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# Recovery from Conflict

## Lessons of Success

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## Abstract

This paper studies long-term impacts of violent conflict, to provide insights into the costs of conflict and policies to prevent conflict relapse. The findings link evidence on the contemporaneous effects of conflict with its persistent impact, especially by combining multiple data sources such as night lights, indicators of political exclusion, and nutrition. There is a strong level effect on output arising from the intensity of conflict, which, contrary to perceptions of post-conflict booms, on average is not reversed by subsequent more rapid growth. The paper investigates two possible channels that make conflict persistent: refugee flows and investment. Both channels display wide variation across recovery episodes, and are capable of large surges, which can in some cases generate rapid recoveries. Where recoveries lack buoyancy—which is the case for many post-conflict episodes—deeper political constraints appear to be at work, which may ultimately relate to the effectiveness of power sharing. Finally, to highlight the need for more effective policies and knowledge in this area, the paper shows that the human development costs of conflict are huge, and can persist through a full generation. Policy recommendations and pointers for future research form the conclusion.


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# Recovery from Conflict: Lessons of Success

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# 1 Introduction

The danger of internal conflict and its potential importance for the process of economic and social development hardly needs emphasis. The set of countries which are failing most chronically to meet the Millennium Development Goals (MDGs) consists disproportionately of conflict-affected states. This has been recognized by the international community and the analysis of, and initiatives for, fragile and conflict-affected states (FCS) have been growing rapidly. In addition to addressing drivers of conflict and fragility these initiatives, so is the hope, should improve economic development.

This report tries to understand why some countries fail to recover from conflict. In other words, our goal is to understand how conflict affects economic development beyond the conflict period. This is a difficult task. There is most likely a two-way relationship between conflict and development, which has been captured by the idea of a "conflict trap".[1] In addition, there are also factors that impact both conflict and development. Besley and Persson (2008), for example, argue both theoretically and empirically that the countries affected by internal conflicts are those that invest less in state capacity. In their analysis, low state capacity, conflict and lack of development are driven by factors like the abundance of natural resources and weak political institutions. The problem of policies for recovery is therefore not only to address different channels through which conflict impacts the economy in the long run but to address other elements which both inhibit development and lead to conflict. In short, the two-way relationship between conflict and development and the multitude of confounding factors such as state capacity make it impossible to develop policy without a clear idea of the mechanisms at play.

The aim of this report is not to re-invent the wheel. There is a lot of previous work in this area which has been summarized, for example, in the World Development Report 2011 (WDR). The report analyzes the spurs of violence in FCS and explains why recovery from conflict is hard to address. The core message of the WDR is that in order to break the vicious cycle of violence, FCS should strengthen legitimate institutions and restore citizen security, justice and job opportunities.

We add to this through the lens of the most recent wave of research in the area. The backbone to our analysis is the analysis of the contemporaneous effect of conflict which we present in section 2. We show, using standard panel fixed effect regressions, that economic growth during conflict incidence is significantly lower. This is true both at the country and ethnic group levels. Local disruptions of the economy in conflict seem to play an important role in this loss.

In section 3 we argue that this impact is also crucial to understand the lack of long term development in FCS. FCS grow as fast as other countries outside the conflict period, i.e. average growth is not significantly lower before a renewed outbreak of conflict. Peace stability is therefore a key factor in explaining a lack of long term

[1] This is the core idea that supports the World Bank Policy Research Report provided by Collier et al. (2003). The authors summarize the idea of conflict trap as a situation where *if development succeeds, countries become progressively safer from violent conflict, making subsequent development easier. While where development fails, countries are at high risk of becoming caught in a conflict trap in which war wrecks the economy and increases the risk of further war.*

development. These findings are somewhat contradictory to the idea of a conflict trap in which lack of growth and conflict reinforce each other. A good development policy in this context is policy that helps avoid violent conflict.

The remaining sections build on these findings. In sections 4 and 5 we argue that the humanitarian crisis triggered by civil war could impact the recovery period in ways that are not measurable in standard panel regressions. Section 4 discusses the close relationship between violence and refugees. In the average civil war year, around 500,000 persons leave their country. This is an important finding as it gives an idea of the scale of the humanitarian crisis entailed by mass violence. In section 5 we use the findings of a relatively new literature to argue that long term labor productivity and, hence, recovery might be strongly affected through permanent losses in human capital due to exposure to conflict.

In section 6 we argue that if countries are known to revert to conflict this will hinder investment. We know from enterprise surveys that firms react strongly to political instability. The expectation of future instability will therefore be a critical element in their decision making. We show in this context that political inclusion and returning refugees can predict inflows of foreign investment in the critical phase after conflict. A causal link is harder to establish here but it seems reasonable to assume that commitments to political inclusion might play a key role in attracting investment.

Section 7 turns towards a detailed discussion of political exclusion as a factor of instability. We focus on a channel that has been proposed by the recent literature in this area. In absence of strong political institutions, political exclusion matters because it leads to an unequal distribution of economic resources. We find quite striking evidence for this. In addition, we find that formal institutions matter in how political power is reflected in economic well-being. These findings are very much in line with the idea that political institutions help avoid conflict because they prevent a "winner takes all" dynamic in which loss of political power leads to economic decline.

Section 8 concludes. In this section we present additional conclusions that arise from our findings and the related literature.

## 2 Conflict and Economic Growth

Civil wars affect economic conditions in two stages: during conflict and during the post-war period. We start our analysis by exploring the first stage, i.e. the relationship between violence and economic activity during conflict. We then turn towards the recovery from conflict. It turns out that the contemporaneous cost of conflict is essential to comprehend the observed lack of long term development in FCS. This is because many FCS do not experience stable peace. Economic recovery happens on average but it does not last long enough. This is why understanding the contemporaneous effects of conflict is essential to understand long term development.

However, the direct economic cost of conflict incidence is not the only channel through which civil wars impact the development of the affected territories. In this report we explore two ways in which the detrimental effects of conflict spread to the recovery period: the humanitarian crisis triggered by wars (sections 4 and 5) and the contraction of investments due to instability (section 6). Both of these effects will force growth in the recovery period downwards. This is important as it indicates that the contemporaneous effects we turn towards now might be an underestimate.

The macroeconomic impact of civil wars has been studied extensively. Collier (1999) analyzes the effects of violence on GDP growth using cross-county data on internal wars which occurred between 1960 and 1992. He finds that civil conflict is correlated with a contemporaneous reduction of GDP per capita growth of 2.2 percent.[2] On a regional level, Abadie and Gardeazabal (2003) investigate the economic effect of the Basque terror campaign and estimate a reduction of the GDP per capita of approximately 10 percent.

There are several channels through which violence retards development. During conflict there is a direct cost caused by the destruction of resources that would have been employed in production. This directly impacts contemporaneous economic performance in the affected territory and can affect recovery as well. In addition, the economic activity of countries involved in civil conflicts is damaged indirectly by an increase in production costs and insecurity in transport. Fear spreads the economic costs of conflict. We will show, for example, that the number of people running away from violence is far larger than the number of fatalities. Apart from this very direct impact of fear there are several indirect effects including the deviation of resources towards armament or the faltering of investment due to a lack of perspective. All these ideas have been explored in the academic literature.[3]

In what follows we will take an agnostic view regarding the channel through which the contemporaneous effect of violence on growth arises. Instead, we will simply look at correlates at the country and ethnic group level. It is nonetheless an important question whether the effect of violence is coming from the local level or whether the main channel is the political and state crisis that coincides with civil war. We will turn towards this first.

[2] This effect is comparable to estimates we compute and discuss in this section.

[3] See Blattman and Miguel (2010) for a review of the literature. Mueller (2013) provides a recent review of the literature on the economic costs of violence.

## 2.1 The Per Capita Model of Violence

Assumptions regarding the main channels through which violence affects the economy have a direct impact on how the issue needs to be investigated empirically - even at the macro level. If local effects drive the economic costs of conflict then we expect countries with high per capita violence to suffer most economically. If macro effects are most important, the economy of the whole country will be affected by local violence. The economic impact of a fatality would then be independent of population size. In other words, if violence was only a sign of a national fragility which also affected the economy then we would expect that the same intensity of violence in India and Nicaragua have the same growth effect. At the same time, local and macro effects call for different policy responses. If effects are predominantly, local then the policy response should also have a strong local element.

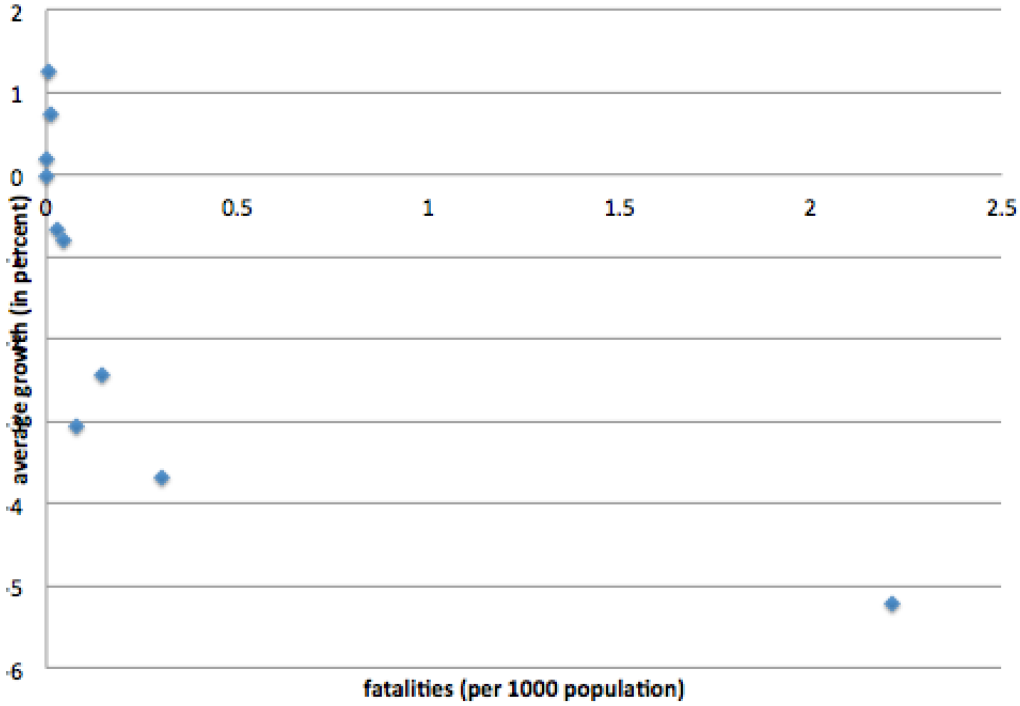
There are good reasons to believe that both channels are active. Ksoll et al. (2009), for example, provide an example of local effects in their study of election violence in Kenya. Their paper provides direct evidence for the increase in labor costs that occur due to local violence risk. In a recent working paper Amodio and Di Maio (2014) also provide evidence for similar increases in costs due to break-down in transportation links caused by violence locally. At the same time the disruption of transport will affect international trade. Blomberg and Hess (2006) argue that the presence of violence is equivalent to a 30 percent tariff on trade. Martin et al. (2008) estimate a reduction of trade with conflict of between 20 and 25 percent. In addtion, there are direct state level effects as well. Collier et al. (2003), for example, show that during civil war countries increase their military expenditure from 2.8 to 5 percent of GDP. Mueller (2016) argues that if this is the main channel in which violence affects the economy then it could be regarded as a pure public bad at the country level. All inhabitants of the country will suffer from the distortion in budgets regardless of their direct exposure to violence or the population size of the country. However, it can be shown that a per capita model of violence leads to a better description of the impact of conflict on the economy.

Figure 1 demonstrates that aggregate growth changes with the per capita intensity of violence. It displays growth averages for different levels of violence intensity controlling for country and year fixed effects. Violence intensity in the graph is displayed as the number of battle-related deaths from UCDP/PRIO per 1000 population.[4] Each observation in the figure contains 10 percent of all country/year observations which experienced some violence. The observation at the far right contains the years with the most intense violence. These countries experienced extreme levels of violence with more than 2 fatalities per 1000 population (0.002 fatalities per capita). In this group growth was 5.2 percentage points lower compared to average growth during peacetime in the same country. Growth in the three next most affected groups was about 3 percentage points lower, despite the fact that violence per capita in these groups was only around 0.2 fatalities per 1000 population. Below this intensity, the effect of violence on growth cannot be distinguished from zero with this data. A populous country like India, for example, can grow seemingly uninhibited by constant violence on its territory.

[4]For a data description see the appendix. The most intense civil war in this regard took place in the Lebanon which experienced more than 20 fatalities per 1000 population.

However, local economic effects could be just as strong.

Figure 1: Violence per Capita and Growth

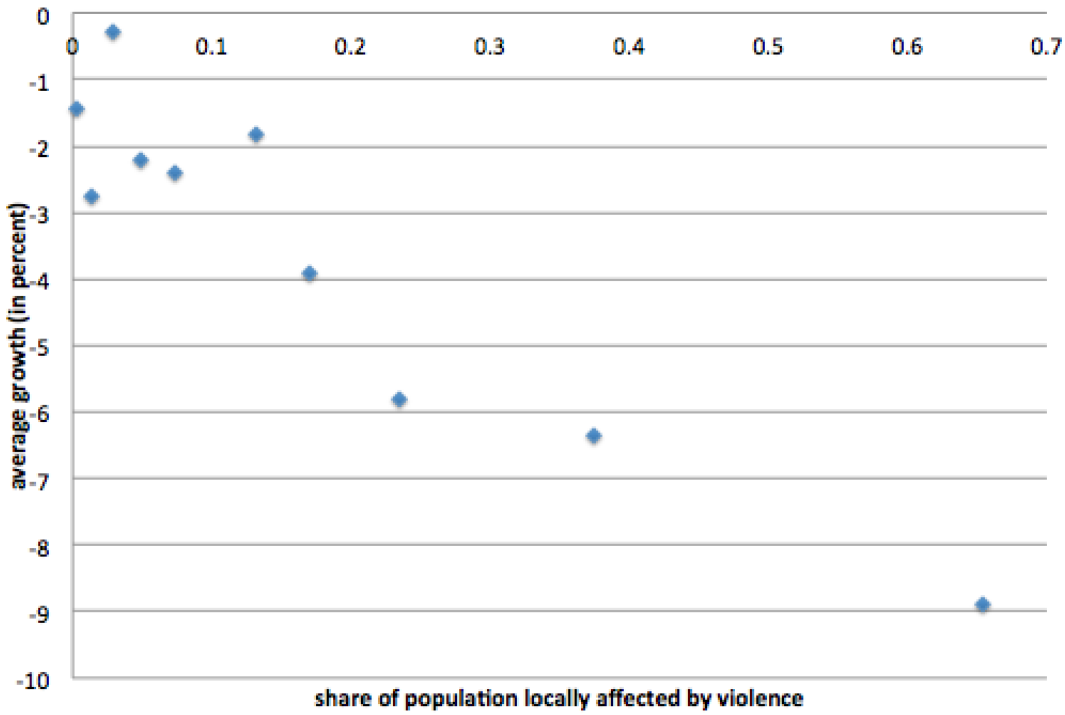



The main insight from Figure 1 is that per capita violence provides a good approximation of the impact of violence on growth which comes mainly from the local level. New data from the UCDP GED and G-Econ projects for the African continent allows us to provide even more direct evidence for this. Mueller (2016) shows, using this data, that the growth damage of violence can be traced to 100kmx100km cells. Each year with violence in such a cell reduces growth in the cell by more than 2 percentage points. High intensity violence of 100+ fatalities reduces growth by about 5.8 percentage points locally.[5] At this level, violence seems to be a pure public bad, i.e. the population size within the cell does not affect how much damage a fatality does to the economy. An easy way to understand the magnitudes involved here is to go back to the country level and to use the data on locally affected population from the micro data.

In Figure 2 we show the result. The x-axis displays the share of the population in a country affected by 100+ fatalities in their cell. Again, we generate ten groups defined

[5]These results are derived with cell and year fixed effects so that omitted variable bias is less likely to drive the result.

Figure 2: Locally Affected Population and Growth (African Countries)




by this measure and see how growth in these groups changes with increasing violence intensity. The group of the 10 percent most affected countries had over 65 percent of their population affected by violence in the same cell. Growth in these countries was in free fall - their economies grew by almost 9 percentage points less than average.

Figure 2 reveals that there is an almost linear relationship between the country growth rate and the share of population affected by violence locally. As the locally affected population increases, so does the damage to growth associated with conflict. This suggests that understanding the local impact of violence is therefore key to understanding its overall impact. An absolute count of fatalities is then a misleading measure of violence intensity. Throughout this report we will use this insight and approximate conflict intensity not through fatality counts but through fatality per capita counts.

