WP/20/110

IMF Working Paper

The Macroeconomic Costs of Conflict

by Natalija Novta and Evgenia Pugacheva

INTERNATIONAL MONETARY FUND

 WP/20/110

IMF Working Paper

Research Department

The Macroeconomic Costs of Conflict[1]

Prepared by Natalija Novta and Evgenia Pugacheva[2]

Authorized for distribution by Oya Celasun

June 2020

Abstract

Macroeconomic costs of conflict are generally very large, with GDP per capita about 28 percent lower ten years after conflict onset. This is overwhelmingly driven by private consumption, which falls by 25 percent ten years after conflict onset. Conflict is also associated with dramatic declines in official trade, with exports (imports) estimated to be 58 (34) percent lower ten years after conflict onset. The onset of conflict often also induces significant refugee outflows to neighboring non-advanced countries in the short run, and relatively small but very persistent refugee outflows to advanced countries over the long run. Finally, we stress that conflict should be defined in terms of the number of people killed relative to the total population. The traditional definition of conflict—based on the absolute number of deaths—skews the sample toward low-intensity conflicts in large countries, thereby understating the negative effects of conflict from a macroeconomic perspective.

JEL Classification Numbers: D74, E66

Keywords: conflict, war, growth, trade, migration

[1] We are grateful to Oya Celasun for helpful comments, guidance, and contributions on ways to incorporate pre-conflict growth forecasts into the analysis. We have greatly benefitted from comments and suggestions from Valerie Cerra, Raphael Espinoza, Òscar Jordà, Klaus Hellwig, Tara Iyer, Siddharth Kothari, Gian Maria Milesi-Ferretti, Nikolay Zubanov, and Thierry Nguema-Affane. All errors are our own.

[2] All authors are at the International Monetary Fund. Authors' E-Mail Addresses: NNovta@imf.org, EPugacheva@imf.org.

I. INTRODUCTION

The total number of conflict-related deaths has been on the rise since the early 2000s, reflecting the very deadly conflicts in Afghanistan, Iraq, and Syria. Conflict is a key factor that can hold back economic development (Rodrik 1999; Besley and Persson 2008). Conflict leads to economic losses that can persist for years (Cerra and Saxena 2008), dramatic consumption losses (Barro and Ursua 2008), and immeasurable humanitarian suffering. Conflict can also ignite large refugee flows and may affect the economies of countries, near and far, for an extended period of time. Even though the number of countries in conflict has fallen since the 1990s (see Figure 1), the rise in violent conflict across the world since the 2000s has weighed on global and regional GDP growth, given the number of relatively large economies experiencing strife and the severe effect of some of these episodes on economic activity.

In this paper, we focus on the macroeconomic costs of conflict. We start with stylized facts documenting the association between conflict and growth collapses, measured by the decline in real GDP relative to the pre-conflict growth forecast, based on the International Monetary Fund's *World Economic Outlook* forecasts for each country. We also investigate what share of global GDP is attributed to countries in conflict, which has been shown to help explain errors in GDP forecasting (Celasun et al. 2020).

We then conduct an empirical analysis of the dynamic effect of conflict on real GDP per capita. We look at the components of GDP by expenditure (private consumption, government spending, investment, and trade in goods), value added by sectors of the economy (manufacturing, services, agriculture) to determine the channels through which conflict affects aggregate GDP. Lastly, we consider the impact of conflict on the number of refugees seeking shelter in neighboring countries and in advanced economies, which are typically located farther away from the epicenter of conflict. Throughout, we focus on a ten-year horizon after conflict outbreak.

We further contribute to the literature by using new definitions of conflict onset and incidence based on the share of population killed. The standard definition of conflict in the literature is based on an absolute number of people killed (for example, 1,000 people killed to identify a major conflict), but this definition does not properly account for population size (Mueller 2016). A conflict with a thousand deaths could have almost no macroeconomic impact in a very large country, yet be a major destabilizing force in a small country. Hence, we define conflict in terms of the percentage of the country's total population that died in battle or as civilian casualties. We argue that—from a macroeconomists' perspective—this is the relevant conflict definition to use.

The rest of the paper is organized as follows: in Section II we present our definitions of conflict onset and incidence; in Section III we look at conflict-related growth collapses and the effect on global GDP; in Section IV we quantify the macroeconomic costs of conflict; Section V concludes.

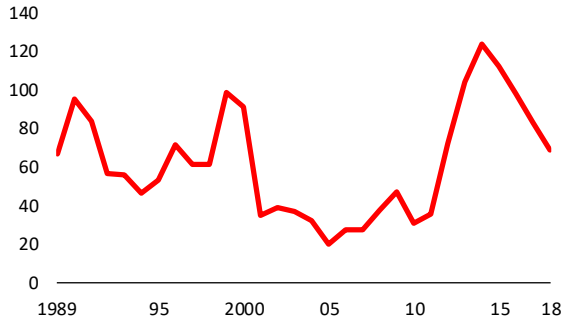
II. Data and Measurement of Conflict

An expansion of conflict research in both political science and economics has created excellent sources of conflict data.[3] In this paper, we primarily rely on the Uppsala Conflict Data Program (UCDP) Georeferenced Event Dataset to define our indicators of conflict incidence and onset. This dataset covers all conflicts, i.e. state-based conflicts, non-state conflicts and one-sided violence[4] and looks at the best estimates of the number of people killed, both civilians and combatants.

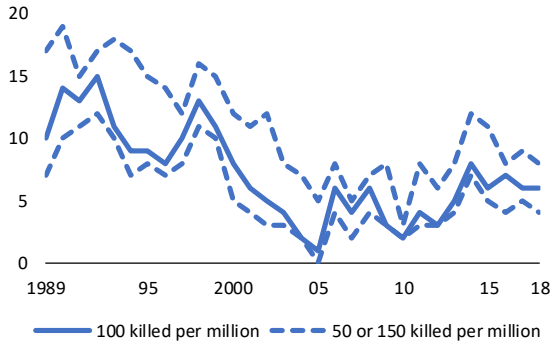
Figure 1. Conflict-Related Fatalities and Number of Countries Affected by Conflict

1. Conflict-Related Fatalities

(Thousands)



2. Number of Countries Affected by Conflict



Sources: Uppsala Conflict Data Program (UCDP) Georeferenced Event data set v. 19.1 and Battle-Related Deaths data set v. 19.1; and authors' calculations.
Note: Panel 1 excludes Rwanda in 1994 (0.5 million dead). In panel 2, a country is considered in conflict if in any year 100 (50 or 150) people or more are killed per 1 million population.

Choosing a criterion to classify a country as having experienced conflict is not trivial. Traditionally, political scientists have used a threshold of one thousand battle-related deaths to classify whether a country has experienced a major conflict (e.g. Blattman and Miguel 2010, Collier et al 2003). Certainly, if conflict claims the lives of one thousand people in a single year, this is a major event. The main argument against using a measure of conflict based on an absolute number of conflict-related death in macroeconomic analysis is that country size will implicitly affect this measure. Specifically, the one thousand deaths threshold would make it more likely to record conflict in a large populous country, such as India, which experiences frequent Hindu-Muslim violence without serious macroeconomic implications. The same threshold would make it less likely to record a conflict in a small country, such as Georgia, even when that country is experiencing major violence with large macroeconomic consequences. Mueller (2016) reports a strong positive correlation between population size and the incidence of civil war, as defined by the absolute threshold of one thousand battle-related deaths.

[3] A description of all the data used in this paper, as well as an overview of alternative data sources, is provided in Annex I.

[4] State-based conflict is defined as conflict in which at least one party is the government of a state. Non-state conflict is conflict between two organized armed groups, neither of which is the government of a state. One-sided violence is the use of armed force by the government of a state or by a formally organized group against civilians. For more information see Högbladh (2019).

From a macroeconomic perspective, we find it is more appropriate to define conflict incidence based on the share of the population killed. In this paper, a country is coded as having experienced a conflict in a particular year if at least one hundred people were killed in battle that year for every one million people in the general population. Table 1 below shows how our definition of conflict compares to the absolute threshold definition. Almost 93% of country-years in our dataset were peace years given both definitions. In 3.1% of country-years the two definitions also concur in identifying conflict. However, in 0.6 percent of country-year observations would we define a conflict that involved less than 1,000 deaths as a large-scale conflict; these would involve countries with small populations. Also, in 3.2 percent of observations conflict is not "large scale" in terms of the share of population killed, even though there are more than 1,000 deaths. As a robustness check and for alternative measures of conflict intensity we also consider additional thresholds for defining conflict incidence based on the share of population killed: specifically, 50 and 150 people killed per one million population. Of course, defining conflict using one approach or another in no way negates the fact that any and all loss of life is tragic.

Table 1. The Percent of Country-Years in Conflict Based on Different Conflict Definitions

		Absolute threshold	
		<1,000 deaths or no conflict	>1,000 deaths
Relative threshold	<100 deaths per million or no conflict	5,240 (92.9%)	185 (3.3%)
	>100 deaths per million	36 (0.6%)	179 (3.1%)

Note: For each country and year conflict is coded based on two definitions: 1) more or less than 1,000 deaths, 2) whether the share of population killed exceeds one hundred per one million people. We tabulate the number of country-years in each category and show the percentage in parentheses. Sample includes 188 countries, 1989–2018.

