the war, the country's oil revenues helped to finance the Angolan government's war effort against the UNITA rebels (Le Billon 2000; Bannon and Collier 2003; Le Billon 2000). In addition, oil is an important factor in the ongoing Cabinda conflict, which we observe from 1991. This conflict represents the attempt of the mainly ethnic Bakongo-inhabited, oil-rich, and geographically separated Cabinda province in the north to secede (Porto 2003; Minorieties at Risk 2017).

Although the historical roots of Sudan's conflict go beyond the discovery of oil, the discovery of oil reserves in the south and the perception that the northern government displaced thousands of people to get access to the oil fields contributed to the Second Civil War from 1983-2008 (Johnson 2003; Collins 2005). Oil also helped to finance the Sudanese government during the Western Darfur rebellion from 2003-08 (Patey 2010).

Indonesia's conflict years in the sample are a combination of three distinct ethnic conflicts that all reflected that the Javanese-dominated central government tried to establish greater control of resource-rich peripheral areas where the ethnic minorities wanted to secede (see Online Appendix F).

Azerbaijan's 1992-94 and 2005 observations reflected that the mainly Armenian-inhabited Ngorno-Karabakh region attempted to secede to Armenia. Although Ngorno-Karabakh is not known to possess fossil fuels, oil extraction appears to have helped to finance Azerbaijan's war effort (Kaldor 2007, 163):

> 'Because of the collapse of the official [Soviet] economy and because, in any case, taxation had been centralised in the Soviet era, there was almost no official funding. On the Armenian side, funding was almost entirely war related – diaspora support, Russian military assistance, loot and pillage, contraband trade (especially petroleum products) and hostagetaking…On the Azeri side, the government was able to commandeer crude oil from the Azerbaijan State Oil Company (SOCAR) either for use at the front or for sale...'

Related, our 1995 observation for Azerbaijan is a coup attempt that Cornell (1999) argues can most convincingly be explained be Russia's desire to control the country's oil (Cornell 1999, 57):

> ‘Moscow saw its control over Azerbaijan slipping away with the oil deal [that the Azerbaijan’s state oil company had just re-negotiated with a western oil companies] and therefore triggered a crisis that would bring its ally to power.’

References (uncited in the main paper)

Collins, R.O. (2005). ‘Civil Wars and Revolution in Sudan.’ Hollywood, CA: Tsehai Publishers and Distributors.

Cornell, S. E. (1999). *The Nagorno-Karabakh Conflict*. Inst. för Östeuropastudier.

Johnson, D. H. (2003). *The root causes of Sudan's civil wars*. Vol. 601. Bloomington, IN: Indiana University Press.

Kaldor, M. (2007). ‘Oil and conflict: the case of Nagorno Karabakh.’ In Mary Kaldor, Terry Lynn Karl and Yahia Said (eds.) *Oil Wars*. London: Pluto Press,157-182.

Le Billon, P. (2000). ‘Angola's political economy of war: The role of oil and diamonds, 1975–2000.’ *African Affairs* 100 (398): 55-80.

Minorities at Risk. (2017). Assessment for Cabinda in Angola. Accessed March 25, 2017, http://www.mar.umd.edu/assessment.asp?groupId=54003

Patey, L. A. (2010). ‘Crude days ahead? Oil and the resource curse in Sudan.’ *African Affairs* 109 (437): 617-636.

Porto, J. G. (2003). *Cabinda: Notes on a Soon-to-be-forgotten War*. Institute for Security Studies ISS Paper 77, August