## 2.2 Conflict Incidence and Economic Performance

As a first step into the analysis we run standard panel regressions of growth on conflict incidence. For this purpose we assemble three indicators of country-level economic performance during the post War World II period. The first and the second indices are GDP per capita growth computed using data provided respectively by Penn World Tables and World Bank Open Data. The third proxy for economic activity is given by per capita growth of night light, computed using satellite data from the National Oceanic and Atmospheric Administration (NOAA).[6] Night light data has the benefit

[6]Satellite data is available for a shorter time period, 1992-2013.

of being available on a yearly basis independently of the quality of local statistical offices and data gathering. While it comes with its own problems it can shed light on local economic activity where gathering of statistical data is incomplete.[7] This makes it a great fit for measuring growth in a context of civil conflict. Conflict incidence is measured through the number of battle-related deaths from UCDP/PRIO dataset.

We run the following regression for country $i$ at time $t$:

$$g_{it} = \beta \times incidence_{it} + \mu_i + \eta_t + \epsilon_{it} \tag{1}$$

where $g_{it}$ is economic performance per capita growth of country $i$ in year $t$, $incidence_{it}$ is conflict incidence, $\mu_i$ and $\eta_t$ are respectively country and year fixed effects.

A cross-country analysis as in equation (1) bears considerable potential for both reverse causality and omitted variable bias. Thus, a priori, a convincing causal link is hard to establish. However, here we expect the resulting bias to be small for two reasons. First, the cross-country literature has not found that negative, contemporaneous shocks to growth systematically lead to violence.[8] Second, we have run a large number of robustness checks by adding time trends or lagged growth to our specification and controlling for rainfall shocks directly.[9] The upshot from this is not only that results remain significant but also that the estimated coefficients barely change. This does not mean that a causal link from falling growth to conflict can be ruled out. But it is unlikely to drive the macro relationship we see in the data.

In order to further explore the relationship between violence and country-level output we run two specifications of the model described above. In the first model conflict in country $i$ at time $t$ is defined by any violence, i.e. if at least one battle related deaths occurs. In the second specification, conflict is defined by a higher threshold, by 0.008 deaths per 1000 population.[10]

We expect to get different results from the two specifications. From the analysis of Figure 1 we know that economic damage of civil war increases with the severity of conflict. The estimated impact from the second model should therefore be more acute.

Table 1, panel A and B, reports the results. Each column contains one of our measures for economic growth. In all specifications, conflict incidence correlates negatively with country-level economic performance. The estimated coefficients of conflict incidence are statistically significant and negative. We also find that the coefficients

[7]For a discussion see Henderson et al. (2012). In order to calculate light per capita we use population data that is provided by a World Bank dataset.

[8]The standard reference here is Miguel et al. (2004). Ciccone (2011) shows that high rainfall levels three years earlier seem to be best predictors of conflict in the reduced form. Miguel and Satyanath (2011) argue that lagged negative growth shocks are a predictor of conflict onset. In any case, there is no evidence from this literature that contemporaneous growth declines cause conflict. Bazzi and Blattman (2014) corroborate the view that the relationship between income shocks and conflict is not straightforward. They do not find evidence of an effect of price shocks on conflict onset and only weak evidence on incidence.

[9]Results from this are presented in the Appendix.

[10]We take the threshold from Mueller (2016) who shows that a threshold like this leads to a similar number of coded civil wars as the threshold of 1000 battle-related deaths often used in the conflict literature. In the context here, this is a conservative approach as it is not the threshold which yields the biggest difference between conflict and non-conflict countries.

reported in panel B are approximately twice as high (in absolute value) as the ones shown in panel A.

In Table 1 panel B we find that the estimated coefficients of the incidence variable reported in columns (1) and (2) are fairly similar. According to these results, civil conflict in country $i$ at time $t$ correlates negatively with GDP per capita growth which ranges from 2 to 3 percentage points. In column (3) we use night light as an economic indicator. The estimated effect of conflict on night light is statistically significant and is equal to -0.075. What does this number mean in terms of GDP per capita growth? One way to think about this is the estimates from Henderson et al. (2012) who argue that the relationship between GDP and light can be expressed fairly well in a constant elasticity model in which an increase of night light by 1 percent implies an increase of GDP of about 0.25 percent. If we apply this model to our result from Table 1 panel B, the conflict reduces GDP growth by almost 1.9 percentage points. This is strikingly similar to the 2 percent found in column (1).

Table 1: Conflict Incidence and Economic Performance: Country-level data

**Panel A**

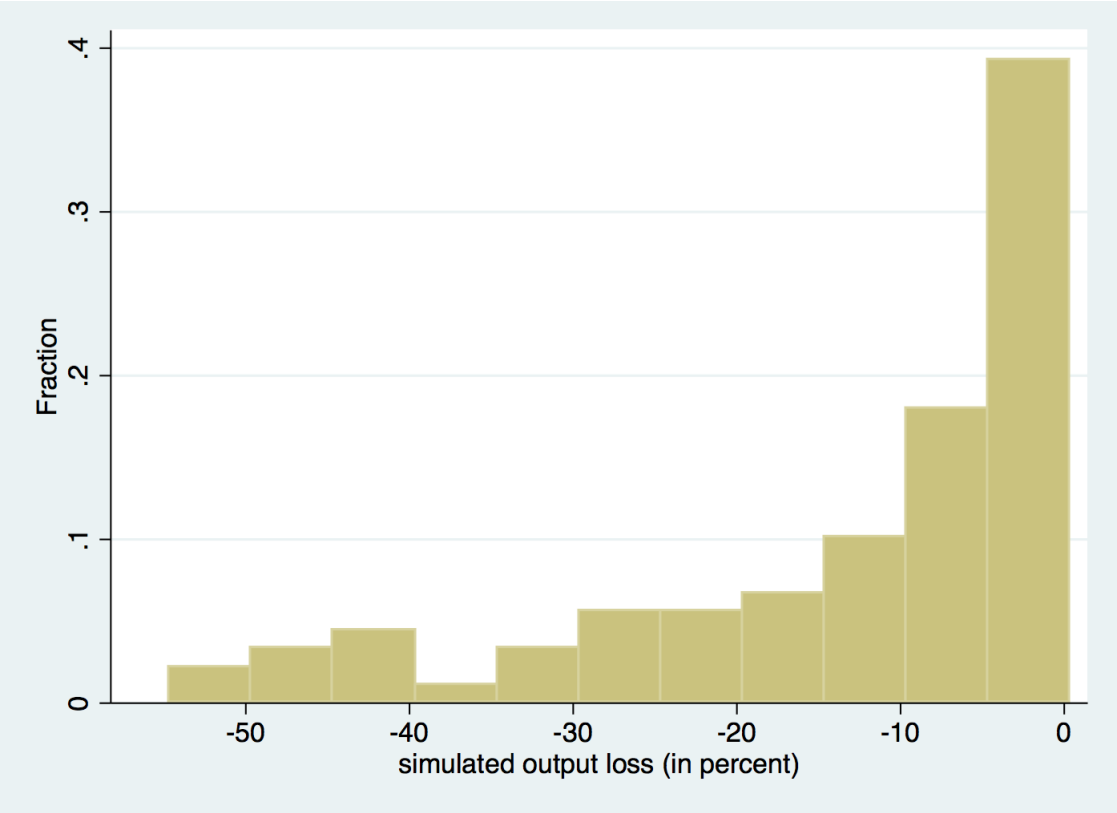
| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.011** | -0.016*** | -0.032* |
| | (0.004) | (0.004) | (0.016) |
| Observations | 8,004 | 8,076 | 3,924 |
| R-squared | 0.097 | 0.124 | 0.267 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

**Panel B**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.020*** | -0.029*** | -0.075*** |
| | (0.005) | (0.005) | (0.024) |
| Observations | 8,004 | 8,076 | 3,924 |
| R-squared | 0.100 | 0.130 | 0.268 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). Panel A uses as "conflict incidence" a dummy that takes a value of one if in country $i$ at time $t$ the number of battle related deaths is higher than 0. In Panel B "Conflict incidence" dummy takes a value of one if the number of battle deaths is above a threshold of 0.008 fatalities per 1000 population.

Figure 3: Estimated output loss in the period 1946-2010 (cross-country analysis)




Another way to understand the size of the decline in economic performance with conflict is to use the estimate of $\hat{\beta}$ in equation (1) to simulate how output in each country would have developed as a function of the number of years in which the country was affected by civil conflict. For the simulation we focus on the Post War Word II period, i.e. 1946-2014 and count the number of years each country has been affected by conflict. Call this number $T_i$. In Table 1 panel B column (1) we estimated that for each year a country is in conflict the GDP per capita will decrease by around 2 percentage points. From this we calculate the total loss for country $i$ as

$$OutputLoss_i = (1 + \hat{\beta})^{T_i} - 1$$

where $\hat{\beta}$ is the estimate of the panel regression (1). This simulation predicts output, had the country not experienced conflict but otherwise kept its growth path.

The findings are displayed in Figure 3. Around 70 percent of countries hit by conflict experienced only one or two years of high intensity violence which, according to our estimates, would have directly lowered their output by 2 to 4 percentage points. The remaining countries experienced conflict for a longer time period. Accordingly, the total output loss in these groups ranges from around 10 to over 50 percentage points. These are quite striking magnitudes.

In order to interpret these results it is important to keep in mind that our estimates are coming from a country fixed effects regression. In this way we are comparing growth in a country during conflict to other years in the same country without conflict. The hope is that factors which affect the country generally are captured by the fixed effect. However, our empirical strategy also implies that if conflict affects growth in the post-conflict period then $\hat{\beta}$ will provide an underestimate of the true economic costs of conflict. We will return to this point below.

## 2.3 Economic Impact at the Ethnic Group Level

As a final piece of evidence, we draw from economic, population and ethnic conflict data compiled in the GROWup dataset. This dataset provides satellite night light data as a proxy for economic activity at the ethnic group level. Conflict incidence in the GROWUp data is defined through more than 25 fatalities, i.e. a fairly low threshold, in ethnic conflicts. This dataset provides information on 502 ethnic groups for the period 1992 to 2013. We run a regression of the following form:

$$g_{it} = \theta_i + \eta_t + \beta \times incidence_{it} + \epsilon_{it}$$

where $g_{it}$ is night light per capita growth of group $i$ in year $t$, $incidence_{it}$ is conflict incidence, $\theta_i$ are a set of 502 group fixed effects and $\eta_t$ are year fixed effects. The fixed effects in this context control for group-specific growth trends in the data. Note that we do not use the per capita model in this specification as violence seems to be a pure public bad locally.

Table 2 reports the results. We find a negative and statistically significant effect of incidence on per capita light growth. Light per capita growth is reduced by around 7 percentage points in years a group is engaged in conflict. This effect is robust to controlling for lagged light growth in column (2). In columns (4) and (5) we show that these reductions in light per capita growth are composed by two factors; light growth falls dramatically and this is partially offset by a negative effect on population growth. However, column (3) also shows that there is some evidence for negative spill-overs from conflict at the country level. Conflict in other groups in the same country lower light per capita growth for other groups in the same country by 0.7 percentage points.

Again we interpret these estimates in terms of GDP growth following Henderson et al. (2012). If a decrease of night light by 1 percent implies a decrease of GDP of about 0.25 percent, then our result from column (1) in Table 2 can be translated into a reduction of GDP growth of about 1.8 percentage points.

Overall this suggests that local effects are important and comparatively large in comparison to spill-overs. This is important for our discussion as they define the challenge that the country faces in the recovery from civil wars. Local effects of violence imply that civil conflict leaves a legacy of regional economic divergence. Another way to understand the size of this relative decline is to perform a second simulation of the GDP loss that focuses on group-level economic performance, following the same steps described above. Figure 4 displays the distribution of conflict lengths in the sample for which we also have the night light per capita data (years 1992-2012). We estimated

that, for each year a group is in conflict, GDP per capita in its homeland will decrease by 1.8 percentage points. As a result, around one half of the ethnic groups is estimated to have a loss of output that ranges between 10 and 30 percent. If this is not recovered it will lead to regional imbalances on the country level and could amplify conflict.

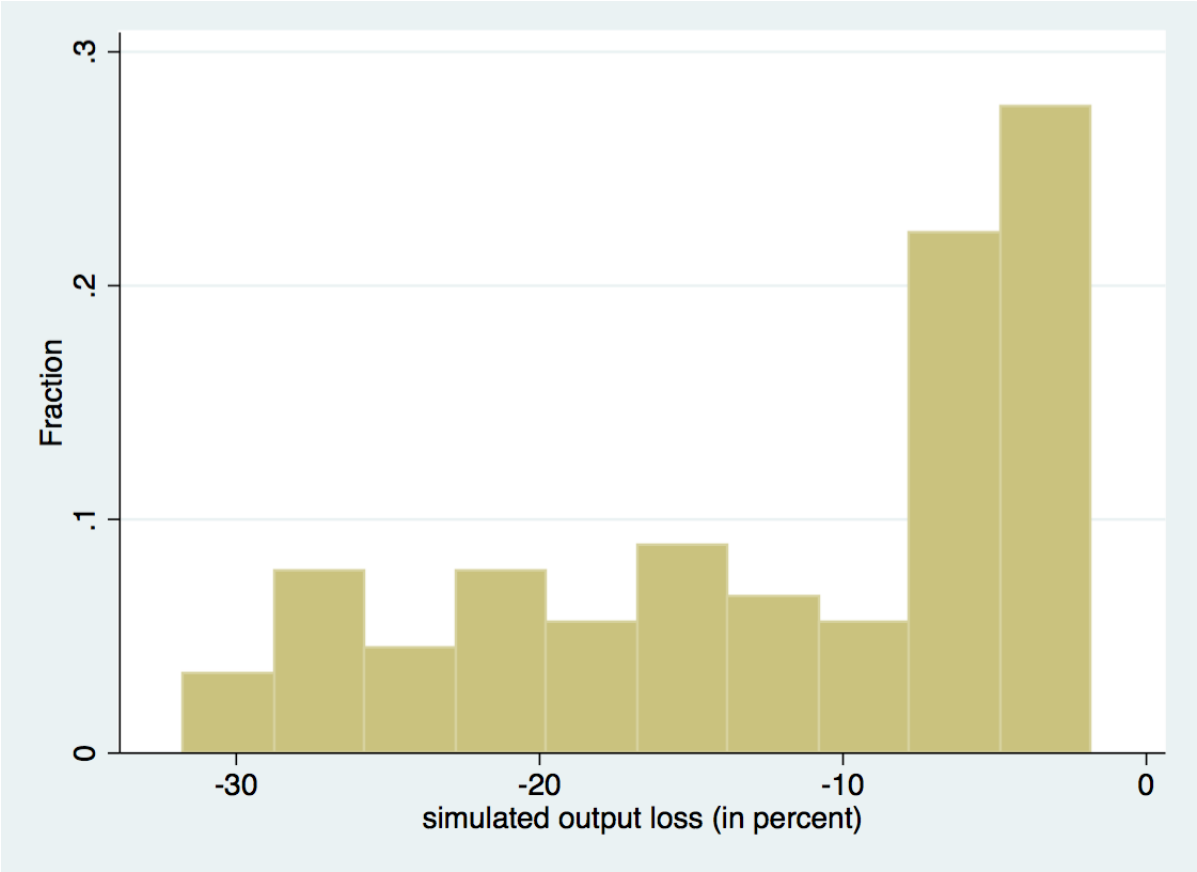
In summary, we have shown, using panel data regressions, that economic growth decreases dramatically when a country or region experiences violence. As the economic effects of violence are predominantly local this implies that conflict might lead to or amplify regional imbalances.

Table 2: Conflict Incidence and Country Economic Performance: Ethnic-level data

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | light per capita growth | light per capita growth | light per capita growth | light growth | population growth |
| Conflict Incidence | -0.074** | -0.069** | -0.063** | -0.077*** | -0.003** |
| | (0.029) | (0.034) | (0.031) | (0.029) | (0.001) |
| N. of groups in conflict in the country | | | -0.0078* | | |
| | | | (0.00424) | | |
| Group FE | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES |
| Lagged growth control | NO | YES | NO | NO | NO |
| Observations | 7,949 | 7,425 | 7,949 | 7,949 | 7,949 |
| R-squared | 0.268 | 0.473 | 0.268 | 0.267 | 0.045 |
| Number of groups | 502 | 499 | 502 | 502 | 502 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Errors in column (3) are clustered at the country level. We use data over the period 1992-2013. Unit of observation are ethnic groups. "Light per capita growth" and "Population growth" are the log difference of the variable to the previous year. "Conflict incidence" is a dummy defined through more than 25 fatalities in ethnic conflicts. "Number of group in conflict" counts the number of ethnic group involved in conflict episodes in a given country during year $t$.