As we show in Figure 1, both the number of conflict-related death and the incidence of conflict based on our definition has risen in recent years from low levels in the early 2000s. Although the total annual number of conflict-related deaths is still relatively low from a historical perspective if one were to look further back over the 20th century, the increase in the number of fatalities in recent years has been sharp. Over time, the nature of conflict has changed: there was more interstate conflict between World War II and the 1990s, and there has been more internal civil war since the 1990s (Blattman and Miguel 2010). The location of major conflict has also shifted, from Sub-Saharan Africa in the 1990s to the broader Middle East region, especially since 2010.

We define conflict onset as the first year of conflict, based on our definition of conflict incidence above. Since some countries experience several conflicts, we record conflict onset in a particular year if the number of deaths exceeds one hundred (or 50 or 150) per one million population in that year, after at least four consecutive years without passing that threshold.[5] As a robustness check,

[5] Annex I provides details on data sources, variable definitions, and a list of country-years for which we identified conflict incidence and onset. Note that our conflict onset years may at times differ from historical sources. In our approach, when conflict begins and ends will only depend on the number of battle-related deaths per population, and the assumption about how many years of peace (i.e. low fatalities) are needed before we identify another onset.

we also consider a definition of conflict onset after at least two consecutive years without passing the threshold. In total in our sample of 188 countries over 1989–2018 (5,640 country-year observations) we identify conflict incidence based on the one hundred people killed per one million threshold in 215 instances (3.8 percent) and conflict onset following the same threshold in 50 instances (0.9 percent).

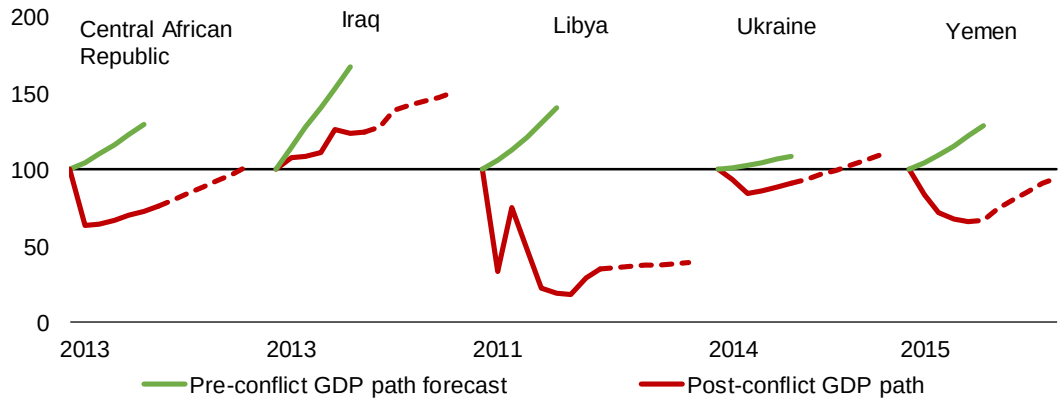
III. Conflict-related Growth Collapses and Its Effect on Global GDP

To evaluate the impact of conflict, we look at the difference between actual real GDP growth path and the forecast that was made a year before conflict outbreak. These forecasts are prepared by IMF country experts and account for country-specific circumstances and risk factors. Conflict outbreak in general is associated with sizable growth revisions (for a study of GDP forecast errors see Celasun et al. 2020).

Figure 2 illustrates the impact of conflict onset with several country examples: Conflict onset leads to a decline in real GDP with an associated downward shift of the real GDP path, which in some cases is accompanied by a general decline in GDP growth rates (as indicated by the flattening of the red line, for example, in Iraq and Libya).

Figure 2. Pre-conflict GDP Forecast versus Actual GDP Path

(Index, year before conflict = 100)



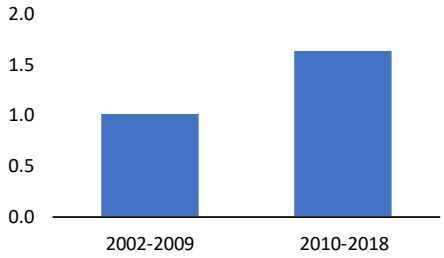
Sources: IMF World Economic Outlook database; and authors' calculations.
Note: Conflict onset is the first year of conflict in which the number of deaths exceeds 100 per one million population (after at least four consecutive years without passing that threshold). Dashed lines indicate future forecast.

The rise in the number and intensity of conflicts has weighed on global GDP growth in recent years. This is true for three main reasons:

1) the number of economies that are experiencing strife has been increasing (as seen in Figure 1, Panel 2);
2) some of these conflict episodes have had a very severe negative effect on economic activity, leading to true economic collapses;
3) some of the affected economies are large (for example, Iraq, Nigeria or Ukraine in some years).

In total, the countries currently involved in conflict account for about 1.6 percent of global GDP (Figure 3).[6] The share of global GDP affected by conflict has clearly risen in recent years.[7] While it is true that only a relatively small set of countries—and thus a relatively small share of global GDP—are affected by conflict, in the remainder of this paper we will show that the macroeconomic costs experienced by these countries are large and very long-lasting. Moreover, macroeconomic costs of conflict are not limited to only those countries experiencing conflict. Neighboring and non-neighboring countries can be negatively affected, through trade, refugee flows, and other spillovers, that can continue to have effects over ten years or more following conflict onset.

Figure 3. Global GDP Shares of Conflict-Affected Countries
(Percent)



Sources: World Economic Outlook database; and authors' calculations.
Note: GDP in purchasing-power-parity international dollars shares are based on the first year within the bin.

IV. Macroeconomic Costs of Conflict

In this section, we estimate the macroeconomic costs of conflict. We focus on GDP per capita, components of real GDP (such as consumption, government spending, investment and trade in goods), sector value added, and finally the number of refugees. We present results on each in the following subsections. Throughout, we use the local projection method of Jordà (2005) and Teulings and Zubanov (2014)[8] to estimate the impact of conflict over the subsequent ten-year horizon. The following type of equation is estimated:

$$y_{it+h} - y_{it-1} = \beta_1^h c_{it} + \beta_2^h c_{it-1} + \sum_{j=1}^{h-1} \beta_3^j c_{it+h-j} + \theta_1^h \Delta y_{it-1} + \theta_2^h x_{it} + \mu_i^h + \gamma_t^h + \varepsilon_{it}^h,$$
$$h = 0, \dots, 10$$

where y_{it} is log GDP per capita and $y_{it+h} - y_{it-1}$ indicate a cumulative growth rate between horizons *t–1* and *h* (for other dependent variables see definitions in the subsequent sections), c_{it} is

[6] The share of global GDP in conflict-affected countries, if calculated separately for each year, mechanically declines during the period of conflict simply because the GDP of conflict-affected countries typically drops during conflict (Mueller 2013; Cerra and Saxena 2008). To limit this mechanical effect, the percentage of global GDP in purchasing power parity terms that a country represents is recorded in the first year of the period (2002 or 2010) and kept constant throughout each period shown in Figure 3.

[7] The conclusion that the share of global GDP affected by conflict has risen recently holds if we use alternative definitions of conflict (50 or 150 killed per million), and other time periods (2002-2005, 2006-2009 and 2010-2016). For details, see Box 1.1 in Chapter 1 of April 2017 *World Economic Outlook*.

[8] Tuelings and Zubanov (2014) argue that omission of the shock variable (in our case, the conflict variable) between periods *t* and *t+h* leads to an attenuation bias, particularly as the horizon window increases. Following their specification, we include the $\sum_{j=1}^{h-1} \beta_3^j c_{it+h-j}$ term in the regression equation. We find that estimates without controlling for conflict onset within the forecast period are generally statistically significant but smaller in magnitude, as predicted by Teulings and Zubanov (2014).

a variable for conflict, x_{it} is a vector of controls (lagged log population; and, for regressions where the dependent variable is based on the number of refugees, lagged log GDP per capita), μ_i^h are country fixed effects, γ_t^h are time fixed effects, and *h* is the time horizon. The contemporaneous effect is indicated by *h=0*, the subsequent horizons show the cumulative effect on the dependent variable. In regressions below where we control for the pre-conflict GDP forecast, the x_{it} vector of controls includes $y_{it+h}^{forecast} - y_{it-1}$, where $y_{it+h}^{forecast}$ is the IMF forecast of log GDP per capita in country *i*, *h* years ahead.

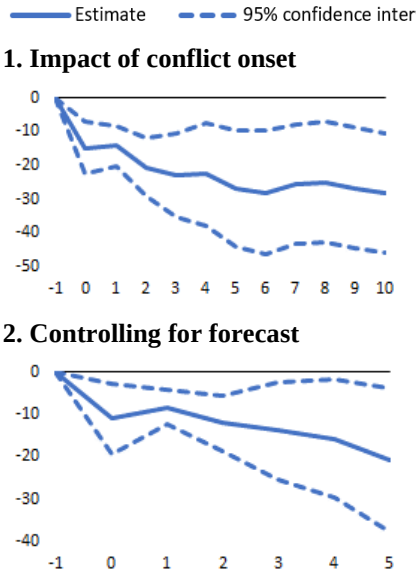
A. Effect on GDP per capita

We estimate that conflict onset implies an immediate decline in GDP per capita of about 15 percent, on average (Table 2, column 2 and Figure 4, panel 1). The cumulative effect on per capita GDP is persistently negative. Even ten years after conflict onset, the cumulative reduction in the level of GDP is about 28 percent relative to the pre-conflict year.[9]

One common concern when estimating the effect of conflict on GDP is that the expectation of poor economic conditions may lead to conflict, and thus the estimated negative effect of conflict could be biased. To address this potential bias, we control for the GDP per capita forecast made before the conflict started, based on *World Economic Outlook* forecasts for each country and the appropriate contemporaneous vintage.[10] The estimated effect of conflict onset, controlling for pre-conflict GDP forecast, is shown in Table 3 and in Figure 4, Panel 2. For these regressions we only consider five years after the shock, because the WEO forecast is only made for five years ahead. Overall, the estimated effect of conflict onset is broadly similar in Panels 1 and 2 of Figure 4 (over the first five years that are estimated), indicating that expectations about GDP are not an important source of potential bias.[11]

Severity of the conflict also matters. We explored the estimated effect of conflict onset when conflict is less or more

Figure 4. Impact of Conflict Onset on GDP per Capita
(Percent; years on x-axis)



Source: Authors' calculations.
Note: t = 0 is the year of the shock. Conflict onset takes the value of 1 in the first year of conflict after at least four consecutive years without passing the threshold of 100 killed per 1 million population.