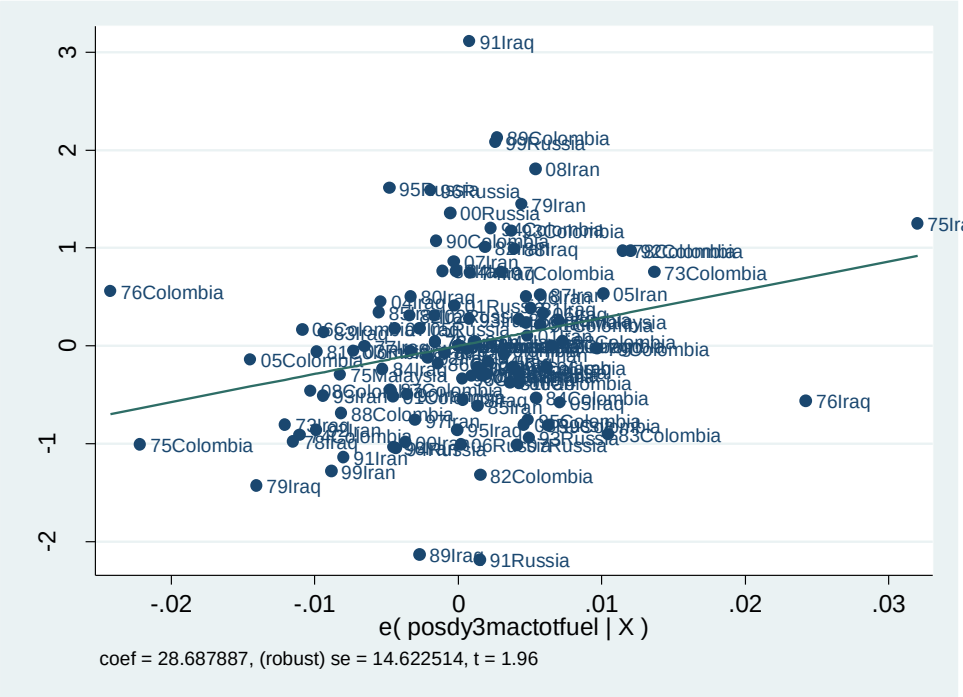
Online Appendix H

Partial residual plots for the Table 9, Column (1) and (5) regressions.

In order to ensure that outlier effects do not explain the paper’s Table 9, Columns (1) and (5) results, Figures A3-A4 plot the partial residuals for the positive and negative fossil fuel terms of trade shocks in the two regressions.

FIGURE A3

Partial residual plots for the Table 9, Column (1) regression: the effects of positive and negative fuel terms of trade shocks in intermediately ethnically fractionalized fuel exporters. Herfindahl-Hirschman ethnic fractionalization index in the 25-75th percentile.



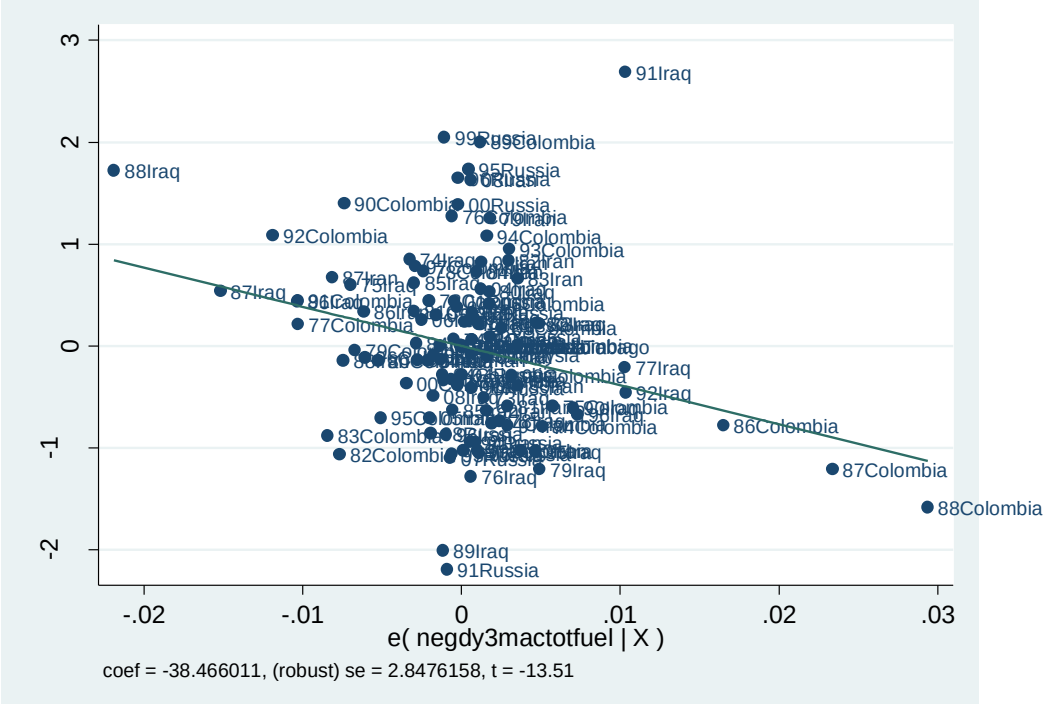


FIGURE A4

Partial residual plots for the Table 9, Column (5) regression: the effects of positive and negative fuel terms of trade shocks in intermediately ethnically fractionalized fuel exporters. Herfindahl-Hirschman ethnic fractionalization index is in the 15th - 85th percentile and large producers omitted.