Figure 4: Estimated Output Loss in the period 1992-2012 (ethnic group level)



# 3 Recovery from Conflict

The analysis of the contemporaneous effects of conflicts provided in the previous section is crucial to understand the long term effects that violence has on post-war economic development. In the present section, by analyzing the economic conditions of FCS during the recovery period, we will learn that the key element needed for long term development is peace stability. In fact, during recovery FCS grow as fast as other countries; while, as we learned in the previous section, during conflict period growth is substantially hampered. Therefore the occurrence of renewed outbreak of conflict, that disrupts the economic conditions of the affected countries and break the recovery process, is the crucial element on which depends the success or the failure of the post-conflict development. In this section we analyze all the aspects of recovery that, combined with the evidence provided in the previous section, allow us to draw these conclusions.

According to the WDR 2011, one of the most problematic challenges that FCS face is the occurrence of repeated cycles of violence. On the one hand, they have a high probability of relapsing into conflict within relatively short time periods. On the other hand political violence might evolve into other forms of violence, such as organized crime. This transformation can hinder the recovery and the economic and social development of the areas of interest.

From the previous section, we know that countries and ethnic groups with conflict experience dramatic economic decline. However, this only leads to a *conflict trap* if 1) the weakened economy does not recover and 2) if the absence of a recovery leads to renewed conflict.

Surprisingly, perhaps, there is quite a lot of controversy in the academic literature regarding the long-term effects of violence on economic activity.[11] There are both theoretical and empirical reasons for this controversy. Theoretically, classic growth models like the Solow model assume that countries converge to their own steady state and that countries face decreasing returns to human and physical capital. An exogenous destruction of production factors through war will therefore result in a more rapid accumulation of physical or human capital after the conflict.[12] In its plainest form, this model predicts that countries will grow much quicker after a negative exogenous shock. The long term economic costs of conflict are therefore less severe.

Empirically there is some support for this hypothesis from external wars. In an early contribution, Organski and Kugler (1977) show that output of winners and, more surprisingly, also losers of the World Wars caught up with non-affected countries after 15 to 20 years. This is supported by additional evidence from the micro level. Davis and Weinstein (2002) show that Japanese cities that were bombed had completely recovered their relative size 20 years after the US bombing in World War II. In a similar vein, Brakman et al. (2004) find that bombing of Germany had a significant but temporary impact on postwar city growth in West Germany but a sustained impact in East Germany. Miguel and Roland (2011) study a whole battery of indicators from

[11] For an excellent review see Serneels and Verpoorten (2015).

[12] Collier (1999), for example, uses this logic to argue that longer civil wars will be followed by stronger recoveries because the capital stock has adjusted downwards.

poverty rates, population densities to schooling in Vietnam 25 years after the US bombing campaign and find that the local economy had recovered.

Of course, the time dimension involved in these findings is in itself not a reason for general optimism in a post-conflict situation. The evidence on quicker gains is more mixed - mostly because there is no agreed methodology for how to study recoveries. Cerra and Saxena (2008) use a method used to study crisis episodes more generally to study civil wars. In this method the start of an episode is coded as 1 and the impact over time is studied using forwards and lags. They find that, while output falls steeply immediately after conflict (6 percent on average), the economy recovers relatively soon afterwards. Mueller (2012) shows that this, fairly optimistic, view is due to a coding error. Economies contract by more than 18 percent in a civil war and this is not recovered within a decade. However, the problem here is partly one of the correct coding of recoveries which we will turn to next.

## 3.1 Empirical Evidence for Economic Recoveries

A simple way to check what happens in the recovery period at the macro level is to construct a set of dummies that capture the years after violence ends directly. These can then be used in a regression like the following

$$g_{ct} = \theta_c + \eta_t + violence_{ct} + recovery^1_{ct} + recovery^2_{ct} + ... + \epsilon_{ct}$$

where $g_{ct}$ is the growth rate of country $c$ in year $t$ and $recovery^1_{ct}$ is a dummy that takes the value of 1 in the first year after violence ends. Table 3 shows the result using 5 recovery dummies. The result is a striking bounce of the growth rate by about 2.5 to 3 percentage points right after violence ends but otherwise little evidence for prolonged periods of extraordinary growth. This implies that, in the majority of cases, the output lost is not completely recovered in the recovery period. In addition, the similar results for light per capita growth suggest that the lack of an extraordinary growth period at the country level is not due to measurement issues. Regressions with levels of GDP per capita on the left hand side confirm this lack of a recovery.

This is, however, not a contradiction to the findings of strong recoveries in levels of output within country in the long run. As a check we use the data on night light at the ethnic group level as it offers a unique opportunity to study the dynamics of local economic activity on a yearly basis.

We run the following regression for group $i$ in year $t$ in country $c$:

$$y_{cit} = \theta_{ct} + incidence_{cit} + recovery_{cit} + \epsilon_{cit}$$

where $y_{cit}$ is the log of per capita night light, $incidence_{cit}$ is conflict incidence and $recovery_{cit}$ are a set of recovery dummies that capture the period after conflict, all at ethnic group level. The key addition in this regression is a set of of country/year fixed effects $\theta_{ct}$ which capture average economic activity at the country level in every year. In this way we compare how the level of economic activity in group $i$ compares to other groups in the same country $c$ during and after conflict. This mimics the existing

Table 3: Recovery Growth After Conflict: Country Level

| | (1) GDP p.c. growth (PWT) | (2) GDP p.c. growth (World Bank) | (3) Light p.c. growth |
|---|---|---|---|
| conflict incidence | -1.645*** | -2.653*** | -7.648*** |
| | (0.478) | (0.601) | (2.787) |
| first year after violence | 2.993** | 2.468** | 3.175 |
| | (1.364) | (1.156) | (4.497) |
| second year after violence | -0.949 | -0.115 | -1.013 |
| | (0.946) | (0.741) | (2.279) |
| third year after violence | 0.400 | -0.213 | -3.014 |
| | (0.735) | (0.660) | (2.210) |
| fourth year after violence | 0.519 | -0.344 | -0.855 |
| | (0.555) | (0.576) | (2.622) |
| fifth year after violence | 0.273 | 0.116 | -3.911 |
| | (0.638) | (0.488) | (2.751) |
| country fixed effects | YES | YES | YES |
| year fixed effects | YES | YES | YES |
| Observations | 8,004 | 8,076 | 3,924 |
| R-squared | 0.053 | 0.067 | 0.235 |
| Number of country | 186 | 192 | 187 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). "Conflict incidence" is a dummy that takes a value of 1 if the number of battle related deaths is above a threshold of 0.008 per 1000 population. Dummies $1^{st}$ year after conflict, $2^{nd}$ year after conflict, etc. take a value of 1 in the $x^{th}$ year after the war ends.

literature on within-country comparisons fairly well. Results are in columns (1) and (2) of Table 4. We find that groups in conflict receive about 30 percent less light per capita than other groups in the same country and year.[13] Interpreted with the log-linear-relationship between light and GDP this is equivalent to a difference of about 8 percent in GDP per capita. During the time after conflict this difference to other groups narrows. To show this we introduce two sets of dummies. First we introduce a dummy for the first five years after conflict and a second dummy for the remaining years. We see that light per capita is 20 percent less in groups that come out of conflict and remains significantly lower after five years. Second, we look at the first ten years and find, again, that groups coming out of conflict receive 20 percent less light per capita. However, now in the remaining recovery years the difference is only 5 percent and is not statistically significant. Overall this suggests some catch up a decade after conflict.[14]

In summary, there are a series of papers which show a complete recovery following wars of the most affected regions within 15 to 25 years. We find evidence that this result generalizes to a large cross-section of countries. Recovery at the country level appears to be much weaker. We find little evidence for extraordinary growth periods after civil war. This is, however, not the final word regarding recovery. There is a

[13]We find very similar coefficients when including group and year fixed effects instead of country/year effects. Groups are not just receiving less light compared to other groups in the same country but also compared to themselves in other years.

[14]To check this from a group perspective we also ran growth regressions with dummies indicating recovery years and find that light per capita grows significantly after conflict. See Appendix Table A5.

Table 4: Recovery Growth After Conflict: Ethnic Group Level

| | (1) ln(light per capita) | (2) ln(light per capita) | (3) ln(light per capita) |
|---|---|---|---|
| Conflict Incidence | -0.311*** | -0.312*** | -0.312*** |
| | (0.054) | (0.054) | (0.054) |
| First 5 Years | -0.202*** | | |
| | (0.064) | | |
| Remaining 5 Years | -0.130** | | |
| | (0.060) | | |
| First 10 Years | | -0.200*** | -0.136** |
| | | (0.051) | (0.061) |
| Remaining 10 Years | | -0.052 | -0.054 |
| | | (0.087) | (0.087) |
| Fragile Peace | | | -0.190** |
| | | | (0.095) |
| Country/Year FE | YES | YES | YES |
| Group FE | NO | NO | NO |
| Observations | 8,517 | 8,517 | 8,517 |
| R-squared | 0.847 | 0.847 | 0.847 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Unit of observation are ethnic groups. The dependent variable is the natural logarithm of night light per capita. Night light data are gathered form the National Oceanic and Atmospheric Administration (NOAA). "Conflict incidence" is a dummy defined through more than 25 fatalities in ethnic conflicts. Dummies "First 5 years" and "First 10 years" take a value of 1 if the ethnic group is experiencing respectively one of the first five or ten years after the conflict episode it was involved in. Dummies "Remaining 5 years" and "Remaining 10 years" control the remaining years with no war. "Fragile peace" is a dummy that equals one if is experiencing one of the first five year of recovery but will relapse into conflict within the next five years.

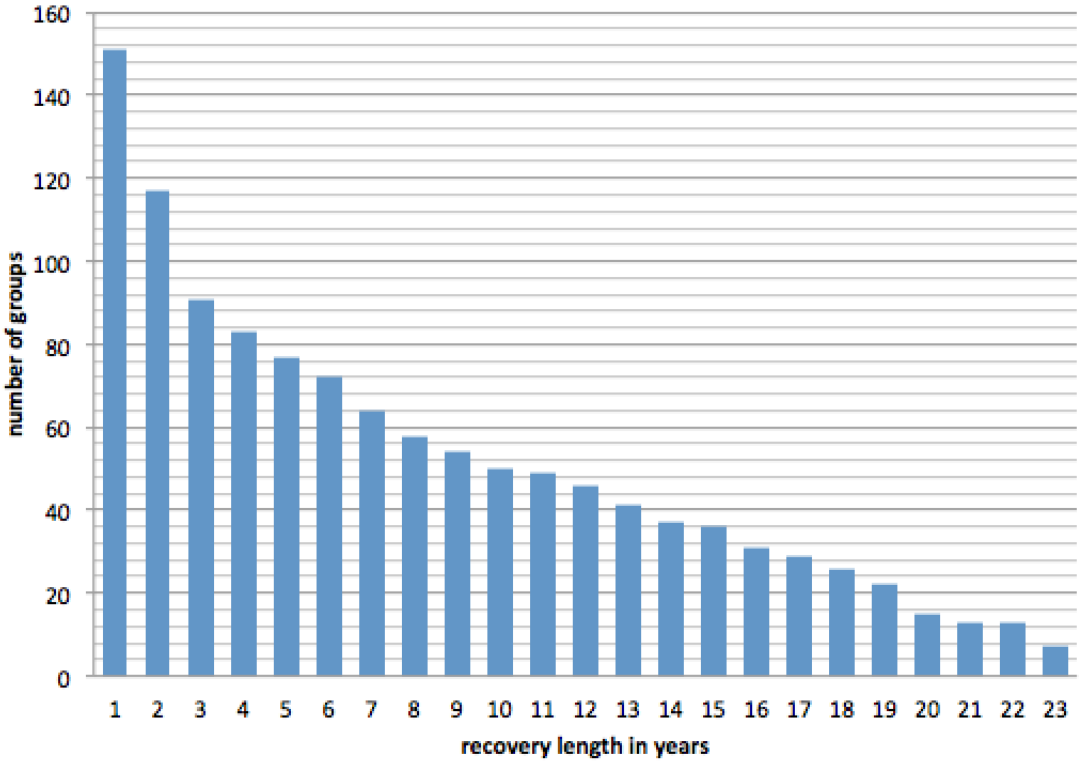
selection problem built into the idea of studying long periods of recovery which we turn to next.

## 3.2 Unstable Peace as a Central Selection Problem

In the analysis of recovery provided above we focus on groups, countries or regions that did not face the resurgence of violence. This is obvious in the existing literature which is focused on countries like Japan, Germany and Vietnam. It is also true for the data we use as the dummies in our regressions condition on the length of the recovery period. In column (1) of Table 4 this implies, for example, that we focus on the recoveries that have lasted longer than 5 years. Economic performance in the other cases cannot be studied because they have entered renewed conflict. This selection problem means we are drawing conclusions from countries that have managed to stay peaceful.

This is a serious concern as most groups do not stay in peace. In Figure 5 we show the distribution of recovery lengths at the group level. The figure shows that 151

Figure 5: Length of Recovery Period on the Ethnic Group Level




groups enter recovery at some stage but only 117 of those recoveries last a second year, only about half of the sample stayed in peace for longer than 5 years and less than a third stayed in peace for longer than 10 years. And, indeed, we find that fragile peace is anticipated by a lack of development at the group level. In column (3) of Table 4 we add a dummy which takes the value of 1 if the group is in the first ten years of recovery but is known to fall back to conflict within the next nine years. In this way we separate groups that experience longer recovery lengths from those that go back to conflict. The first thing to note is that the coefficient on the first ten years of recovery, which now covers only groups that keep recovering, rises a little from -20 percentage points to -13 percentage points. In addition, the dummy that shows the difference between groups that recover from those that do not is -13 percent. Groups that fall back into conflict are relatively poor during the recovery period.

In order to understand what is going on we need to take a step back. In Table 5, Panels A and B we show simple average growth rates of GDP per capita for countries that experienced conflict and compare it to countries that did not. We see that average growth rates are slightly lower in the conflict sample. This sort of evidence has often been used to argue for a conflict trap. We then split up the growth rates in conflict countries into years in which the countries experienced violence (defined by more than more than 0.008 battle deaths per 1000 population) and years in which they did not. This allows us to look at both levels of growth across peaceful and fragile countries and at differences within violent and peaceful periods.

Table 5: Growth and Conflict in the Cross-section

**Panel A: Country Level, Penn World Table GDP per Capita Growth**

| sample | number of observations | mean | standard deviation | Min | Max |
|---|---|---|---|---|---|
| peaceful countries | 4535 | 2.69 | 6.35 | -42.36 | 115.43 |
| civil war countries | 4107 | 1.73 | 7.69 | -64.61 | 90.03 |
| civil war countries during peace | 3163 | 2.03 | 7.17 | -39.11 | 90.03 |
| violent countries during violence | 673 | 0.29 | 10.19 | -64.61 | 52.07 |

**Panel B: Country Level, Worldbank GDP per Capita Growth**

| sample | number of observations | mean | standard deviation | Min | Max |
|---|---|---|---|---|---|
| peaceful countries | 4244 | 2.52 | 5.53 | -45.83 | 142.07 |
| civil war countries | 3832 | 1.78 | 7.64 | -65.03 | 182.36 |
| civil war countries during peace | 3224 | 2.14 | 7.20 | -34.96 | 182.36 |
| violent countries during violence | 608 | -0.14 | 9.44 | -65.03 | 50.03 |

**Panel C: Country Level, Night Light per Capita Growth**

| sample | number of observations | mean | standard deviation | Min | Max |
|---|---|---|---|---|---|
| peaceful countries | 2055 | 6.01 | 44.40 | -76.12 | 1641.00 |
| civil war countries | 1869 | 6.04 | 30.97 | -63.94 | 564.25 |
| civil war countries during peace | 1558 | 6.62 | 32.30 | -54.99 | 564.25 |
| violent countries during violence | 311 | 3.13 | 23.01 | -63.94 | 116.33 |

"Conflict" is defined as a year in which the number of battle related deaths is higher than 0.008 per 1000 population. GDP per capita growth rate are computed using data from Penn World Tables and World Bank Dataset. Growth rate of night light per capita are computed using data from National Oceanic and Atmospheric Administration (NOAA).

There is a very consistent pattern that arises from the three data series. The average growth rate in civil war countries during peace gets very close to the average growth rate of peaceful countries. However, these countries grow much more slowly during violent periods. In other words, on average they would not fall behind economically if their recovery period was long enough. In this view it is not recovery in itself that is the problem but the fact that it does not last.