[9] Cerra and Saxena (2008) estimate the negative effects of currency crises, banking crises, and twin financial crises (banking and currency) at around 4 percent, 6 percent and 10 percent, respectively, lower output ten years after the shock. These are also examples of very severe economic shocks with permanent effects. Using a conflict definition that differs from ours, Cerra and Saxena (2008) estimate that civil wars are associated with about a 6 percent initial decline in output, and a 3 percentage points cumulative loss in output.

[10] The GDP per capita forecast is from the Spring *WEO* vintage of the same year.

[11] A critic might say that WEO forecasts might already incorporate the expectation of conflict, since IMF country teams who make these forecasts might be aware of the potential for conflicts in individual countries, as well as their

severe, i.e. coding conflict if there are at least 50 or 150 conflict-related deaths per million population, instead of 100. Results that compare the estimated effect of conflict onset for different thresholds are shown in columns 1–3 of Table 2. Results are very consistent throughout, with the smallest estimated magnitude for the definition with 50 killed per million, followed by 100 and 150 killed per million of the total population. If we look at the most severe conflicts, with more than 150 killed per million, the onset of conflict has devastating consequences, with approximately 16 percent lower GDP per capita in the year of conflict onset, about 34 percent lower 5 years on, and 38 percent lower ten years on.

In column 4 of Table 2, we consider an additional measures of conflict onset: based on the absolute threshold of 1,000 battle deaths. Overall, the estimated coefficients are all negative and statistically significant. This more traditional definition of major conflict produces results that are most similar to the conflict onset indicator based on 50 deaths per million people, which tends to pick up low-intensity conflicts. This suggests that studies that estimate the overall effect of conflict on output using the traditional conflict definition of 1,000 deaths might underestimate the negative effects of conflict because they might focus on low-intensity conflicts.

Finally, in the remaining columns 5–8 of Table 2 we repeat the same regressions, but switch the indicator of conflict onset from the one where conflict onset is identified after at least four consecutive years without passing the threshold to the definition where conflict onset is identified after at least two consecutive years without passing the threshold. We again find very strong negative and statistically significant results.

We further expand our analysis by estimating the regressions for sub-samples of Sub-Saharan African (SSA) countries (Table 4, column 1), and countries from the Middle East, North Africa, Afghanistan and Pakistan (MENAP) (column 2). We show results only using conflict onset based on the 100 deaths per million threshold, as results are generally consistent with different thresholds. We find the effect to be negative and statistically significant for the Sub-Saharan countries, with GDP per capita declining by 8 percent on impact and 25 percent cumulatively ten years after the shock. We do not find a statistically significant effect for MENAP countries, which we attribute to the smaller sample size and to data availability limitations, as the data on GDP becomes either completely unavailable or highly unreliable for the most severely affected countries, such as Syria.

We make a further extension to our analysis by considering the possibility that conflict outbreak and GDP declines could be both caused by unexpected country-year specific shocks, which would not be captured in either the country or the year fixed effects. More specifically, we control for the impact of commodity terms of trade shocks that affect a country's exports. Such shock would include fluctuations in the price of oil and other export commodities of each country, weighted by their share of exports in output (Gruss and Kebhaj, 2019). In Table 4 column 3, we first estimate our original specification on a sample of observations for which commodity terms of trade data is available, and in column 4 we present the results where commodity terms of trade enter the

potential macroeconomic ramifications. However, even if a country is conflict-prone, predicting the exact onset of conflict is difficult (see Cederman and Weidmann 2017), including for IMF teams.

regression as a control. Direct comparison of the two columns shows that overall findings remaining unchanged.

Finally, in the last three columns of Table 4 we explore whether the impact of conflict onset on GDP depends on whether the country is a fragile state or not. In column 5, we present the original specification limited to the observations where data on state fragility is available (for a list of data sources see Annex I), starting from year 1996. We further interact the indicator variable for fragility with the indicator variable for conflict and estimate a single regression with this interaction term. In column 6, we present the impact of conflict in fragile states, and in column 7 the impact of conflict in politically and economically stable states. We find that the effect of conflict is negative and statistically significant for fragile states on impact and ten years after the shock. For non-fragile states, the effect of conflict is also negative and significant on impact, but becomes statistically indistinguishable from zero over longer horizons. Given limited data availability of the fragility index it is difficult to explore this issue further.

Table 2. Impact of Conflict Onset on GDP per Capita

	Conflict onset after 4 years of no conflict				Conflict onset after 2 years of no conflict			
	50 killed per million	100 killed per million	150 killed per million	1,000 killed	50 killed per million	100 killed per million	150 killed per million	1,000 killed
Years after the shock:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t = 0 (contemporaneous)	-12.446 ***	-14.888 ***	-16.358 ***	-11.650 **	-10.591 ***	-13.716 ***	-14.730 **	-9.742 **
	(4.329)	(3.950)	(5.908)	(4.499)	(3.215)	(4.359)	(5.754)	(3.787)
t = 1	-12.552 ***	-14.221 ***	-15.038 ***	-12.311 ***	-11.057 ***	-13.068 ***	-13.566 ***	-9.753 ***
	(3.478)	(2.983)	(4.497)	(3.467)	(2.790)	(3.145)	(4.395)	(2.897)
t = 2	-18.349 ***	-20.497 ***	-22.009 ***	-15.487 ***	-14.938 ***	-18.518 ***	-20.073 ***	-12.401 ***
	(4.694)	(4.484)	(5.996)	(4.726)	(3.572)	(4.553)	(6.082)	(3.768)
t = 3	-20.775 ***	-22.763 ***	-26.198 ***	-18.319 ***	-16.943 ***	-19.136 ***	-22.284 ***	-13.905 ***
	(6.077)	(6.323)	(7.973)	(6.275)	(4.620)	(5.436)	(7.105)	(4.320)
t = 4	-23.199 ***	-22.688 ***	-27.531 ***	-18.554 **	-18.278 ***	-18.075 ***	-22.599 ***	-12.995 ***
	(6.888)	(7.709)	(9.420)	(7.358)	(5.423)	(6.273)	(7.833)	(4.537)
t = 5	-25.940 ***	-27.048 ***	-34.034 ***	-22.748 ***	-20.452 ***	-21.246 ***	-27.162 ***	-15.543 ***
	(8.033)	(8.817)	(10.686)	(8.633)	(6.175)	(7.568)	(9.012)	(5.468)
t = 6	-26.117 ***	-28.137 ***	-32.805 ***	-22.316 ***	-20.453 ***	-21.502 ***	-26.278 ***	-14.696 ***
	(7.635)	(9.336)	(10.183)	(8.167)	(6.059)	(7.979)	(8.548)	(5.378)
t = 7	-26.369 ***	-25.570 ***	-32.350 ***	-22.213 ***	-20.572 ***	-18.459 **	-26.094 ***	-15.106 ***
	(7.475)	(9.061)	(9.905)	(7.894)	(6.147)	(7.380)	(8.444)	(5.392)
t = 8	-26.380 ***	-25.009 ***	-34.270 ***	-21.617 ***	-21.750 ***	-17.899 **	-27.624 ***	-15.198 ***
	(7.546)	(9.093)	(9.683)	(7.817)	(6.433)	(7.598)	(8.553)	(5.523)
t = 9	-27.016 ***	-26.700 ***	-36.584 ***	-21.923 ***	-21.994 ***	-19.655 **	-29.832 ***	-14.798 ***
	(7.651)	(9.200)	(9.802)	(7.972)	(6.418)	(7.755)	(8.763)	(5.481)
t = 10	-28.619 ***	-28.101 ***	-38.117 ***	-21.994 ***	-23.726 ***	-21.240 ***	-31.531 ***	-15.604 ***
	(7.720)	(9.021)	(9.852)	(7.990)	(6.897)	(7.717)	(8.953)	(5.414)
For t = 0 (contemporaneous) regression:								
Number of countries	188	188	188	188	188	188	188	188
of which in conflict	36	29	28	35	41	32	29	40
Number of observations	5,171	5,171	5,171	5,171	5,171	5,171	5,171	5,171
of which in conflict	46	37	32	35	60	45	40	40
R^2	0.23	0.23	0.23	0.22	0.22	0.23	0.23	0.22

Source: Authors' calculations.

Note: The dependent variable is cumulative growth of real GDP per capita in the year after the shock. Regressions are estimated separately for each horizon. All regressions include controls for lagged GDP per capita growth and lagged log population, country and year fixed effects. Standard errors are clustered at the country level. NA = not applicable. * p<0.1; ** p<0.05; *** p<0.01.

Table 3. Impact of Conflict Onset on GDP per Capita: Controlling for Forecast

	Conflict onset after 4 years of no conflict				Conflict onset after 2 years of no conflict			
Years after the shock:	50 killed per million (1)	100 killed per million (2)	150 killed per million (3)	1,000 killed (4)	50 killed per million (5)	100 killed per million (6)	150 killed per million (7)	1,000 killed (8)
t = 0 (contemporaneous)	-9.158 **	-11.048 ***	-15.974 ***	-9.769 **	-7.861 **	-10.117 **	-13.779 **	-7.870 **
	(4.300)	(4.200)	(5.927)	(4.367)	(3.047)	(4.588)	(5.728)	(3.562)
t = 1	-7.650 **	-8.324 ***	-14.146 ***	-9.790 ***	-7.115 ***	-8.098 **	-12.711 ***	-7.658 ***
	(3.279)	(2.102)	(4.254)	(3.463)	(2.496)	(3.136)	(4.539)	(2.941)
t = 2	-11.340 **	-12.142 ***	-19.418 ***	-11.240 **	-9.106 ***	-11.648 **	-17.978 ***	-9.221 **
	(4.485)	(3.406)	(5.418)	(4.689)	(2.869)	(4.834)	(6.491)	(3.972)
t = 3	-13.592 **	-13.799 **	-22.486 ***	-13.723 **	-10.844 ***	-11.673 **	-19.049 **	-10.420 **
	(6.079)	(5.857)	(8.091)	(6.329)	(3.991)	(5.765)	(7.747)	(4.492)
t = 4	-18.078 ***	-15.758 **	-25.113 ***	-15.876 **	-13.718 ***	-12.179 **	-20.178 **	-10.768 **
	(6.745)	(7.146)	(9.494)	(7.131)	(4.753)	(6.082)	(8.059)	(4.258)
t = 5	-20.704 **	-20.780 **	-32.175 ***	-16.916 *	-15.414 ***	-15.507 **	-24.899 ***	-11.389 **
	(8.148)	(8.735)	(11.273)	(9.027)	(5.627)	(7.606)	(9.501)	(5.269)
For t = 0 (contemporaneous) regression:								
Number of countries	188	188	188	188	188	188	188	188
of which in conflict	31	24	22	31	36	29	25	37
Number of observations	4,986	4,986	4,986	4,986	4,986	4,986	4,986	4,986
of which in conflict	40	31	26	31	54	39	34	37
R^2	0.38	0.39	0.40	0.39	0.38	0.39	0.40	0.39

Source: Authors' calculations.

Note: The dependent variable is cumulative growth of real GDP per capita in the year after the shock. Regressions are estimated separately for each horizon. All regressions include controls for lagged GDP per capita growth and lagged log population, country and year fixed effects. Standard errors are clustered at the country level. NA = not applicable. * p<0.1; ** p<0.05; *** p<0.01.

Table 4. Impact of Conflict Onset on GDP per Capita: Sub-Samples and Controls

	Sample		CTOT control		Fragile state		
	SSA	MENAP	Full sample	Control	Full sample	Yes	No
Years after the shock:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
t = 0 (contemporaneous)	-8.366 **	-25.361 **	-14.952 ***	-14.888 ***	-10.583 **	-12.007 **	-6.655 **
	(3.661)	(10.497)	(4.189)	(3.950)	(4.669)	(5.194)	(3.036)
t = 1	-9.755 **	-10.636 ***	-14.187 ***	-14.221 ***	-6.051 *	-7.041 *	-2.981
	(3.870)	(3.197)	(3.318)	(2.983)	(3.616)	(3.646)	(4.314)
t = 2	-14.782 ***	-15.599 *	-20.346 ***	-20.497 ***	-9.703 *	-7.874	-6.465
	(5.215)	(7.573)	(4.744)	(4.484)	(5.483)	(6.077)	(5.401)
t = 3	-13.926 **	-23.542	-23.273 ***	-22.763 ***	-10.795	-8.719	-6.335
	(5.689)	(16.273)	(6.665)	(6.323)	(7.743)	(8.717)	(8.220)
t = 4	-15.123 **	-26.769	-25.351 ***	-22.688 ***	-9.834	-9.186	-6.896
	(7.012)	(20.467)	(7.698)	(7.709)	(8.160)	(10.037)	(9.290)
t = 5	-18.511 **	-34.448	-30.787 ***	-27.048 ***	-11.303	-13.320	-7.818
	(7.647)	(23.468)	(8.635)	(8.817)	(8.367)	(11.330)	(8.733)
t = 6	-20.268 **	-36.319	-32.538 ***	-28.137 ***	-10.407 *	-16.263	-8.175
	(8.899)	(25.386)	(9.048)	(9.336)	(6.206)	(9.922)	(7.056)
t = 7	-20.662 **	-23.158	-30.053 ***	-25.570 ***	-7.844	-10.099	-4.798
	(9.319)	(21.419)	(8.740)	(9.061)	(5.812)	(7.292)	(6.763)
t = 8	-21.618 **	-9.992	-29.562 ***	-25.009 ***	-5.980	-9.817	-3.534
	(9.893)	(15.450)	(8.895)	(9.093)	(4.607)	(6.259)	(6.209)
t = 9	-23.188 **	-7.792	-31.428 ***	-26.700 ***	-6.601	-11.952 *	-3.648
	(9.574)	(12.997)	(8.947)	(9.200)	(4.793)	(6.065)	(5.858)
t = 10	-24.837 ***	-8.148	-32.990 ***	-28.101 ***	-8.389 *	-14.188 **	-7.048
	(8.320)	(11.182)	(8.580)	(9.021)	(4.781)	(6.196)	(6.453)
For t = 0 (contemporaneous) regression:							
Number of countries	45	23	181	188	164	85	128
of which in conflict	13	6	27	29	20	16	4
Number of observations	1,235	617	4,951	5,171	3,545	1,314	2,231
of which in conflict	14	10	35	37	25	19	6
R^2	0.23	0.18	0.23	0.23	0.21	0.22	

Source: Authors' calculations.

Note: The dependent variable is cumulative growth of real GDP per capita. Regressions are estimated separately for each horizon. All regressions include controls for lagged GDP per capita growth and lagged log population, country and year fixed effects. Columns 1 and 2 are estimated on a sub-sample of countries from Sub-Saharan Africa (SSA) and the Middle East, North Arica, Afghanistan, and Pakistan (MENAP). In columns 3 and 4 the sample of observations is identical. Column 3 presents the original regression (i.e. column 2 in Table 2) for the sample, while column 4 is estimated with a control for commodities terms of trade (CTOT). In columns 5–7 the sample of observations is identical. Column 5 presents the original regression (i.e. column 2 in Table 2) for the sample. Columns 6 and 7 are from one single regression where an indicator variable for fragile states is interacted with the conflict indicator variable. The definition of a fragile state is time-variant: a country could be classified as fragile and not fragile for different years. Standard errors are clustered at the country level. * p<0.1; ** p<0.05; *** p<0.01.

B. Impact of Conflict on Consumption, Investment, Trade, and Sector Value Added

To deepen our understanding of the effect of conflict on GDP, we differentiate between the components of GDP by expenditure (private consumption, government spending, investment, and trade in goods[12]), and value added by sectors of the economy (manufacturing, services, agriculture). The regression results are presented in Table 5 and Figure 5. In this and the following subsections we show results using conflict onset based on the 100 deaths per million threshold.

The key message is that consumption and exports are both very strongly and durably affected by conflict onset. Figure 5, panel 1 indicates that conflict onset reduces consumption by about 6 percent in the same year, cumulative 12 percent one year later, and cumulative 22 percent ten years after conflict onset. These are very large and persistent negative effects, clearly driven by declines in private consumption rather than public spending.

The effect of conflict on trade appears even more dramatic (Figure 5, panels 5 and 6), though this might be at least in part due to a rise in smuggling of goods to evade customs, in which case trade would be underreported in official statistics. Our estimates suggest that conflict onset is associated with a reduction of exports by 26 percent in the same year, cumulative 35 percent five years later, and cumulative 58 percent ten years after conflict. In the case of imports, conflict onset is associated with a reduction of imports by about 17 percent in the same year, cumulative 23 percent five years later, and 34 percent ten years after conflict onset.

Our results do not definitively show that conflict is associated with a decline in investment, other than a contemporaneous negative effect in the year of conflict onset. Our estimates for investment over time are very imprecise, which is likely due to significant measurement issues in conflict-affected countries, or possibly due to substantial variation in international community involvement and aid in different countries affected by conflict.[13]

We must note that in low-income and conflict-stricken countries, data on components of GDP, that we use in this paper, is generally of poor quality. Hence, our results must be interpreted with caution. In addition to overall poor data quality, private consumption data may be estimated as a residual, after trade, investment and government consumption are accounted for. That noted, the negative effects of conflict on household saving and consumption have also been reported in the literature (Voors et al. 2012), as well as its effect on capital flight (Collier, Hoeffler, and Pattillo 2004).