Since this is a core finding we propose several additional ways to illustrate the importance of fragility. First, we develop a measure for the fragility of peace. One, extremely simple, way is to calculate:

$$persistence\ of\ peace\ = \frac{peace\ years - war\ starts}{peace\ years} \tag{2}$$

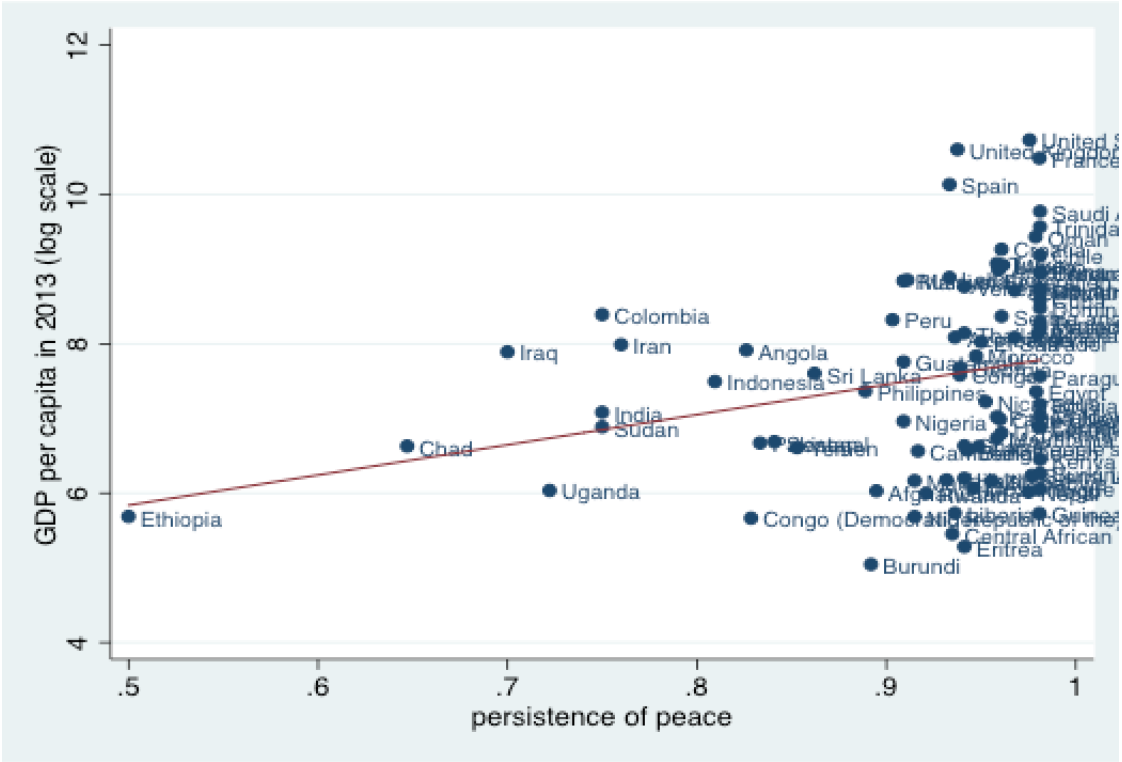
which provides a number between 0 and 1. This number indicates the likelihood that a year of peace is followed by another year of peace. If this number is high it means that peace in the country was very persistent. Low persistence is an indicator of fragility. Since the calculation of persistence relies on rare events (the start of an armed conflict) it will vary considerably regarding to the sample period and definition of conflict used. In order to include as much violence as possible we use data on all internal PRIO armed conflicts since the second world war to calculate the persistence of peace. Figure 6 shows how persistence of peace, defined this way, relates to GDP per capita now. There is a striking positive relationship. Countries with a high persistence of peace have a much higher GDP per capita than countries with low persistences. This relationship holds despite the fact that we excluded a set of relatively rich countries which never experienced armed conflict.

We use the persistence of peace to explore country variation in GDP per capita. We run a regression, not reported here, of log GDP per capita in 2013 on the persistence measure.[15] The persistence of peace and log GDP are strongly associated: the estimated coefficient of the persistence measure is around 4 and it is statistically significant. A coefficient of 4 suggests that an increase of persistence of 10 percentage points is associated with an increase of GDP by about 50 percent. To have a practical example of what this relationship means, consider the case of Ethiopia from Figure 6. This country has a persistence of peace of only 0.5. If we interpret the results here as causal, the change from 0.5 to a value close to 1 would be associated with 6-fold increase of GDP per capita.

A stable recovery is so important for economic development that this fact can even be made visible in a much simpler way. Figure 7 Panel (a) shows GDP per capita in 2014 and the conflict history of countries which have experienced at least one year of violence. The y-axis captures the log of GDP per capita in 2014 while the x-axis shows the number of years a country has experienced high intensity violence as defined by our

[15] We exclude countries that never had an armed conflict. We also exclude countries with less than 1 million inhabitants.

Figure 6: GDP per capita in 2013 and Peace Stability at the Country Level




per capita measure (0.08 battle related deaths per 1000 population). This relationship is not statistically significant. Figure 7 Panel (b) shows the GDP per capita (in logs) in 2014 while the x-axis reports the number of years a country has been in recovery after the last episode of violence.[16] The relationship between these two variables is positive and statistically significant.[17] When we use log of night light as proxy of country level economic activity, the relationship between economic performance and length of the last recovery is similar to the one displayed in Figure 7 Panel (b).[18]

We can also give a closer examination of the relationship between peace stability and growth by looking at every single country which experienced conflict.[19] We do so in Table A8 in the Appendix, where we report the average growth rates of GDP during four periods: conflict years; peace years; first five recovery years and fragile peace years. A country is in a fragile peace year if it is experiencing one of the first five years of recovery but will relapse into conflict within the next five years. On average, the growth rate of GDP per capita during the recovery period which is followed by

[16]Where again violence is defined as a year with at least 0.08 battle related death per 1000 population.

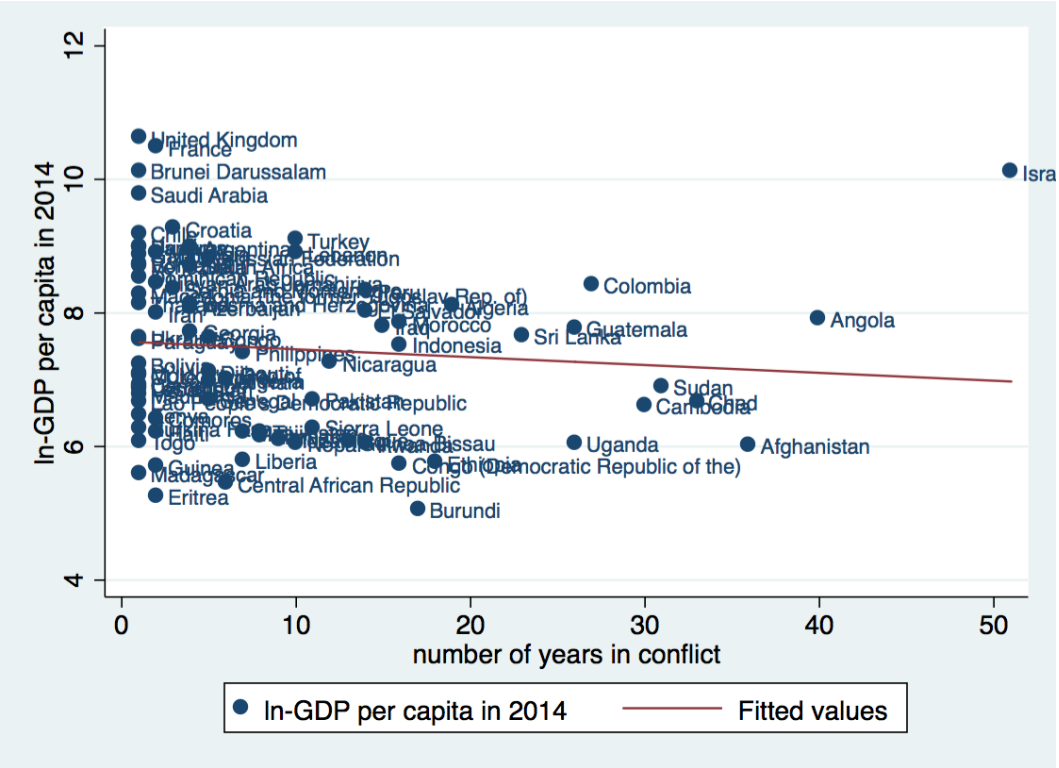
[17]The estimated coefficient of the linear relationship between GDP and years of recovery since the last war equals 0.033 and it is statistically significant at 1% level.

[18]The figure is reported in the Appendix.

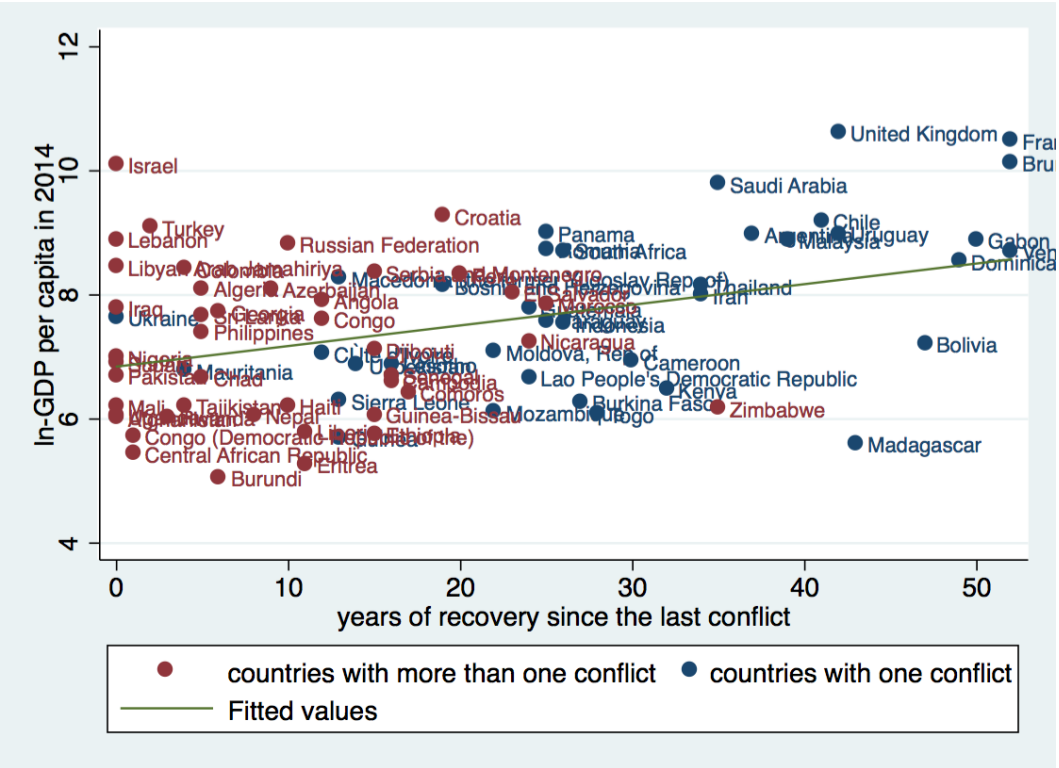
[19]In this case civil conflict occurs if there is at least one battle related death in country $c$ during year $t$. We restrict the sample to those countries which experienced at least 5 years of conflict during the period 1960-2010.

Figure 7: Conflict and Economic Performance

(a) GDP in 2014 and Conflict History




(b) GDP in 2014 and Last Recovery Length



conflict is not lower than the average growth rate during recovery.

These findings indicate that a conflict trap only exists in the sense that renewed outbreaks of conflict are preventing persistent recovery. We do not find any evidence for the idea that a lack of growth post conflict reinforces the trap.[20] Countries might not grow extraordinarily after conflict, but they grow normally and, if anything, quicker before another conflict onset.

A productive avenue for studying the lack of long term development of FCS is therefore the study of fragility not recovery in isolation. One piece of evidence in this direction comes from the fact that ethnic groups in fragile peace do not seem to catch up with average wealth levels in the country. We will return to this after a discussion of two mechanisms by which conflict could affect long run development.

[20]This does not mean, however, that cross-country differences in GDP levels might not reinforce fragility. Figure 7 Panel B illustrates this by showing that countries with the lowest GDP per capita belong to the "more than one conflict" group.

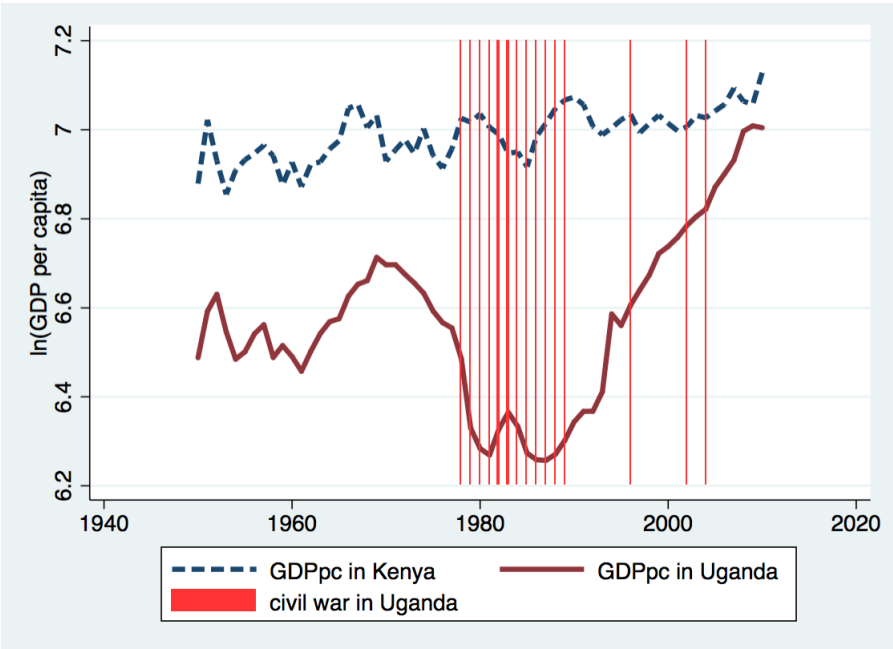
**Example of a Recovery: Uganda**

In Figure 8, we compare the economic performance, measured by GDP per capita (in logs), of two neighboring African countries: Kenya and Uganda. While Kenya has experienced only one year of violence, Uganda has been hit by civil conflict during several years. These episodes of violence are highlighted in the figure as red bars. While the output of Kenya looks stable over time, we notice a severe drop of the Ugandan GDP during civil war.

However, Uganda also experienced a sharp increase in GDP starting from the first years after the conflict period. This recovery has not been inhibited markedly by other episodes of violence that occurred afterwards. The level of the GDP per capita in year 2010 exceeds its level before conflict by a significant margin. Also, Uganda has not slipped back into mass violence. Within a decade of peace the Ugandan economy has grown by more than 70 percent.

Uganda has achieved remarkable growth while at the same time concentrating power institutionally and informally. Besley and Mueller (2015b) show that, indeed, the lack of strong institutional checks on the executive can imply both extraordinary strong growth and a higher likelihood of disasters. In this view, institutional checks are not a guarantor for high growth but instead a safeguard against disastrous economic contractions. Violent conflict is a possible trigger for the latter. That said, data from GROWup shows a significant drop in the share of the population that the government excludes from power after 1985 and another decrease in political discrimination after 2005. This gives some hope that future political conflicts in the country can be resolved without violence.

Figure 8: Comparison Between Uganda and Kenya



# 4 Internal Conflicts and Refugees

A particularly serious aspect of internal conflicts is the human suffering they generate. This is not only those who are killed or injured in conflict but the large number of people who are forced to leave their homes. The issue of refugees has received particular attention in Western media in recent years as refugee flows from Northern Africa, the Middle East and Afghanistan are increasingly reaching Europe. These refugee streams are linked to a severe humanitarian crisis with considerable funding needs for international donors and heavy strains on host countries.[21] The current refugee crisis, however, is in no way unique. Civil war has always been closely linked to humanitarian crisis and refugee streams are one way to capture this.

In this section we provide a cross-country analysis aimed at investigating how the stock of refugees evolves when a civil conflict hits a country. In the analysis we will focus entirely on showing changes in the stock of refugees across time to illustrate the dimensions involved. We will base our later analysis on these population movements.

We exploit country-level data gathered from several sources. Data about refugees is provided by the UNHCR Population Statistics Database. The database provides information about UNHCR's populations of concern from the year 1951 up to 2014. This database lists seven categories: refugees, asylum-seekers, returned refugees, internally displaced persons (IDPs), returned IDPs, stateless persons and others of concern. For each group the database provides yearly information about their composition by location of residence and origin. We exploit only the data on "refugees".[22] In particular, we are interested in the annual stock of refugees for each country of residence, i.e. how many people with refugees status have left their home country each year. We focus on these numbers as they appear to be the most comparable across time and countries. However, this is likely to capture only the tip of the iceberg in some cases. The number of IDPs is extremely high in some instances but cannot be captured with the same level of confidence as refugees generally.[23]

Cross-country data about conflict is provided by the UCDP/PRIO. As for the index of country-level economic activity, we use again information provided by the Penn World Table and World Bank databases.

As mentioned above, our aim is to explore the dynamics of refugees during conflicts. In other words, we attempt to answer several questions. Do people run away from their home country when a conflict breaks out? Does the seriousness of the conflict matter in this decision? In which phase of the conflict do they leave? When do refugees come back to their home country?

In order to answer these questions, we look at the impact of conflict incidence on

[21] We will return to these issues in the policy section.