To extend the analysis further, we look at the production side and analyze the impact of conflict on sectoral value added. More specifically, we look at agriculture, manufacturing, and services. We find that conflict is associated with a decline in production across all sectors. Agriculture value added decreases by 6 percent in the year of conflict onset, with the effect remaining negative and statistically significant for the next six years. Manufacturing declines by 16 percent in the year of

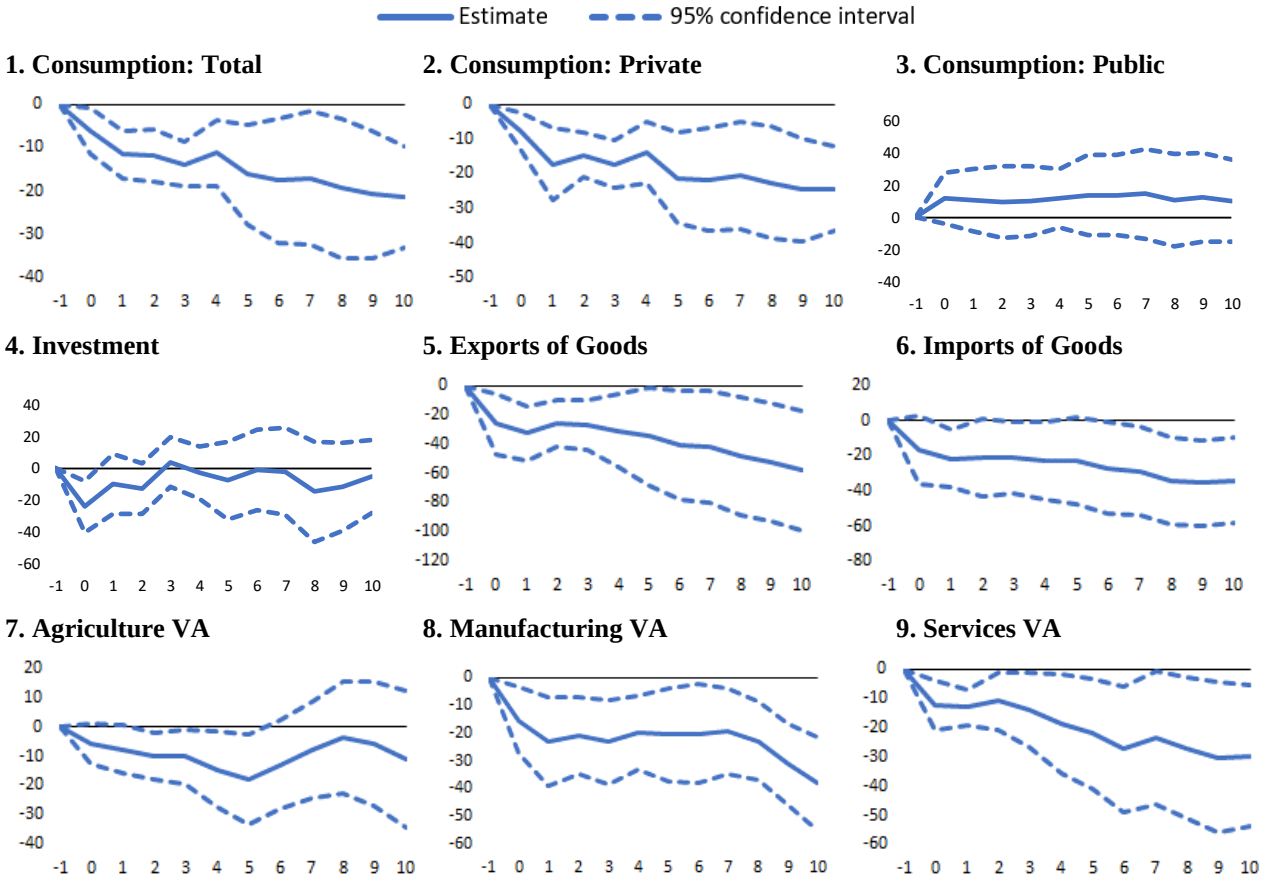
[12] We took the trade variables from trade statistics, not national accounts. Using imports and exports of goods data from national accounts give us comparable, though somewhat less significant, results.

[13] Data constraints do not permit separating private and public investment in our sample.

conflict onset and by 38 percent cumulatively ten years after the shock. Services decline by 12 percent on impact and by 30 percent ten years after the shock.

We must also note that conflict likely affects GDP per capita through various channels that we cannot differentiate. It can directly reduce the workforce, hamper labor productivity, reduce the physical and mental health of the population. The negative effects of conflict can be large over the medium and long term if people's health is permanently damaged, they leave the country as refugees or economic migrants, or they are prevented from attending school, which lowers human capital, both individually and in the aggregate (see Blattman and Miguel 2010; Justino 2007 and 2009).

Figure 5. Impact of Conflict Onset on Consumption, Investment, Trade, and Sector Value Added
(Percent; years on x-axis)



Source: Authors' calculations.
Note: t = 0 is the year of the shock. Conflict onset takes the value of 1 in the first year of conflict after at least four consecutive years without passing the threshold of 100 killed per 1 million population. VA = value added.

Table 5. Impact of Conflict Onset on Consumption, Investment, Trade, and Sector Value Added

	Consumption						Value Added		
	Total	Private	Public	Investment	Exports	Imports	Agriculture	Manufacturing	Services
Years after the shock:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
t = 0 (contemporaneous)	-6.152 **	-7.555 ***	11.855	-24.208 ***	-26.406 **	-16.673 *	-5.588	-15.603 **	-12.345 ***
	(2.686)	(2.701)	(8.199)	(8.371)	(10.356)	(10.031)	(3.539)	(6.068)	(4.232)
t = 1	-11.641 ***	-17.302 ***	10.621	-9.740	-32.440 ***	-21.649 ***	-7.606 *	-23.129 ***	-12.982 ***
	(2.840)	(5.240)	(9.973)	(9.638)	(9.477)	(8.195)	(4.164)	(8.062)	(3.125)
t = 2	-11.911 ***	-14.599 ***	9.597	-12.731	-25.950 ***	-21.450 *	-9.994 **	-21.015 ***	-10.944 **
	(3.105)	(3.201)	(11.570)	(8.203)	(7.986)	(11.269)	(4.023)	(7.096)	(4.929)
t = 3	-13.806 ***	-17.335 ***	10.370	3.954	-27.181 ***	-21.179 **	-10.110 **	-23.269 ***	-14.004 **
	(2.631)	(3.462)	(11.128)	(7.982)	(8.868)	(10.322)	(4.713)	(7.686)	(6.438)
t = 4	-11.193 ***	-13.982 ***	11.746	-2.721	-31.081 **	-22.720 **	-14.529 **	-19.692 ***	-18.756 **
	(3.888)	(4.481)	(9.372)	(8.543)	(12.751)	(11.224)	(6.531)	(6.795)	(8.706)
t = 5	-16.206 ***	-21.255 ***	13.969	-7.617	-34.964 **	-22.749 *	-17.894 **	-20.669 **	-22.016 **
	(5.922)	(6.744)	(12.759)	(12.489)	(17.081)	(12.500)	(7.771)	(8.603)	(9.626)
t = 6	-17.634 **	-21.670 ***	13.948	-0.865	-40.855 **	-26.943 **	-12.927 *	-20.303 **	-27.370 **
	(7.254)	(7.582)	(12.739)	(12.867)	(19.139)	(13.194)	(7.616)	(9.041)	(11.020)
t = 7	-17.002 **	-20.472 ***	14.694	-1.931	-41.588 **	-28.696 **	-7.685	-19.513 **	-23.354 **
	(7.808)	(7.845)	(14.195)	(13.906)	(19.576)	(12.676)	(8.397)	(7.890)	(11.596)
t = 8	-19.443 **	-22.614 ***	11.018	-14.750	-48.413 **	-34.237 ***	-3.738	-22.850 ***	-26.980 **
	(8.214)	(8.286)	(14.738)	(16.082)	(20.742)	(12.696)	(9.795)	(7.220)	(12.232)
t = 9	-20.856 ***	-24.648 ***	12.484	-11.580	-52.620 **	-35.436 ***	-5.805	-31.148 ***	-30.135 **
	(7.474)	(7.532)	(14.248)	(14.225)	(20.764)	(12.388)	(10.895)	(7.489)	(13.032)
t = 10	-21.495 ***	-24.446 ***	10.333	-5.136	-57.927 ***	-33.951 ***	-11.167	-38.179 ***	-29.641 **
	(5.947)	(6.175)	(13.115)	(11.842)	(20.843)	(12.380)	(11.958)	(8.579)	(12.253)
For t = 0 (contemporaneous) regression:									
Number of countries	164	164	166	163	186	186	182	179	181
of which in conflict	22	22	22	21	27	27	20	16	18
Number of observations	4,402	4,402	4,449	4,379	5,095	5,093	4,441	4,124	4,039
of which in conflict	26	26	26	25	35	35	26	21	24
R^2	0.11	0.09	0.08	0.09	0.17	0.16	0.10	0.13	0.18

Source: Authors' calculations.

Note: The dependent variable is cumulative growth of real consumption (columns 1–3) and real investment (4), value of imports (5) and exports (6) of goods, real value added by agriculture, manufacturing, and services (7–9). Regressions are estimated separately for each horizon. All regressions include controls for lagged dependent variable growth in and lagged log population, country and year fixed effects. Standard errors are clustered at the country level. * p<0.1; ** p<0.05; *** p<0.01.

C. Effect on migration

To understand how conflict affects migration patterns, we separately consider refugees to neighboring countries and refugees to advanced economies as migration to these two groups of countries might be very different in the short and long run. In addition, we also separately consider: 1) refugees in terms of the conflict country's population, to convey the magnitude of the migration crisis and, 2) the log difference of refugees, to proxy for their growth over time. We estimate the effect of conflict on migration using the same specification as before, controlling for lagged log GDP per capita and log population.

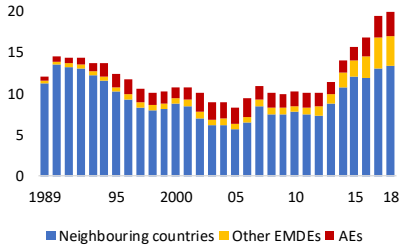
Before we begin our analysis, we present some basic summary statistics on refugees in Figure 6. First, we observe that the number of refugees has been rising globally over the past decade (Figure 6, Panel 1), and stood at around 20 million people in 2018, about 30 percent of which were refugees from Syria. The chart also shows that the vast majority of refugees go to neighboring countries and only a small fraction (are able to) go to advanced economies. Second, conflicts are associated with large migrations. For example, in 1995 about 15 percent of the population in conflict countries left as refugees (Figure 6, panel 2). Third, on average, the number of refugees, especially in advanced economies, represents a small fraction of the asylum country's population (Figure 6, panel 3).

In our regression analysis, we first discuss effects of conflict on migration to neighboring countries, that absorb the largest shock. We separately discuss refugee flows to advanced economies, which are incredibly persistent and grow over time following conflict onset.

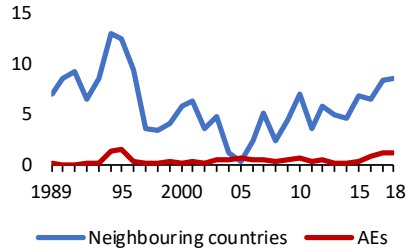
Following conflict onset, neighboring countries are usually the first to receive a large influx of refugees—typically close to 2 percent, cumulatively, of the conflict country's population 4 to 5 years following conflict onset (Figure 7, panel 1). The cumulative log difference—which to some extent approximates the cumulative growth—of refugees to neighboring countries is mostly stable over time (Figure 7, panel 2). This means that refugees tend to stay in neighboring countries for ten years or more after a conflict onset.

Figure 6. Number of Refugees by Country of Asylum

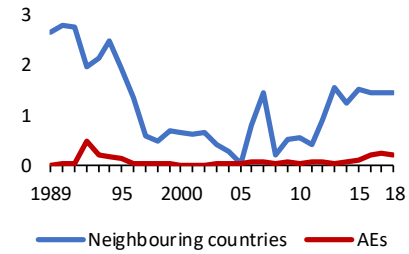
1. Number of refugees
(Million)



2. Refugees from countries in conflict
(Percent of country of origin's population, average)



3. Refugees from countries in conflict
(Percent of country of asylum's population, average)



Source: Authors' calculations.
Note: Panel 1 shows the total number of people that have refugee status according to UNHCR. Panel 2 shows for countries in conflict the percent of these country's population that sought asylum in neighboring countries and in advanced economies, averaged across countries in conflict. Panel 3 shows for countries in conflict the number of refugees to neighboring countries and advanced economies as percent of the asylum's country population, averaged across asylum countries. Conflict incidence defined as 100 killed per 1 million population.

For example, in the case of Bosnia refugees started fleeing as soon as conflict broke out in 1992, first to neighboring countries. UNHCR data suggests that in 1992 alone more than 8 percent of Bosnia's population fled as refugees to neighboring countries. In the subsequent years, however, refugee flows from Bosnia to neighboring countries were either much smaller, or even negative, as more Bosnians sought refuge in advanced economies. In 1992, only about 1.7 percent of the Bosnian population were able to seek refuge in an advanced economy. This is a substantial number compared to other conflicts, but much smaller than the number of refugees in neighboring (non-advanced) economies. By 1994, however, the number of Bosnian refugees in advanced economies exceeded that in neighboring countries.

As suggested with the case of Bosnia, refugee dynamics to advanced countries are often different than those to neighboring countries. At the onset of conflict, the most vulnerable population is forced to move either internally, or to neighboring (non-advanced) countries. Over time, the flow of refugees to advanced economies might rise as people search for better opportunities.

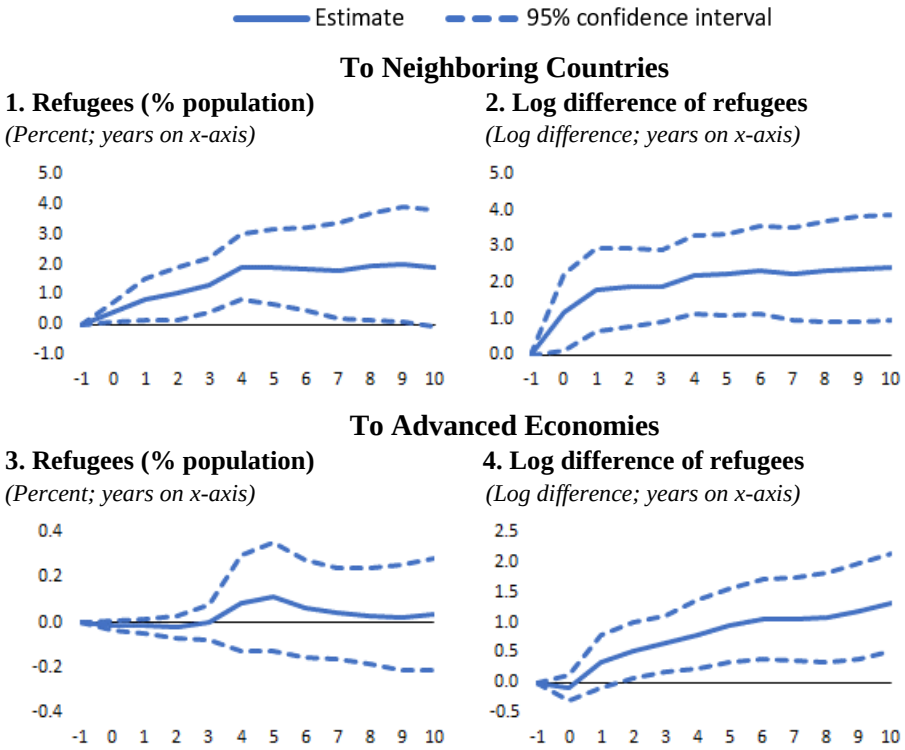
In most conflict-affected countries, unlike in Bosnia, only a tiny proportion of people manage to obtain refugee status in an advanced country, much less than 1 percent of the population. This may be because they lack the resources to travel far, apply for refugee visas, or avail themselves of extensive social networks in potential host countries. When our dependent variable is refugees as percent of population of the conflict country, we generally do not find a statistically significant effect of conflict onset on refugees to advanced countries (Figure 7, panel 3). However, focusing on the cumulative log difference of refugees over time, we see that the growth of refugees in advanced economies is extremely persistent and continues even ten years after conflict onset (Figure 7, panel 4). This gradual but persistent growth may suggest that refugees initially face significant obstacles in obtaining refugee status in advanced economies, but that continued efforts tend to become fruitful over time. Table 6 summarizes all the results from Figure 7.[14]

Large refugee outflows from conflict affected countries, and the fact that many of these people do not return over the next ten years, implies a significant loss of present and future labor force.[15] This will negatively affect the productive capacity of the country well after conflict ends.

[14] Given that in recent years a large share of refugees came from Syria, as a robustness check we re-estimated the regressions with the exclusion of Syria and found comparable results.

[15] Of course, in addition to refugees, the present and future labor force will shrink due to direct loss of life related to the conflict. During conflict, wounded people and those actively fighting, are also unable to participate in economic activity.

Figure 7. Impact of Conflict Onset on the Number of Refugees



Source: Authors' calculations.
Note: t = 0 is the year of the shock Conflict onset takes the value of 1 in the first year of conflict after at least four consecutive years without passing the threshold of 100 killed per 1 million population.

Table 6. Impact of Conflict Onset on the Number of Refugees

	% Population				Log Difference			
	Total	To AEs	To EMDEs	To Neighboring Countries	Total	To AEs	To EMDEs	To Neighboring Countries
Years after the shock:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t = 0 (contemporaneous)	0.433 ***	-0.013	0.446 ***	0.455 ***	1.175 **	-0.093	2.025 ***	2.231 ***
	(0.161)	(0.012)	(0.161)	(0.163)	(0.532)	(0.111)	(0.658)	(0.681)
t = 1	0.811 **	-0.017	0.822 **	0.912 ***	1.784 ***	0.342	2.595 ***	2.733 ***
	(0.351)	(0.017)	(0.353)	(0.318)	(0.582)	(0.222)	(0.694)	(0.718)
t = 2	1.028 **	-0.020	1.043 **	1.111 ***	1.861 ***	0.536 **	2.545 ***	2.524 ***
	(0.454)	(0.025)	(0.456)	(0.408)	(0.563)	(0.241)	(0.684)	(0.723)
t = 3	1.312 ***	0.001	1.308 ***	1.362 ***	1.890 ***	0.645 ***	2.692 ***	2.492 ***
	(0.456)	(0.038)	(0.456)	(0.399)	(0.509)	(0.232)	(0.665)	(0.689)
t = 4	1.899 ***	0.084	1.810 ***	1.830 ***	2.210 ***	0.800 ***	3.291 ***	2.857 ***
	(0.554)	(0.110)	(0.549)	(0.488)	(0.560)	(0.289)	(0.712)	(0.763)
t = 5	1.920 ***	0.114	1.803 ***	1.814 ***	2.226 ***	0.945 ***	3.241 ***	2.811 ***
	(0.639)	(0.122)	(0.624)	(0.569)	(0.580)	(0.311)	(0.720)	(0.789)
t = 6	1.831 ***	0.064	1.763 **	1.808 ***	2.341 ***	1.049 ***	3.479 ***	3.120 ***
	(0.698)	(0.110)	(0.680)	(0.614)	(0.618)	(0.340)	(0.755)	(0.836)
t = 7	1.786 **	0.041	1.740 **	1.927 ***	2.251 ***	1.056 ***	3.322 ***	2.900 ***
	(0.803)	(0.103)	(0.783)	(0.655)	(0.652)	(0.347)	(0.797)	(0.895)
t = 8	1.926 **	0.029	1.896 **	2.122 ***	2.303 ***	1.082 ***	3.428 ***	3.106 ***
	(0.909)	(0.110)	(0.892)	(0.729)	(0.707)	(0.379)	(0.845)	(0.982)
t = 9	1.989 **	0.021	1.966 **	2.225 ***	2.382 ***	1.181 ***	3.457 ***	3.169 ***
	(0.969)	(0.120)	(0.949)	(0.739)	(0.742)	(0.402)	(0.896)	(1.052)
t = 10	1.888 *	0.035	1.857 *	2.141 ***	2.414 ***	1.331 ***	3.527 ***	3.095 ***
	(0.990)	(0.126)	(0.964)	(0.712)	(0.740)	(0.412)	(0.924)	(1.104)
For t = 0 (contemporaneous) regression:								
Number of countries	188	188	188	188	188	188	188	188
of which in conflict	30	30	30	30	30	30	30	30
Number of observations	5,187	5,187	5,187	5,187	5,187	5,187	5,187	5,187
of which in conflict	38	38	38	38	38	38	38	38
R^2	0.06	0.11	0.05	0.04	0.14	0.26	0.09	0.07