[22] According to the UNHCR definition, this category includes "individuals recognized under the 1951 Convention relating to the Status of Refugees; its 1967 Protocol; the 1969 OAU Convention Governing the Specific Aspects of Refugee Problems in Africa; those recognized in accordance with the UNHCR Statute; individuals granted complementary forms of protection; or those enjoying temporary protection; and people in a refugee-like situation".

[23] The UNHCR Global Trends Report 2014 provides evidence that confirms this hypothesis. About 59.5 million people were forcibly displaced worldwide by the end of year 2014. Among them, 19.5 million were refugees and 38.2 million were IDPs.

the yearly stock of refugees. More formally, we run the following regression for country $i$ in year $t$:

$$refugees_{it} = incidence_{it} + phase_{it} + \delta_i + \delta_t \ + \ \epsilon_{it}$$

Our outcome of interest is $refugees_{it}$, which is the stock of refugees. The variable $incidence_{it}$ is conflict incidence. In one specification of the model we use the definition from the PRIO dataset of at least 25 battle related deaths caused by an internal conflict. In the other specifications we use a more stringent definition of internal conflict which requires at least 1000 battle related fatalities.[24]

Variable $phase_{it}$ is a vector of dummies we use to show the dynamics in the stock of refugees in different phases of the conflict. In one specification we control for the *year before the conflict starts* and *first year of conflict*. Then, we include in succession dummies for the *last year of conflict* and *recovery years* up to the tenth year of recovery.

Finally, $\delta_i$ and $\delta_t$ are respectively country and year fixed effects: the former control for time invariant country-specific impact on the change of the number of refugees, while year fixed effects capture the average state-invariant influence of each year $t$ on $refugees_{it}$.

Table 6 reports the results. In column (1) conflict incidence coincides with the PRIO definition of at least 25 battle related deaths, i.e variable *25+ battle deaths*. The estimated coefficient indicates that during conflicts more than 144,000 people leave their home country on average. This average rises markedly when we use the more stringent definition of at least 1000 battle related fatalities as conflict incidence variable. In fact, in column (2) the estimated effect of conflict incidence on $refugees_{it}$ more than doubles. Note that in this specification we include the dummy *25-1000 battle deaths*[25] in order to check whether people have an incentive to leave their country when some violence occurred, but the situation has not escalated into a conflict with more than 1000 deaths in a given year. We notice that during these years a significant number of people leave the country, but this average is very low if compared with the average stock of refugees during the violent years with more than 1000 deaths. We therefore focus on dynamics in war period, using as "conflict incidence" the tighter definition of at least 1000 battle related deaths.

Column (3) of table 6 adds to the previous model the controls for the initial phase of the conflict, namely *year before the war* and *first year of the war*. Compared to column (2), the estimated coefficient of the variable *1000+ battle related deaths* increases. On average, the stock of refugees during conflict is more than 487,000 people. But in the first year of conflict the average stock is by 384,851 lower, i.e. only 20 percent of the almost 500,000 refugees leave their country during the first year of conflict.[26] Column (3) also tells us that there is there is no significant departure during the year before the conflict. This suggests that forced displacement of people takes off with the start of violence but not before.

[24]Note, that we now switched to counts of fatalities as our outcome variable is also in absolutes. Weighting both sides by population would not change the results.

[25]This dummy takes value one if in country $i$ during year $y$ the registered battle related deaths are between 25 and 1000.

[26]The number of 20 percent is obtained by computing (487,968-384,851)/487,968.

Column (4) includes controls for the last phase of the conflict, namely the *last year of conflict* and *first year of recovery*. Compared to the specification of column (3), the coefficient of conflict incidence does not change significantly. During the last year of the civil wars, around one half of refugees are still out of their home country (the stock of refugees is approximately 210,000 on average). This amount decreases during the first year of recovery. In fact, the estimated coefficient of the variable *first year of recovery* indicates that, on average, only about 20 percent of the refugees have not come back into their home country in the first recovery year. Columns (5) and (6) add controls for additional years of recovery, i.e. the two specifications includes dummies respectively for five and ten years of recovery. We can observe that the stock of refugees decreases with longer recoveries. The estimated coefficient of the variable *10+ recovery years* in column (6) suggests that around 70,000 refugees who left their home country during civil war have not returned 10 years after the war has ended. These are about 15 percent of all people who leave.[27]

We have also performed the same analysis excluding Afghanistan. Given that the yearly stock of refugees registered in Afghanistan is significantly higher than the stock of any other country, we want to exclude the hypothesis that Afghanistan is driving the results we described above. We compute the equivalent of Table 6, that we do not report here. Although coefficients are smaller in size, our main conclusions are left unchanged. The results are also robust to controlling for famine episodes as shown in Table A7 in the appendix.[28]

These results allow three conclusions. First, our analysis suggests that violence leads to a severe humanitarian crisis which forces people to leave their country of origin. Second, residents seem to migrate as refugees when the internal conflict breaks out, in other words, they do not leave the country before the conflict has actually started. After conflict, the large majority of refugees returns very quickly, i.e. within a year after the end of conflict, 4 out 5 refugees have returned. However, the average return flow then slows markedly and ten years after the conflict ended 3 out of 20 refugees remain outside their country of origin.

[27]The number of 15 percent is obtained by computing 73,528/466,418.

[28]Famine and conflict are closely associated in the sense that the risk of a famine more than doubles with conflict. In addition, famine leads to substantial flight. We discuss details in the Appendix.

Table 6: Impact of Civil Conflict on the Stock of Refugees: Country-level Analysis

| VARIABLES | (1) Refugees | (2) Refugees | (3) Refugees | (4) Refugees | (5) Refugees | (6) Refugees |
|---|---|---|---|---|---|---|
| 25+ battle deaths | 143,789*** | | | | | |
| | (11,963) | | | | | |
| 1000+ battle deaths | | 337,498*** | 487,968*** | 424,115*** | 463,596*** | 466,418*** |
| | | (31,004) | (45,835) | (41,811) | (43,736) | (43,790) |
| 25-1000 battle deaths | | 66,436*** | 66,873*** | 57,496*** | 41,575*** | 38,586*** |
| | | (7,018) | (7,118) | (6,759) | (6,406) | (6,419) |
| year before war | | | -5,246 | | | |
| | | | (20,679) | | | |
| first year of war | | | -384,851*** | | | |
| | | | (52,151) | | | |
| last year of war | | | | -259,338*** | -256,393*** | -255,965*** |
| | | | | (53,001) | (52,639) | (52,618) |
| $1^{st}$ recovery year | | | | 103,277*** | 156,552*** | 161,668*** |
| | | | | (27,380) | (28,291) | (28,274) |
| $2^{nd}$ recovery year | | | | | 123,404*** | 128,224*** |
| | | | | | (20,514) | (20,493) |
| $3^{rd}$ recovery year | | | | | 113,294*** | 117,929*** |
| | | | | | (20,348) | (20,339) |
| $4^{th}$ recovery year | | | | | 102,866*** | 107,279*** |
| | | | | | (19,990) | (19,991) |
| $5^{th}$ recovery year on | | | | | 76,984*** | |
| | | | | | (8,624) | |
| 5+ recovery years | | | | | | 116,326*** |
| | | | | | | (22,593) |
| $6^{th}$ recovery year | | | | | | 109,938*** |
| | | | | | | (23,690) |
| $7^{th}$ recovery year | | | | | | 109,283*** |
| | | | | | | (24,808) |
| $8^{th}$ recovery year | | | | | | 88,871*** |
| | | | | | | (15,669) |
| $9^{th}$ recovery year | | | | | | 84,465*** |
| | | | | | | (16,136) |
| 10+ recovery years | | | | | | 73,528*** |
| | | | | | | (8,684) |
| Observations | 12,784 | 12,784 | 12,763 | 12,784 | 12,784 | 12,784 |
| R-squared | 0.435 | 0.467 | 0.489 | 0.478 | 0.483 | 0.485 |
| Country FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Country-level data on yearly stocks of refugees are gathered from UNCHR database. In column (1) "25+ battle deaths" is the definition from PRIO dataset of at least 25 battle related deaths in a given year. In column (2)-(6) internal conflict, i.e. variable "1000+ battle deaths", is defined as a year in which violence involves more than 1000 fatalities. Variable "25-1000 battle deaths" controls for years in which fightings cause a number of deaths between 25 and 1000. "Year before war" is a dummy that controls for years with no violence or violence that involves between 25 and 1000 fatalities, followed by a year with at least 1000 battle related deaths. Variables "first year of war" and "last year of war" are dummies that take a value of one during the first and the last year of civil war respectively. Dummies "$1^{st}$ recovery year", "$2^{nd}$ recovery year", etc. take a value of 1 in the $x^{th}$ year after the war ends.

# 5 Conflict and Long Term Productivity

As argued in section 3 there is no distinct recovery growth period. Countries seem to return to their average growth level in the absence of conflict. While this is good news in the sense that there is positive growth on average, it is also bad news in the sense that there seems to be, on average, no adjustment back to steady state once conflict is over. This is in contradiction with findings on the quick rebuilding of capital stock found in the literature. However, Barro and Sala-i Martin (2004) predict that the speed of recovery depends on the type of capital that is destroyed, with a slower recovery if human capital is destroyed, because it has a higher adjustment cost.

This is particularly relevant as there is evidence in the literature that exposure to conflict during early childhood or adolescence has a huge and persistent direct effect on health, education and productivity of children. Leon (2012) shows that the average person exposed to political violence in Peru before school-age accumulated 0.31 fewer years of schooling upon reaching adulthood. This suggests that children who were affected by violence during early childhood suffer irreversible effects. Duflo (2001) finds that the effect of a huge school construction program in Indonesia on school attainment in the long-run is of a slightly smaller magnitude. Each school constructed per 1,000 children led to an increase of 0.12 to 0.19 years of education. This means that if one wanted to mitigate the long run effect of conflict in Peru on schooling by opening more schools, one would need to build more than 8000 new schools.[29] This is a big adjustment cost which supports the claims in Barro and Sala-i Martin (2004).

Akresh et al. (2012) also identify the long term impact of exposure to conflict during the Nigerian civil war in the late 1960s on health. They find that individuals who where exposed to this conflict in their childhood or adolescence have a reduced stature. Adult stature is a latent stock measure of health and variation in height induced by childhood or adolescence environment has been documented in the literature as a good predictor of longevity, education and earnings (Behrman and Rosenzweig, 2004; Case and Paxton, 2008; Strauss and Thomas, 1998). The impact of pre-adulthood exposure to conflict on height identified in Akresh et al. (2012) can therefore be viewed as a permanent labor productivity loss for the exposed individuals.

Note, that these findings come from micro level regressions using cohort fixed effects and therefore face less concerns about reverse causality and omitted variable bias. Below we will take these findings at face value and analyze the implications for the economy, i.e. at the macro level. From a macro perspective, we can infer that in the years following onset of intense conflicts, cohorts of treated individuals (those exposed to the conflict before adulthood) will progressively enter into the labor force in substitution of older workers. This will progressively increase the aggregate productivity loss of the country and thus hinder recovery. Therefore, the full consequence of a given conflict occurs when all the exposed children have entered the labor force. This effect vanishes completely only when none of them belongs to the labor force anymore.

The existing empirical evidence suggests that this view is not entirely unrealistic. Ichino and Winter-Ebmer (2004) for instance estimate the long run educational cost of

[29] The total population of age less than 14 is 8 million in Peru.

World War II. They find that individuals who were 10 years old during the conflict, or were more directly involved through their parents in Germany and Austria, received less education than individuals with comparable characteristics in Switzerland and Sweden. Affected individuals also experience a sizable earnings loss, some 40 years later. Blattman and Annan (2010) use the exogeneity in child military conscriptions into rebel groups in Uganda to provide evidence of widespread and persistent economic and educational impact of conflicts. They find that schooling falls by nearly a year, that skilled employment halves, and that earnings drop by a third among child soldiers as compared to the control group.

Conflicts affect aggregate productivity directly through physical health but also indirectly through mental health. Being exposed to violence leads to post-traumatic stress disorder (PTSD) which affects both adults and children. These mental illnesses are characterized by hyper-vigilance, flashbacks and nightmares. Individuals who are exposed to a traumatic event have an increased likelihood of poor self-reported health, morbidity (as indicated by physical exam or laboratory tests), utilization of medical services, and mortality. Li et al. (2011) show that people who experience PTSD are at much higher risk of developing other health problems, including diabetes, heart ailments, depression and addiction. Sibai et al. (1989) study civilians exposed to the civil war in Lebanon and find that patients with severe coronary artery disease had more war-related stress than did either patients with normal arteriographic findings or hospital visitors. Using female Vietnam veterans, Wolfe et al. (1994) show that war-zone exposure and PTSD are associated with self-reports of poor health and numerous physical problems. PTSD in early childhood also makes people more vulnerable in later life (Economist, ed, 2015).

Rosen and Fields (1988) were among the first to attempt to explain how PTSD could adversely affect physical health. The potential channels can be divided in 3 groups: biological, psychological and behavioral channels (Friedman and Schnurr, 1995). From a biological point of view, PTSD can modify cardiovascular reactivity, disturb sleep physiology, enhance thyroid function, etc. The psychological channels include depression, hostility, and poor coping capacity. The behavioral ones include poor health habits such as smoking and drinking.[30]

For the rest of this section, we treat all these effects as a persistent loss in human capital due to pre-adulthood exposure to conflicts. We first propose a measure of aggregate health loss in labor productivity based on pre-adulthood exposure of workers to conflict, that uses the existing micro estimates and combines them with the labor force composition (which share of labor force experienced violence at a given age before adulthood). We also explore how this measure correlates with output in a macro framework and whether it is consistent with micro level estimates of returns to health in the literature.

[30] A review of how PTSD could adversely affect physical health can be found in Friedman and Schnurr (1995).

## 5.1 A Measure of Aggregate Productivity Loss

In this section we will use the results from the micro level regressions to construct a measure of aggregate productivity loss. The micro findings have the advantage that identification is stronger than in cross-country studies. Their disadvantage is that outside validity is not ensured. We therefore first take the micro findings at face value and analyze the implications for the macro economy in the long run. We then show that the cross-country data is consistent with a productivity loss of a size implied by the micro studies.

Akresh et al. (2012) provide estimates of the height loss in cm due to exposure to the Nigerian civil war for different age groups between 0 and 16. Females exposed to the conflict between age 0 and 3 lost on average of 0.75 cm in height as compared to non exposed females. This loss increased to 1.09 cm for the age group 4-6, 2.16 cm for the age group 7-12 and finally 4.53 cm for the age group 13-16. Identification relies on a difference-in-differences model in which authors interact an indicator for war-exposed ethnicity (the Igbos) with a continuous cohort-based measure of months of exposure to the war. Based on these relatively well identified micro level estimates, we propose an estimate of a long run macro-level productivity loss due to conflict.

Suppose workers enter the labor force at age 17 with differences in productivity levels due to previous exposure to conflict. Once in the labor market, productivity dynamics are the same for all cohorts, and workers exit the labor force at age 60. We assume that if there is a conflict at time $t$ in country $i$, all children of age $j$ suffer a loss that depends on the intensity of the conflict.

We follow three alternative approaches to measure conflict intensity and map it into a persistent productivity loss. First, we proxy conflict intensity by the per capita number of battle related deaths. To mitigate the effect of very intense conflicts on our loss measure, we prefer, however, to categorize conflicts in two groups: intense versus non intense conflicts. We use a dummy that takes a value of 1 if the number of per capita battle related deaths exceeded the level suffered in Nigeria during the Biafra civil war.[31] In addition, we use data on the stock of refugees provided by the UNHCR. We believe that flows of refugees are a good proxy for civilian suffering during conflict. We consider therefore a dummy that takes a value of 1 if there is a net outflow of refugees in a given year. However, we are aware that a big challenge of this proxy is that some conflicts by nature cause more internal movements or no movements at all because people are just not able to flee the affected areas.

The loss for a worker of age $h$ at year $t$ in country $i$ is calculated as:

$$loss_{hti} = \Sigma_{j=0}^{16} f_{ji}(I_{t-h+j,i}) \tag{3}$$

and the total loss in country i at year t is given by

$$Loss_{ti} = \Sigma_{h=17}^{60} S_{hti} * loss_{hti}$$

where $S_{hti}$ is the share of workers of age $h$ in total labor force, $I_{t-h+j,i}$ is a measure of

[31] We discuss the effect of a change in the threshold below.

conflict intensity in country $i$, $h-j$ years earlier. $f_{ji}$ is a country specific functional form that maps conflict intensity to a loss for children of age $j$ that are exposed to the conflict in a given year.

To take this measure to the data using either the second or the third proxy for conflict intensity, we assume that all intense conflicts have an effect similar to what was observed during the Biafra civil war and less intense conflicts do not have any persistent effect. When considering the case with battle deaths per capita, we assume the following:

- $f_{ji}$ is linear, which means that if per capita conflict intensity doubles within the same country, the loss of each cohort of exposed children will also double;
- A given conflict intensity will create the same loss on children of age $j$ in all countries $f_{ji} = f_j \ \forall \ i$

These assumptions allow us to rewrite equation (3) as

$$loss_{hti} = \Sigma_{j=0}^{16} \frac{Loss_{j,biafra}}{I_{biafra}} * I_{t-h+j,i} \tag{4}$$

Where $Loss_{j,biafra}$ is the cm loss per year of exposure for children exposed to the Biafra civil war at age $j$ compared to non exposed children. We compute this loss using estimates in Akresh et al. (2012). We first compute a per month cm loss by dividing the total cm loss for each age group by the average number of months of exposure. This per month cm loss is then multiplied by 12 to have the equivalent height loss per year. We finally attribute the age group loss to each age cohort within a given group.

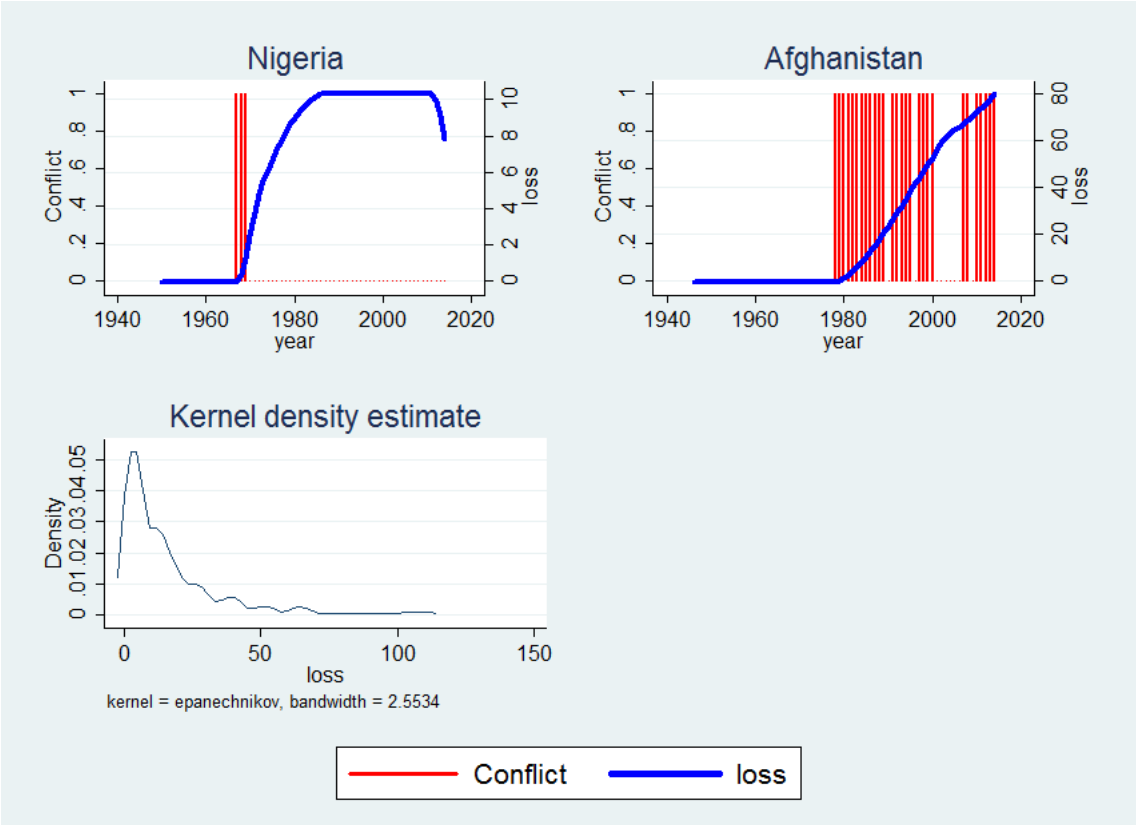
To obtain a direct measure of the productivity loss from the aggregate measure of cm loss, we use micro evidence that estimate the equivalent gain in labor productivity for an extra cm of height, holding education constant. Well (2007) provides different estimates for this parameter based on different studies. According to this paper, an extra cm increases labor productivity by 3 to 7 percent [32]. Multiplying this coefficient with our measure of cm loss yields therefore a measure of productivity loss in percent.

These estimates are however obtained holding constant factor prices and technology in a partial equilibrium framework. General equilibrium interactions can offset or even reverse partial equilibrium conclusions. As argued in Acemoglu (2010), one potential reason for such effect is the imperfect substitution between factors and diminishing returns leading to a change in factor productivities and prices. It is therefore not clear whether these findings would aggregate up after a massive loss of productivity in the population.

The first two graphs in Figure 9 depict our productivity loss measure for 2 specific cases of countries using 7 percent per cm as the marginal effect of height on productivity.

[32] Based on estimates of the impact of fetal growth on height, schooling and wages derived from cohorts of twins in Behrman and Rosenzweig (2004) and Black et al. (2007), Well (2007) finds a coefficient of 0.034 for the return to an extra cm of height on log wages. Average wage represents labor productivity according to classic production theory. Well (2007) also found a coefficient of 0.07 when using estimates based on UK long run historical data.

Figure 9: Conflict and Aggregate Productivity Loss




The measure of conflict intensity used here is the categorization "intensive" versus "non intensive" based on the number of battle related deaths per 1000 inhabitants. Loss measures are given in percentage points of productivity loss.

The first graph reports the pattern of productivity loss and conflict history in Nigeria. The 3 consecutive peaks in battle deaths per capita in late 1960s represent the Biafra war. The aggregate productivity loss estimate coming from the micro evidence increases for the first 16 years following the conflict, as each year a less productive cohort substitutes the oldest cohort in the labor force. The full impact of the conflict on productivity is reached when all the treated cohorts have moved in the labor force and we only observe entry of cohorts that were born after the Biafra conflict. At this point, we estimate that the country would have lost around 10 percent of its potential aggregate labor productivity. More than 40 years after the conflict, the oldest treated cohort exits the labor force and is replaced by a non treated cohort. This leads to a decrease in the aggregate productivity loss. The productivity loss will only completely vanish 60 years after the end of the war, when all the treated cohorts have moved out of the labor force.

In the second graph, we show the case of Afghanistan which has suffered repeated spells of very intense violence since the world war. We estimate that the country would have lost up to 80 percent of the productivity of its labor force due to its conflict history.

The third graph represents the kernel density of our productivity loss measure for observations with positive loss, which represents around 11 percent of country-year observations in our dataset. It gives an idea of the distribution of this variable across country-years. The distribution shows a long and thin upper tail driven by countries with repetitive and highly intense conflict history like Afghanistan or the Lebanon. The average productivity loss is 15 percent in this sample and one fourth of all country-year observations are associated with losses of more than 20 percent of productivity. Even if these estimates were drastically overestimated they indicate that the long run impact of mass violence through this channel could be substantial.

## 5.2 Macro Evidence

In this subsection, we investigate the correlation between the aggregate loss measure and output. For this purpose, we use the height loss measure from the previous subsection to estimate the marginal effect of an extra cm loss on log GDP. This serves two objectives. First, we explore whether the micro evidence can be used as a conduit for understanding the long-term damage to output from conflict. Second, we check whether the aggregate loss in output that we get is consistent with the micro estimates of marginal economic return to health. It is important to stress that the purpose of the estimation is therefore not to identify the effect of the health loss on productivity and output but to gauge whether our previous discussion is realistic.

The theoretical framework we use for this exercise can be described as follows. Assume output is given by

$$Y_{ti} = (\Gamma_{ti} L_{ti})^{\alpha} * K_{ti}^{1-\alpha} \tag{5}$$

where $\Gamma_{ti}$ is the aggregate labor productivity level in country $i$ at time $t$, $L_{ti}$ and $K_{ti}$ are respectively labor and capital. Productivity is given by:

$$\Gamma_{ti} = \exp\Big( \sum_{h=16}^{60} S_{hti} * (a_{hti} - \theta loss_{hti}) + \beta I_{ti} + \eta_t + \delta_i + t\mu_i \Big) \tag{6}$$

where $a_{hti}$ is the baseline productivity level in the absence of conflict of workers of age $h$ at year $t$ in country $i$. $I_{ti}$ is the number of battle related deaths per capita, $\eta_t$ and $\delta_i$ are respectively year and country dummies. $t\mu_i$ is a country specific time trend. Assuming a small open economy in which capital stock adjusts endogenously, equation (5) gives:

$$Y_{ti}^{*} = \Big(\frac{1-\alpha}{r}\Big)^{\frac{1}{\alpha}} * \Gamma_{ti} L_{ti}. \tag{7}$$

Taking logs and substituting equation (6) into equation (7) gives:

$$log(Y_{ti}^{*}) = \frac{1}{\alpha} log\Big(\frac{1-\alpha}{r}\Big) + \sum_{h=16}^{60} S_{hti} * a_{hti} - \theta Loss_{ti} + \beta I_{ti} + \eta_t + \delta_i + t\mu_i + log(L_{ti}) \tag{8}$$

After including the relevant controls, we can estimate $\theta$ from equation (8). It gives us the effect of an extra cm loss on log GDP which is also the marginal effect

on aggregate productivity because of the log-linear relationship between these two outcomes. This coefficient should be comparable to micro estimates of a return to health proxied by a cm height which ranges between 0.033 and 0.073 in the literature.

We take equation (8) to the data after assuming $a_{hti} = a_{ti} = a_i$ since we do not have reliable data on cohort specific differences in productivity. The term $\sum_{h=16}^{60} S_{hti} * a_{hti}$ will therefore be captured by country fixed effects. [33]. The regression we run to get an estimate of $\theta$ in our main specification is

$$log(Y_{ti}^*) = -\theta Loss_{ti} + \gamma log(P_{ti}) + \beta I_{ti} + \delta_i + \eta_t + t\mu_i + \epsilon_{ti}$$

where $P_{ti}$ is the total population size that we use instead of total labor force $L_{ti}$, $\delta_i$ and $\eta_t$ are country and year fixed effects and $t\mu_i$ is a country-specific time trend. We also introduce subregion-year and continent-year fixed effects as robustness check.

Table 7 reports the results. Column (1) shows a specification with country and year fixed effects. We add country specific time trends to the previous specification in Column (2) and this is our main specification. Column(3) allows for non-linearity in the way our height loss measure is correlated to log GDP by adding a square term. Columns (4) and (5) are including respectively continent-year and subregion-year fixed effects to the main specification. In other words, $\theta$ in this specification captures whether our loss measure captures differences in log GDP compared to other countries in the same region.

All first five columns use a dummy that equals 1 if the number of battle deaths per 1000 inhabitants exceeds 0.2 to construct the loss measure.[34] Columns (6) and (7) show results of our main specification using respectively the number of battle deaths per capita and outflows of refugees as measures of conflict intensity.

The negative correlation between log GDP and aggregate loss in stature is significant and robust to all these specifications. Column (2) suggests that an extra cm aggregate height loss is associated with a 10.3 percentage point decrease in output. Columns (6) and (7) suggest a decrease in the output level of respectively 7.9 and 3.4 percentage points. All these numbers are remarkably consistent with the micro-level estimates in Well (2007).[35] The loss measures depicted in 9 are not unrealistic.

The results presented in this section imply that mass violence triggers long term losses for countries which pull down the economy decades after the event. The magnitudes involved are quite large in some cases as we have shown in the previous section. Even a 10 percent loss of output triggered by a persistent health loss (equivalent to

[33]We could also assume a constant growth in labor productivity which would be captured by the parameter $t\mu_i$

[34]The number of battle deaths per 1000 inhabitants in Nigeria was 0.27 in the first year of Biafra conflict. We pick a threshold that will consider this level of intensity as a treatment and that will be high enough to have a persistent effect. Around 15 percent of all conflict/years are above this threshold. We move this threshold for robustness check and our results hold, up to a threshold of 0.08 per 1000 inhabitants, which corresponds to 24% of conflict-years observations. It vanishes for lower thresholds.

[35]This is also in line with Bloom et al. (2005) who find that the estimated macroeconomic effects of health on economic growth are positive, and not significantly different from the microeconomic estimates.

1 cm) implies a total output loss several times as large as yearly GDP. Identification in the macro regressions is obviously not water-tight. But the existence of the micro findings and the fact that their aggregation leads to very similar estimates at the macro level indicates that loss of health in childhood could be an important channel through which violence affects the economy far beyond the short-term.

Figure 10 gives an illustration of what output in Nigeria would be if it did not experience the Biafra war. According to our estimates, GDP would have shifted from 1.406 billion USD to 1.527 billions USD on average. This is a difference of over 120 million US dollars a year for several decades. In this light, avoiding a humanitarian crisis is therefore a long-term investment in labor productivity.

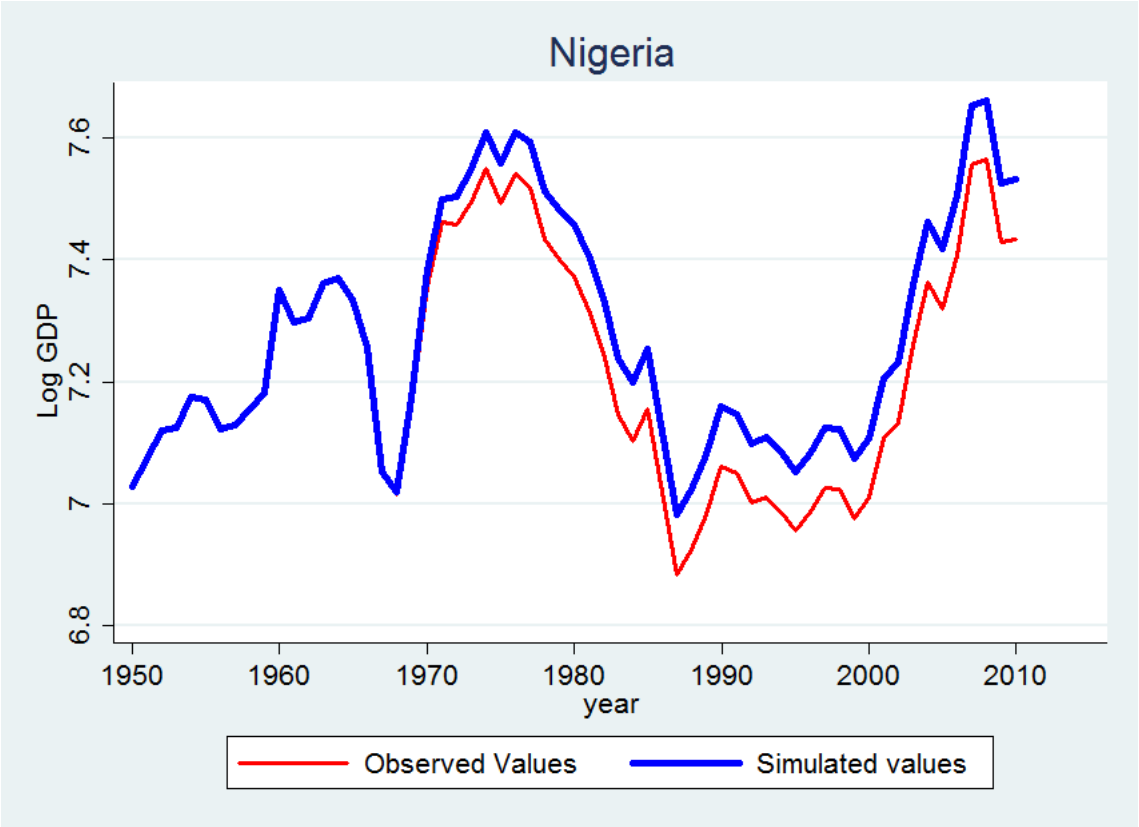
One way of mitigating/preventing such persistent losses after a conflict is to make sure that people who are fleeing violence have access to health and education for their children. Improving living conditions of both internal and external refugees will therefore support recovery.