Source: Authors' calculations.

Note: The dependent variable is either cumulative change in the total number of refugees as percent of population or cumulative log difference of the total number of refugees. Regressions are estimated separately for each horizon. All regressions include controls for lagged dependent variable growth, lagged log GDP per capita in U.S. dollars, lagged log population, country and year fixed effects. Standard errors are clustered at the country level. * p<0.1; ** p<0.05; *** p<0.01.

V. CONCLUSION

This paper concludes with three key findings. First, the costs of conflict are typically very large: GDP per capita is about 28 percent lower ten years after conflict onset. Looking at the components of GDP on the expenditure side, the decline in GDP is primarily driven by the decline in consumption, and specifically private consumption. This is consistent with the large share of consumption in most countries' GDP and the common observation that the poorest, most vulnerable people who do not have the buffers to smooth consumption are those who suffer the largest costs from conflict. Production in all sectors of the economy—agriculture, manufacturing and services—are negatively affected by conflict. Moreover, conflict in one country can have effects in other countries, via significant refugee flows, trade disruptions, and other spillovers. The number of refugees who manage to reach advanced countries are typically not large as a share of both the origin and destination country populations at first, but their growth is highly persistent over time.

Second, even though conflict directly affects only a relatively small number of countries around the world, it can have measurable effects on global GDP and thus demands attention from analysts forecasting growth as there has been an increase in conflict episodes, including in some large economies, and because in some cases the negative effect on GDP has been particularly severe. In some regions, such as Sub-Saharan Africa, Middle East and North Africa, conflict frequently affects people's lives and livelihoods, directly or indirectly (see IMF 2019, Rother et al 2016).

Third, when studying conflict from a macroeconomic point of view, it is important to define conflict in terms of the share of population killed, rather than an absolute number of conflict related deaths, as has traditionally been the case. In our baseline definition, conflict is recorded if the number of people killed exceeds one hundred per one million of total population, in a given year. We estimate the negative effect of conflict on GDP per capita using different definitions of conflict (more or less stringent than 100 killed per one million) and conclude that studies focusing on the traditional definition of conflict (one thousand deaths per year) tend to pick up low-intensity conflict and may therefore underestimate the negative effects of conflict.

Finally, we conclude by noting that the largest negative effects of conflict are borne by the ordinary people in conflict affected countries, whose consumption levels fall, and sometimes collapse, for many years following a conflict episode. Finding ways to reach out to these populations, by extending public goods provision and social safety nets, is essential.

However, macroeconomic policies suitable for stabilization in conflict-affected fragile states are often different from those in countries stricken by a severe economic shock such as a banking or currency crisis. In conflict-affected countries, trust in government institutions and capacity to deliver services to the general population have been fundamentally eroded. Chami et al (2020) discuss ways to adjust macroeconomic stabilization policies to meet the specific challenges facing individual fragile states. United Nations and World Bank (2018) further analyze policies for building inclusive approaches to recover from conflict and prevent future conflict eruption.

REFERENCES

Barro, Robert, and Jose F. Ursua. 2008. "Consumption Disasters in the Twentieth Century." *American Economic Review* 98(2): 58-63.

Besley, Timothy, and Torsten Persson. 2008. "Wars and State Capacity." *Journal of the European Economic Association* 6(2-3): 522-30.

Blattman, Christopher, and Edward Miguel. 2010. "Civil War." *Journal of Economic Literature* 48(1): 3-57.

Cederman, Lars-Erik, and Nils B. Weidmann. 2017. "Predicting armed conflict: Time to adjust our expectations?" *Science* 355.6324: 474-476.

Celasun, Oya, Jungjin Lee, Mico Mrkaic, and Allan Timmermann. 2020. "An Evaluation of World Economic Outlook Growth Forecasts, 2004-17." International Monetary Fund, Working Paper, forthcoming.

Cerra, Valerie, and Sweta Chaman Saxena. 2008. "Growth Dynamics: the Myth of Economic Recovery." *American Economic Review* 98(1): 439-57.

Chami, Ralph, Espinoza, Raphael and Peter Montiel. 2020. "Macroeconomic Policy in Fragile States." *Oxford University Press*, forthcoming.

Collier, Paul, Lani Elliott, Håvard Hegre, Anke Hoeffler, Marta Reynal-Querol, and Nicholas Sambanis. 2003. "Breaking the Conflict Trap: Civil War and Development Policy." World Bank Policy Research Report.

Collier, Paul, Anke Hoeffler, and Catherine Pattillo. 2004. "Africa's Exodus: Capital Flight and the Brain Drain as Portfolio Decisions." Journal of African Economics 13, AERC Supplement 2: ii15–ii54.

Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Håvard Strand. 2002. "Armed Conflict 1946-2001: A New Dataset." *Journal of Peace Research* 39(5).

Gruss, Bertrand, and Suhaib Kebhaj. 2019. "Commodity Terms of Trade: A New Database." International Monetary Fund, Working Paper 19/21.

International Monetary Fund. 2019. "The Economic Consequences of Conflicts" Chapter 2 in IMF Regional Economic Outlook: Sub-Saharan Africa, Washington D.C., April.

Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95(1): 161–82.

Justino, Patricia. 2006. “On the Links between Violent Conflict and Chronic Poverty: How Much Do We Really Know?” CPRC Working Paper 61.

Justino, Patricia. 2009. “Poverty and Violent Conflict: A Micro-Level Perspective on the Causes and Duration of Warfare.” *Journal of Peace Research* 46(3): 315-33.

Högbladh, Stina. 2019. “UCDP GED Codebook version 19.1.” Department of Peace and Conflict Research, Uppsala University

Mayer, Thierry, and Soledad Zignago. 2011. “Notes on CEPII’s Distances Measures: the GeoDist Database.” *CEPII Working Paper* 2011-25.

Mueller, Hannes. 2013. “The Economic Costs of Conflict." Working Paper, International Growth Centre, London.

Mueller, Hannes. 2016. “Growth and Violence: Argument for a Per Capita Measure of Civil War.” *Economica* 83: 473-97.

Pettersson, Therese. 2019. “UCDP Battle-related Deaths Dataset Codebook v 19.1”

Pettersson, Therese, Stina Högbladh, and Magnus Öberg. 2019. “Organized Violence, 1989-2018 and Peace Agreements.” *Journal of Peace Research 56*(4).

Rodrik, Dani. 1999. “Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses.” *Journal of Economic Growth* 4(4): 385-412.

Rother, M.B., M.G. Pierre, D. Lombardo, R. Herrala, M.P. Toffano, M.E. Roos, M.A.G. Auclair, and M.K. Manasseh. 2016. *The economic impact of conflicts and the refugee crisis in the Middle East and North Africa*. International Monetary Fund, Washington D.C.

Sundberg, Ralph, and Erik Melander. 2013. “Introducing the UCDP Georeferenced Event Dataset.” *Journal of Peace Research* 50(4): 523-532.

Teulings, Coen N., and Nikolay Zubanov. 2014. “Is Economic Recovery a Myth? Robust Estimation of Impulse Responses.” *Journal of Applied Econometrics* 29 (3): 497–514.

United Nations and World Bank. 2018. “Pathways for Peace: Inclusive Approaches to Preventing Violent Conflict.” Washington, DC: World Bank.

Voors, Maarten J., Eleonora E. M. Nillesen, Philip Verwimp, Erwin H. Bulte, Robert Lensink, and Daan P. Van Soest. 2012. “Violent Conflict and Behavior: A Field Experiment in Burundi.” *American Economic Review* 102(2): 941-64.

ANNEX I: DATA SOURCES

The data sources used in this paper are listed in Annex Table 1 and the list of country-years in conflict are provided in Annex Table 2.

The source for measures of real GDP per capita, real consumption and investment, and import and export trade value is the IMF's World Economic Outlook (WEO) Database. As data coverage for countries affected by conflict is limited, we extend the available data using previous vintages of the WEO database. For regressions that control for pre-conflict forecast of real GDP per capita, the up to five year ahead forecast is taken from the Spring WEO vintage of that year (World Economic Outlook forecasts are published twice a year in Spring and Fall).