Table 7: Output and Conflict Related Aggregate Loss in Human Capital

| | (1) log GDP | (2) log GDP | (3) log GDP | (4) log GDP | (5) log GDP | (6) log GDP | (7) log GDP |
|---|---|---|---|---|---|---|---|
| loss | -0.053*** | -0.103*** | -0.108*** | -0.092*** | -0.090*** | | |
| | (0.006) | (0.011) | (0.018) | (0.012) | (0.014) | | |
| sq-loss | | | 0.001 | | | | |
| | | | (0.002) | | | | |
| loss using per capita battle deaths | | | | | | -0.079*** | |
| | | | | | | (0.024) | |
| battle deaths per capita | | | | | | -0.040*** | |
| | | | | | | (0.009) | |
| loss using refugees | | | | | | | -0.034*** |
| | | | | | | | (0.004) |
| outflow of refugees | | | | | | | -0.012** |
| | | | | | | | (0.005) |
| Intense conflict | -0.218*** | -0.130*** | -0.130*** | -0.125*** | -0.119*** | | |
| | (0.030) | (0.022) | (0.022) | (0.022) | (0.024) | | |
| Any conflict | -0.004 | -0.030*** | -0.030*** | -0.027*** | -0.030*** | -0.033*** | -0.035*** |
| | (0.013) | (0.009) | (0.009) | (0.009) | (0.010) | (0.009) | (0.009) |
| log population | -0.518*** | 0.197** | 0.194** | 0.193** | 0.154 | 0.173** | 0.155* |
| | (0.029) | (0.081) | (0.081) | (0.084) | (0.094) | (0.084) | (0.083) |
| Country FE | YES | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | NO | NO | YES | YES |
| Country Specific Time Trend | NO | YES | YES | YES | YES | YES | YES |
| Subregion X Year FE | NO | NO | NO | NO | YES | NO | NO |
| Continent X Year FE | NO | NO | NO | YES | NO | NO | NO |
| Observations | 6,962 | 6,962 | 6,962 | 6,962 | 6,962 | 6,962 | 6,962 |
| R-squared | 0.967 | 0.991 | 0.991 | 0.991 | 0.992 | 0.991 | 0.991 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. GDP data is provided by Penn World Table 7.1. Variable "loss" is the aggregate loss measure built using a dummy equal 1 if the number of battle deaths per 1000 inhabitants exceeds 0.2. We use the same threshold to define "Intense conflict" as a dummy variable. "battle deaths per capita" is the number of battle related deaths per 1000 inhabitants. "Outflow of refugees" is a dummy that takes a value of 1 if there is a net outflow of refugees in a given year. "Any conflict" is also a dummy taking 1 if there is any battle related death in a given year ( in Columns (1) to (6)) or a net outflow of refugees (in column (7)). Columns (6) and (7) use respectively the number of battle deaths per capita and outflows of refugees as measures of conflict intensity to build the corresponding loss measures (respectively "loss using per capita battle deaths" and "loss using refugees"). "Log population" is the logarithm of population size.

Figure 10: Simulated Output in Nigeria



# 6 The Role of Expectations for Investment

An important factor in ensuring recovery is capital accumulation in the post war period. It is here that political risk of the resurgence of violence could have a very direct impact. If potential investors believe that future disruptions through violence are likely then they will stay back.[36] The lack of investment then makes the economy less resilient.

Measuring expectations and their impact is difficult. We therefore approach the topic in four ways. First, we discuss the literature which has found a direct impact of changes in expectations and asset prices and investment. Second, we turn towards four cases of strong recoveries and show their that economic activity is strongly correlated with the return of refugees to the country. Third we show, using several surveys, that firms report political risk and political instability as a major obstacle to their economic activity. There is some evidence that the perception of this risk is related to past violence. Forth, we use a model of expected violence to show that this can explain patterns of foreign investments in a post conflict context quite well.[37]

## 6.1 The Literature

It is an accepted truth in macroeconomics that expectations are an important driver of economic activity. Empirical work has, for example, used news shocks to identify their effect. Ramey (2011) argues, for example, that economic activity reacts to the news about government spending shocks. Taking news into account is therefore crucial to understand the effect of these spending shocks. Bruckner and Pappa (2015) analyze bidding for the Olympic Games using panel data for 188 countries during the period 1950-2009. They argue that the bid attracts considerable inflows of investment several years before the Games. In other words, it is not the Olympic games that drive an improvement in economic activity but the expectation of the Games coming to a country.

More specifically, there is mounting evidence for the role of expectations in the context of episodes of violence. Zussman et al. (2008) and Willard et al. (1996) show that asset prices during conflict react to important conflict events like battles or cease-fire agreements. Events that change expectations on the final outcome of conflict therefore have direct economic effects. Abadie and Dermisi (2008) show that following the 9/11 terrorist attacks office vacancy rates increased at the three main landmark buildings in downtown Chicago relative to nearby buildings. Markets also differentiate events according to how they affect an ongoing conflict. Zussman and Zussman (2006) show that the Israeli stock market does react strongly to the assassinations of senior leaders of the Palestinian terrorist organizations: negatively in the case of political leaders but positively in the case of military leaders.

Singh (2013) analyzes the direct impact of violence on investments, using the Punjab

[36] In this perspective, Appel and Loyle (2012) analyze the role of Post Conflict Justice (PCJ) institutions have in attracting FDI in post conflict countries. They argue that post-conflict states that adopt PCJ are more likely to receive higher levels of FDI compared with post-conflict states that refrain from implementing these institutions.

[37] The discussion in this section relies on Besley et al. (2015).

insurgency which occurred between 1981 and 1993 as a case study. In districts affected by terroristic attacks, the long-term yearly investments in agricultural technology is reduced by around 17 percent. This contraction turns in to an average reduction of farmers' income of 4 percent.

Besley and Mueller (2012) study the effect of violence on house prices in Northern Ireland. They show that the peace process and its corresponding decline in violence led to an increase of house prices in the most affected regions compared to other regions. Their paper offers a way to understand the heterogeneity of these changes across regions which directly link to the role of expectations. They find that house prices in Belfast increased by 6 to 16 percent due to changes in expected violence in the peace process.

## 6.2 Political Risk in Enterprise Surveys

Political risk consistently features as a crucial constraint to economic activity in enterprise surveys. The Multilateral Investment Guarantee Agency (MIGA), for example, provides surveys for a number of years each of which show that multinational enterprises report political risks as a key factor for investment in developing countries. Especially for economic activity which requires a mid-term perspective of three years and more political risk is crucial. However, the term political risk captures "the probability of disruption of the operations of multinational enterprises by political forces or events" which is clearly related to political violence but not necessarily larger in conflict countries. In this regard MIGA (2011) is particularly useful as it collected data particularly for risk in Conflict-Affected and Fragile (CAF) economies. The report stresses that these countries are ranked as particularly risky. The three main channels of transmission of political risk to foreign investors in CAF countries are:

- the possible destruction of assets resulting from conflict itself;
- the unavailability of inputs and adequate human resources;
- abrupt declines in domestic demand, leading to lasting impoverishment that persists beyond the end of hostilities.

For investors in CAF states, past losses appear directly related to divestment: 22 percent of MNEs surveyed say that political risk in CAF countries has resulted in scaling back, canceling or delaying their investments.

Perhaps more surprisingly political risk and insecurity also appear to be important constraints for local firms. The enterprise survey conducted by the World Bank in a large set of countries asks whether political instability is an obstacle to the operations of the respective establishment. Only 35 percent of all establishments report that political instability is no constraint. Ten percent report that political instability is the worst constraint they face, i.e. more important than about 10 other factors including finance, corruption or regulation. Furthermore, the tendency of enterprises to report that political instability is an obstacle to their operations is positively associated with

Figure 11: Firms and Political Instability

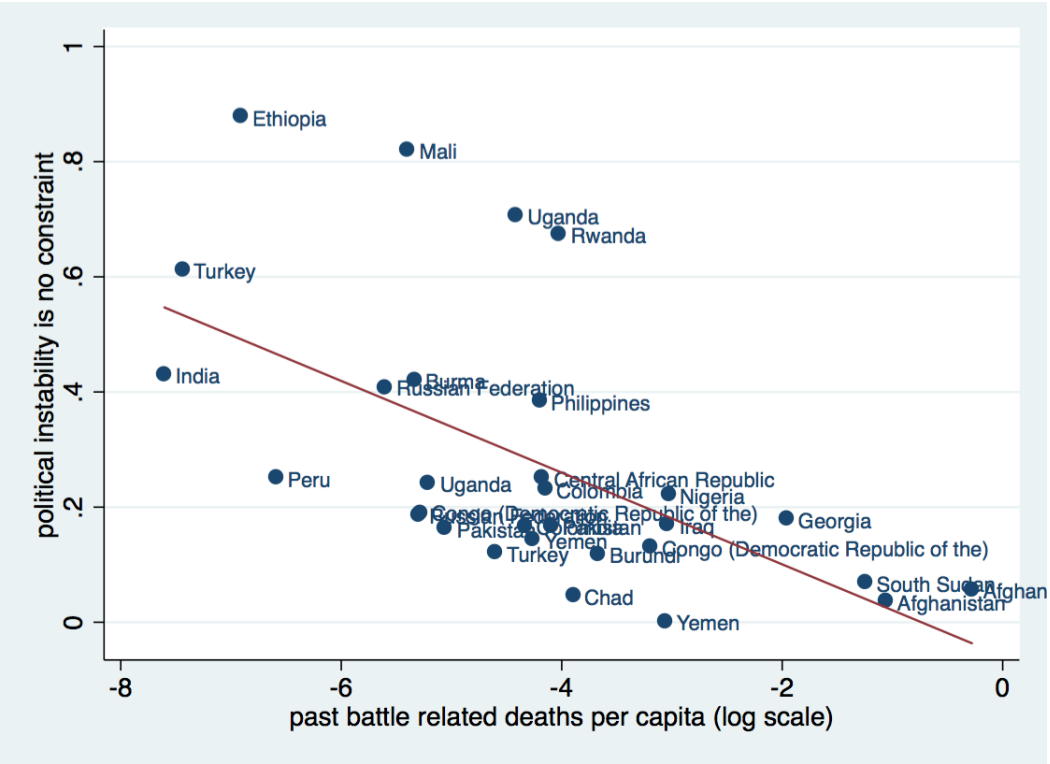
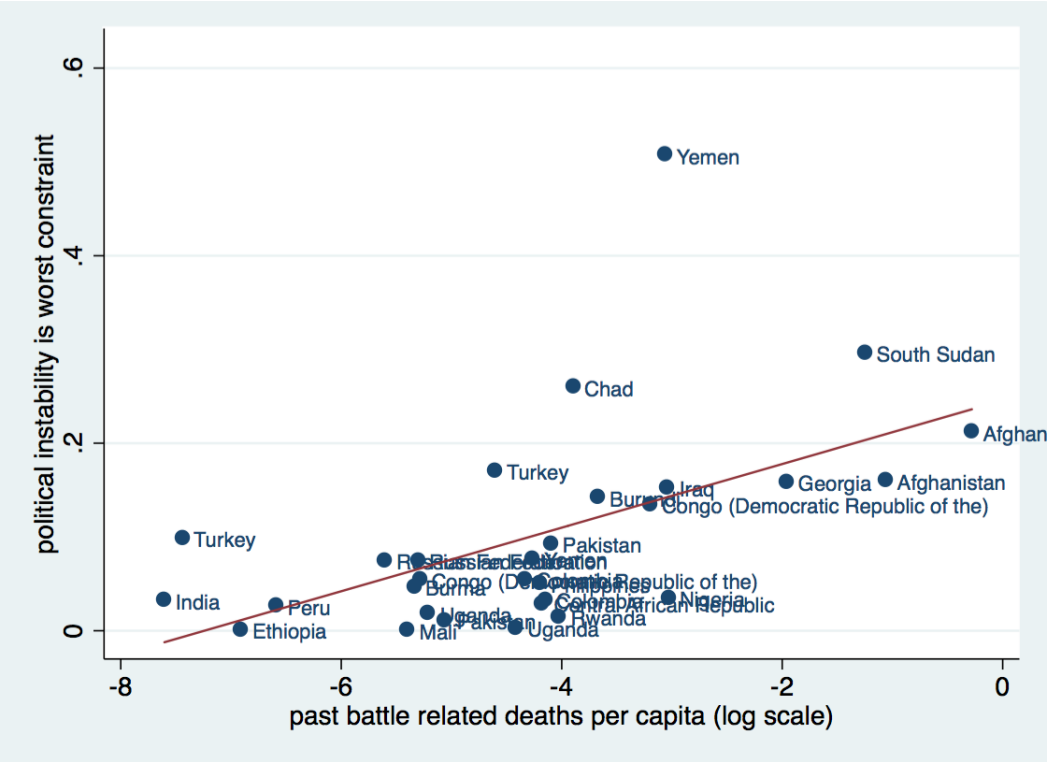



Figure 12: Firms and Political Instability



civil conflict. Countries with more intense violence in their past are much more likely to host firms that report being constrained by political instability. We illustrate this in two figures. Figure 11 shows the share of firms reporting that political instability is no constraint on the y-axis and the log of the sum of past battle related deaths per capita on the x-axis. Firms in countries like India, Turkey or Ethiopia with past violent episodes that were small compared to their population, report constraints close to the overall average. In these countries more than 50 percent report that instability is not a constraint on their activity. This changes dramatically in countries that were heavily affected by violence in the past. Firms in Yemen, South Sudan and Afghanistan are almost all somewhat constrained by political instability. In Figure 12 we show the share of firms reporting that political instability is the worst constraint. The share is increasing in past violence and, strikingly, is higher than 20 percent in the most heavily affected countries. We will return to this data after we have discussed a model of expectations in the following section.

## 6.3 Foreign Investment During Recovery

Data on internal investments is quite patchy or nonexistent in a post conflict context. We therefore approach this issue from a foreign investment perspective. Foreign investments are both a proxy for investment more general and for the particular interest of foreigners in the local economy. We use four different datasets on foreign investments: a unique data set from the Dutch Central Bank, data from the OECD, data from the UNCTAD and data from the World Bank. Details are discussed in the appendix.

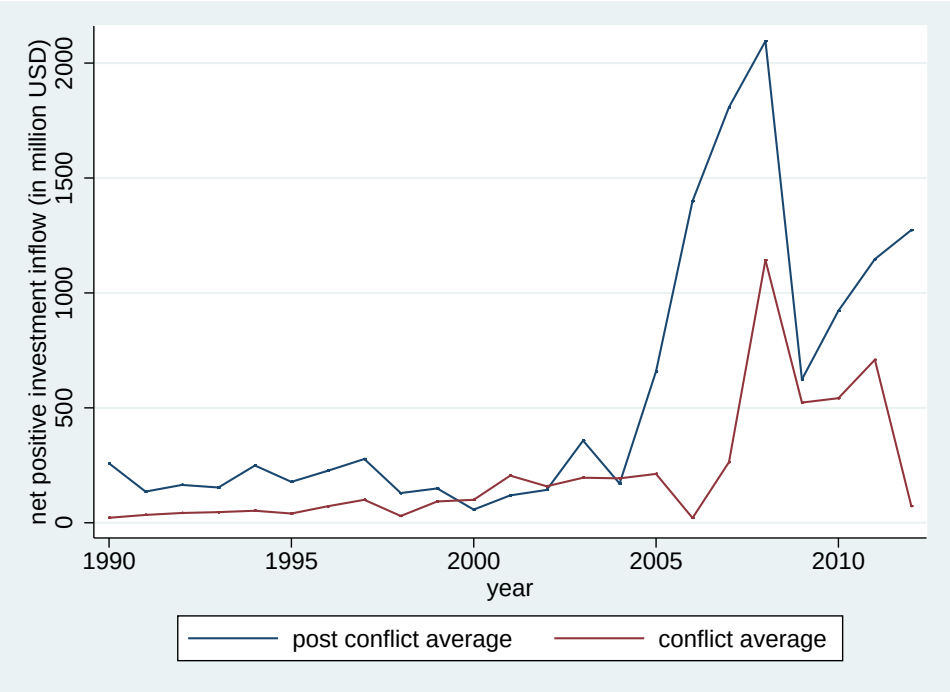
In what follows we focus on net-flows of foreign investments. These are relatively noisy compared to gross flows but we stick to them nonetheless for two reasons. First, it ensures comparability across investment from the different sources we use. Second, results can be interpreted directly as the net amount of foreign investment attracted by the country.

To give a first impression of investment flows Figure 13 plots mean positive net flows in conflict and recovery periods. The blue line shows the average investment in countries that were in their first ten years of recovery, i.e. after conflict ended.[38] The red line shows the average investment flow in the same set of countries but instead during the last ten years of conflict, i.e. before conflict ends.[39] The most obvious feature of this comparison is a large uptick in investment flows during recovery episodes after 2005. Average positive investment flows from OECD countries was over 500 million USD for most of this period and reaches a peak of 2.5 billion USD in year 2008. In contrast, average inflows during conflict episodes is generally lower than the average

[38]The definition of conflict we use here is based on battle related deaths PRIO/UCDP. A country is defined as being in conflict if it suffers more than 0.00008 deaths per capita. The recovery period is defined as the first 10 peacefull years after a conflict ends. Results are robust to variations of this period.

[39]We use the last five years as this autmatically means that the end of the conflict is in the sample period which makes the two curves comparable. The picture does not change qualitatively if we look a the entire conflict period. In order to make conflict flows more comparable to the recovery period we show the four-year lag of flows during conflict, i.e. the number for 2004 refers to average flows during the year 2000.