The estimates of the total number of refugees in a given year by country of origin and country of asylum is from the United Nations High Commissioner for Refugees' (UNHCR) Population Statistics Reference Database. In cases when UNHCR redacts the data to protect the anonymity of individuals, figures ranging between 1 and 4, a value of 4 is assumed. Data where country of origin is "Various/Unknown" is dropped from the sample. For the analysis in this paper, the countries of asylum are grouped by income into Advanced Economies and Emerging Market and Developing Economies (based on the WEO definition as of April 2019), and by proximity to the country of origin into neighboring countries and not neighboring countries. The proximity is defined by whether the countries share a land border based on CEPII GeoDist dataset (Mayer and Zignago 2011), updated by this paper's authors.

These measures of conflict intensity and onset are derived from data on conflict-related fatalities as a share of total population. The estimates of population are taken from the WEO Database, and extended when missing with UN World Population Prospects Database and World Banks' World Development Indicators. To construct the estimates of fatalities, the Uppsala Conflict Data Program's Georeferenced Event Dataset (UCDP GED version 19.1) is used as a primary source (Sundberg and Melander, 2013). The dataset provides information for all types of conflicts worldwide in 1989–2018 with detailed information on the location where fatalities occurred. The estimates for the conflict in Syria (2011–present) are not provided in UCDP GED, but are available at a more aggregate level in UCDP Battle-Related Deaths Dataset (version 19.1).

We assign battle-related death to a country based on the location where the deaths occurred, not based on the nationality or affiliation of the person killed. We also consider all types of conflicts without a separation into state-based conflicts (at least one party of conflict is the government of a state), non-state conflicts (between two organized armed groups, neither of which is the government of a state), and one-sided violence (use of armed force by the government of a state or by a formally organized group against civilians) (Högbladh 2019); however, this distinction can be easily incorporate in the analysis and is presented in our earlier work (WEO April 2017, Box 1.1).

Conflict incidence takes the value of one when the fraction of population killed in conflict in any given year exceeds a threshold. We consider a threshold of one hundred people killed per one million population, with thresholds of 50 and 150 people killed per one million serving as measures of conflict intensity. For robustness checks, we look at an alternative definition of conflict incidence based on the total number of battle-related deaths (1,000 and more) in any given year, as is standard in the literature (Gleditsch et al. 2002).

Conflict onset takes the value of one in the first year of conflict based on conflict incidence, as defined above. For ongoing conflicts where a country might pass the threshold back and forth, the onset is defined only if there is no conflict for the preceding 4 years (as a robustness check, we also consider 2 years of no conflict). Given that our sample starts in 1989 and we do not have the data from the previous years to automatically calculate conflict onset, for years 1989–1992 we cross-reference all conflict incidence cases with external sources to identify conflict onset. For comparison, the UCDP Onset Dataset (version 19.1) defines conflict onset based on 25 and more battle-related deaths for intrastate conflicts only with a buffer of 1/2/3/5/10/20 years of no-conflict prior to conflict onset.

Given that the UCDP GED data starts in 1989, the information on battle-deaths for earlier conflicts can be obtained from the Peace Research Institute Oslo's (PRIO) Battle Deaths Dataset, which goes back to 1946, or the Correlates of War datasets, which go back to 1816. These datasets are coded at the conflict-level with several locations listed in some cases; thus, determining the location of battle deaths might not be straightforward. Unlike the UCDP GED dataset, these datasets do not provide information on the latitude and longitude of the conflict events; however, some geographical estimates can be obtained from the PRIO Conflict Site Dataset.

To provide a brief overview of other conflict-related datasets, it is worth noting that several methodological approaches for data collection exist. The UCDP GED dataset provides granular information with documentation for each conflict episode based on reports and media coverage, with information verified and coded by experts. For estimates of battle death and geographical location of the event, verification by experts plays an important role. Given recent advancements in machine learning and text analysis, datasets like the GDELT Project identify conflict incidence leveraging big data and aim to provide up-to-date information. Other datasets rely on expert opinion about the situation in the country and likewise can be updated frequently, as done monthly by the International Country Risk Guide (ICRG). Other proprietary datasets, such as the International Institute for Strategic Studies' (IISS) Armed Conflict Database, in addition to data provide contextual information and reports. Several datasets also look at riots and demonstrations, for example, Databanks International Cross-National Time-Series Data Archive and the Armed Conflict Location & Event Data Project (ACLED), the latter of which provides geo-coded data going back to 1997 for Africa and has recently started to cover other regions. The list of datasets mentioned here is not exhaustive and new data-collection initiatives are frequent.

Annex Table 1. Data Sources

Indicator	Source
Conflict-related deaths	Uppsala Conflict Data Program (UCDP) Georeferenced Event Dataset v. 19.1; Uppsala Conflict Data Program (UCDP) Battle-Related Deaths Dataset v. 19.1
Population	International Monetary Fund, World Economic Outlook Database; United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects, the 2017 revision; World Bank, World Development Indicators Database.
Number of refugees	United Nations High Commissioner for Refugees (UNHCR), Population Statistics Reference Database.
Real GDP, GDP per capita, total consumption, private consumption, government spending, investment; imports and exports trade value	International Monetary Fund, World Economic Outlook Database (all vintages from years 1990-2019).
Agriculture, manufacturing, services real value added	World Bank, World Development Indicators Database.
Commodity export price index	Gruss and Kebhaj (2019)
State Fragility Index (indicator for scores above 11)	Center for Systemic Peace
Neighboring countries	CEPII GeoDist Dataset

Annex Table 2. Country Sample

Incidence: 100 killed per one million population

Afghanistan (1989-2001, 2006-2018); Algeria (1995, 1998); Angola (1989, 1990, 1992-1994, 1999, 2001); Azerbaijan (1992-1994); Bosnia and Herzegovina (1992-1995); Burundi (1995-2003); Central African Republic (2013-2018); Chad (1990, 1992, 2000, 2006, 2008); Comoros (1997); Congo, Democratic Republic of the (1996-1999, 2002); Congo, Republic of (1997-1999); Croatia (1991, 1995); Djibouti (1990-1992); El Salvador (1989, 1990); Eritrea (1998-2000); Ethiopia (1989-1991, 1999, 2000); Georgia (1992, 1993, 2008); Ghana (1994); Guinea-Bissau (1998, 1999); Iraq (1991, 1997, 2003-2007, 2013-2017); Israel (2002, 2008, 2014); Kuwait (1990, 1991); Lebanon (1989, 1990, 2006); Liberia (1990-1996, 2001-2003); Libya (2011, 2014-2018); Moldova (1992); Mozambique (1989-1991); Nepal (2002); Nicaragua (1989); Panama (1989); Rwanda (1990-1995, 1997, 1998, 2001); Serbia (1998, 1999); Sierra Leone (1991-2000); Somalia (1989-1992, 1996, 2006-2012, 2016-2018); South Sudan (2011, 2013, 2014); Sri Lanka (1990-1993, 1995-2000, 2006-2009); Sudan (1989-1993, 1997, 1998, 2000-2004); Syria (2012-2018); Tajikistan (1992, 1993, 1996, 1998); Ukraine (2014); Yemen (1994, 2015, 2016, 2018)

Onset: first year of conflict in which the number of deaths exceeds 100 killed per one million population after at least four consecutive years without passing that threshold

Afghanistan (1989, 2006); Algeria (1995); Angola (1999); Azerbaijan (1992); Bosnia and Herzegovina (1992); Burundi (1995); Central African Republic (2013); Chad (1990, 2000, 2006); Comoros (1997); Congo, Democratic Republic of the (1996); Congo, Republic of (1997); Croatia (1991); Djibouti (1990); Eritrea (1998); Ethiopia (1999); Georgia (1992, 2008); Ghana (1994); Guinea-Bissau (1998); Iraq (1991, 1997, 2003, 2013); Israel (2002, 2008, 2014); Kuwait (1990); Lebanon (1989, 2006); Liberia (1990, 2001); Libya (2011); Moldova (1992); Nepal (2002); Panama (1989); Rwanda (1990); Serbia (1998); Sierra Leone (1991); Somalia (1989, 2006); South Sudan (2011); Sri Lanka (2006); Syria (2012); Tajikistan (1992); Ukraine (2014); Yemen (1994, 2015)

Onset: first year of conflict in which the number of deaths exceeds 100 killed per one million population after at least two consecutive years without passing that threshold

Afghanistan (1989, 2006); Algeria (1995, 1998); Angola (1999); Azerbaijan (1992); Bosnia and Herzegovina (1992); Burundi (1995); Central African Republic (2013); Chad (1990, 2000, 2006); Comoros (1997); Congo, Democratic Republic of the (1996, 2002); Congo, Republic of (1997); Croatia (1991, 1995); Djibouti (1990); Eritrea (1998); Ethiopia (1999); Georgia (1992, 2008); Ghana (1994); Guinea-Bissau (1998); Iraq (1991, 1997, 2003, 2013); Israel (2002, 2008, 2014); Kuwait (1990); Lebanon (1989, 2006); Liberia (1990, 2001); Libya (2011, 2014); Moldova (1992); Nepal (2002); Panama (1989); Rwanda (1990, 2001); Serbia (1998); Sierra Leone (1991); Somalia (1989, 1996, 2006, 2016); South Sudan (2011); Sri Lanka (2006); Sudan (1997); Syria (2012); Tajikistan (1992, 1996); Ukraine (2014); Yemen (1994, 2015)