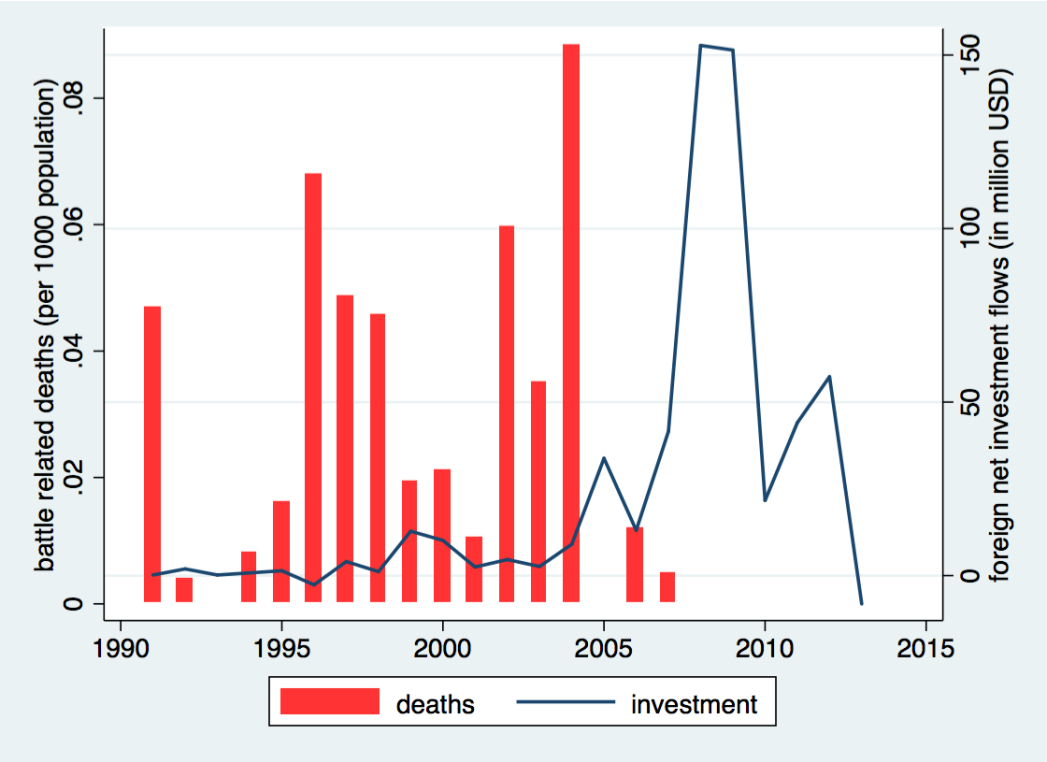
Figure 13: Average Net foreign investment inflows From OECD countries




positive investment flow during recovery. Moreover, the large boom in inflows in the post 2005 period is less marked. Note, that the deviation between the two groups rises around a time in which globalization took off, i.e. countries in recovery joined a globalized network of production and expanding multinational firms.

However, this is obviously not conclusive evidence for the role played by recovery from conflict as the samples of these two groups changes slightly across time. In order to get around this problem we will use country fixed effect regressions. Country fixed effects regressions allow us to look at changes of inflows in the same country across time. Figure 14 displays the example of Uganda. The graph shows battle-related deaths as red bars and investment flows as a blue line. The timing of the increase in inflows coincides quite clearly with the end of violence. Fixed effects regressions help to identify this sort of dynamics.

Figure 14: Investment Flows into Uganda Post Conflict



**Foreign Investment and Refugees**

Figures 15 and 16 display four case studies: Uganda, Sierra Leone, Nicaragua and Cambodia. All four countries experienced extreme levels of violence and are relatively poor. In order to highlight the role of refugees as both a symptom and driving force of recoveries we compare the stock of refugees who lived outside of these countries to time-series of a) GDP per capita and b) foreign investment inflows.

Time series of the stock of refugees and GDP are in the top panels in Figures 15 and 16. GDP per capita is displayed as a red line and is on a log scale. Refugees are meant as refugee stocks outside the country and are displayed as a blue line. We indicate the last peak of refugee stocks by a dashed line. In Uganda the stock of refugees gets to its last peak in 1985 and it falls sharply during the following two years. In the bottom we display total foreign investment inflows from all OECD countries together with refugees. Inflows are given relative to the average flows in the same year to prevent results driven by the waves of globalization in the 1990s and 2000s.

There is a striking pattern in all four countries. The point of return for refugees, marked by the dashed line, anticipates any noticeable economic recovery in most cases except Cambodia. Foreign investment only really picks up after the number of refugees has decreased significantly. The timing here is quite stark and happens with a significant delay to the recovery in GDP per capita.

Figure 15: Refugees and Economic Activity: Uganda and Sierra Leone

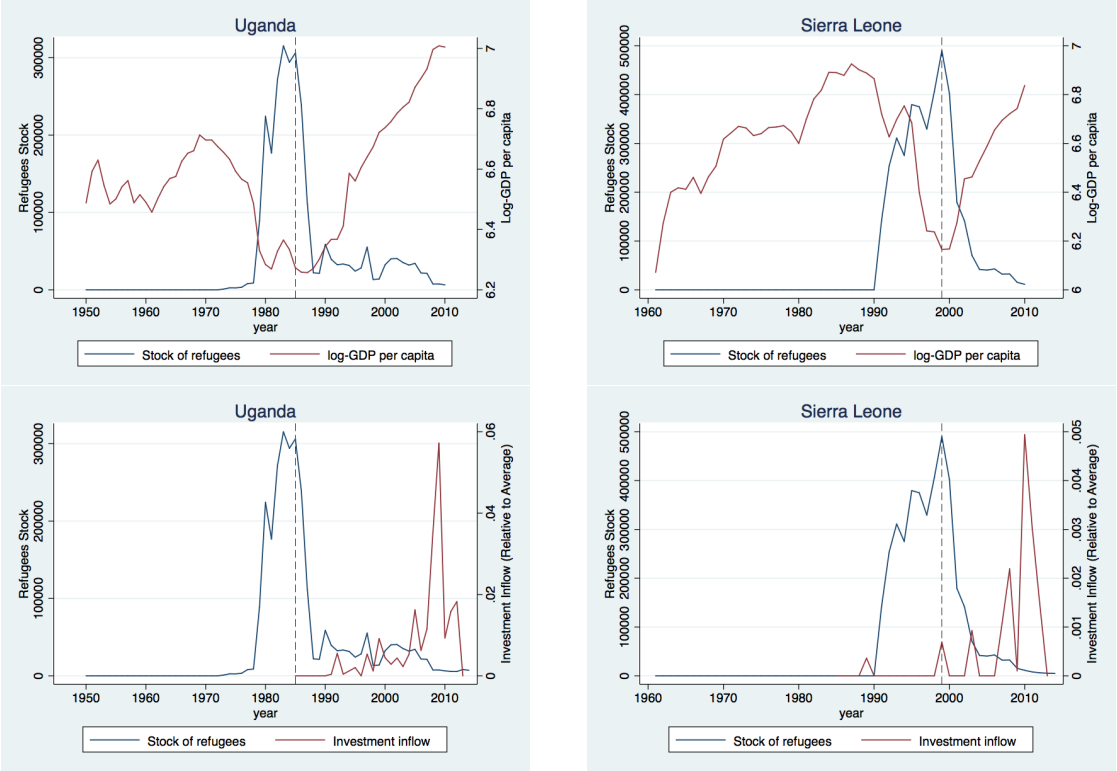
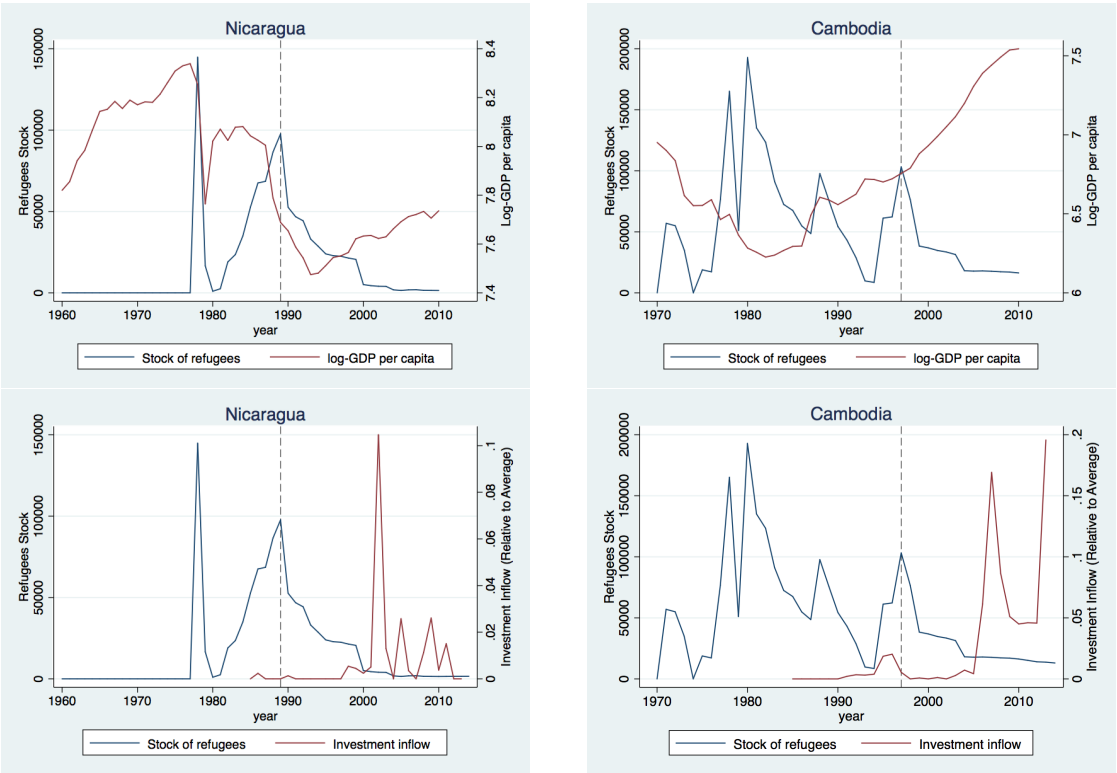



Figure 16: Refugees and Economic Activity: Nicaragua and Cambodia



We follow Besley and Mueller (2015a) and analyze international investment flows in a fixed effects Pseudo Poisson framework. The investment flow at the country level is given by

$$E\{x_{it}\} = \exp(\alpha_c + \gamma_0 * peace_{it} + \log X_t) \tag{9}$$

where $x_{it}$ is the inflow of investment in country $i$ in year $t$. We use the exposure model which controls for global investment flows through $X_t$. The regression with total inflows as an exposure variable can be thought of as modeling the annual *rate* of investment inflows into a country in each year.[40] The variable $peace_{it}$ is a dummy that takes a value of 1 in all years with peace. We lag this variable by one year to allow for the fact that investment needs some planning and will not react immediately to changes in the host country. We expect $\gamma_0 > 0$ if inflows increase after the end of conflict.

It is likely that effects of violence will be most visible if the conflict has been intense in terms of battle related deaths per capita. Yet, the right cut-off for the peace dummy is a priori not clear. India, for example, is coded as in conflict throughout the period if we choose a very low threshold. Choosing a higher cut-off means we treat low intensities as experiencing no conflict. In order to understand the role of threshold we use the fact that we have seven different data sets on investment flows from four different sources.[41] We can therefore take a pragmatic approach and run regressions at different cutoffs with all the different data sets we have and discuss the results jointly. Results are presented in Figure 17. Each point in the graph is a point estimate of $\gamma_0$.[42] The Y-axis displays the magnitude of this coefficient.

The message from Figure 17 is quite clear. The end of civil war is associated with large positive changes in foreign investment inflows - regardless which dataset we use. Estimates vary somewhat but lie around 0.5 which implies that investment inflows increase by 50 percent on average. The second observation is that at a cut-off between 0.005 and 0.02 battle-related deaths per 1000 population all point estimates move up and very close together. In other words, across a large variation of investment measures results are fairly similar.[43] This means that at these cutoffs we have divided countries with similar experiences above and below the threshold. In what follows we focus on the threshold of 0.008 battle related deaths per 1000 population. Observations below this threshold are, for example, from China, the United Kingdom, the Russian Federation, India and Bangladesh. In all these cases violence probably did not affect the entire economy notably. In what follows we focus on positive net flows, i.e. we subtract outflows from inflows and code negative numbers as 0s. Our results are robust to using gross inflows but as these are not provided by all sources.

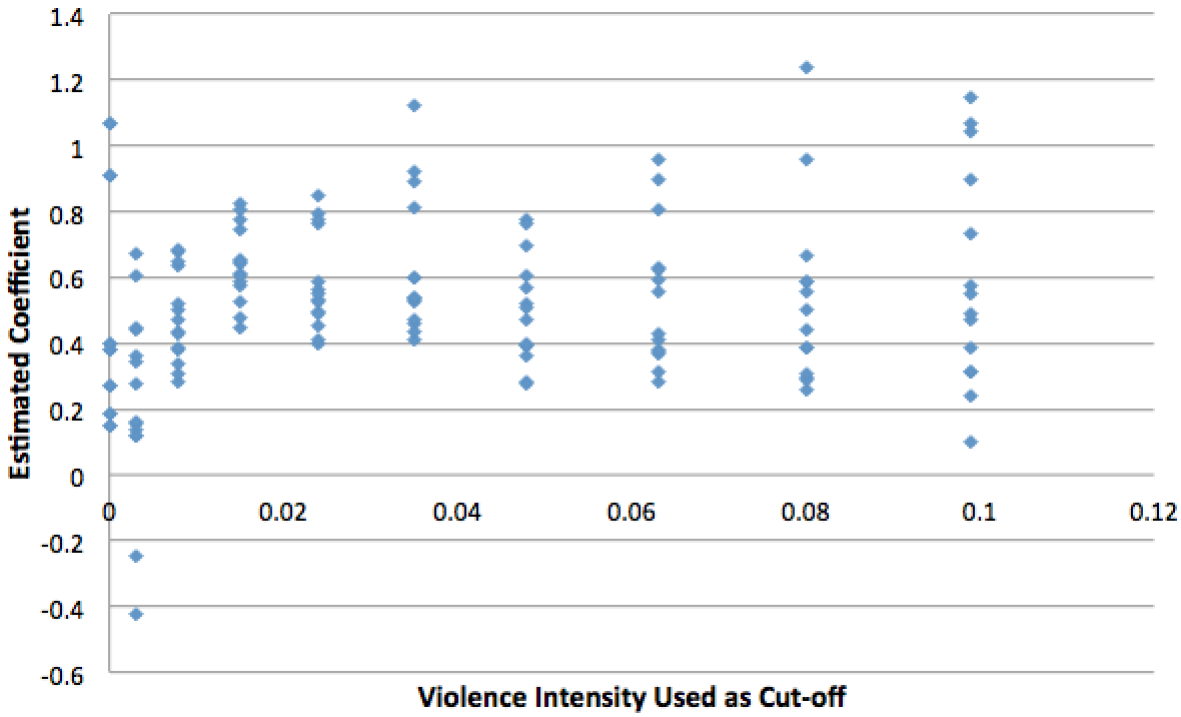
[40] See Frome (1983) for a discussion of using the Poisson model to study rates. For a general discussion of count data models, see Cameron and Trivedi (2013). Our results are also robust to using year fixed effects instead of exposure.

[41] The reason is that the OECD data, the Dutch Central Bank data and the UN data allows us to distinguish between net flows and gross flows.

[42] We also distinguish two different ways of calculating the cut-off of intensity using contemporaneous and average population in a country. In total we therefore have 14 different estimates per cut-off.

[43] Each coefficient is also estimated quite precisely at this cut-off.

Figure 17: Peace and Foreign Inflow Across Cut-offs and Data Sources




The basic results are in Table 8 which shows results for equation (9) using the threshold of 0.008 battle-related deaths per 1000 population. According to this the investment from OECD countries was almost 70 percent larger in peacetime than during conflict. The flows from other data sources shows an increase of between 35 and 50 percent. The consistency of this result across very different datasets is striking. Note also that the average change in inflows implied by these rates is very large. In 2012, average inflows in the World Bank dataset were over 9.5 billion USD and over 3 billion USD in the OECD data. Our estimates therefore imply a gain of between 2 billion and 4 billion USD in yearly inflows for countries which emerge from conflict.

In order to understand the dynamics of recovery it is useful to understand the dynamics of this change around the end of conflict. For this purpose we add a set of dummies to the equation above. We construct a dummy that indicates the start of recovery and add three forward and lag dummies to trace average investment around this date. As before we always lag the explanatory variables by one year. Results for the OECD data are shown in Figure 18. Each point of the solid line displays the inflow of investments compared to an average conflict year. The dashed lines display 90 percent confidence intervals around this line. The graph shows that the last three years of conflict are not very different from the average conflict years in terms of investment inflow. A year after the end of conflict, inflows increase dramatically and stay up thereafter. Three years after the end of conflict inflows have about doubled compared to the last years of conflict.

Table 8: Peace and Foreign Investment

| | (1) positive flows | (2) positive flows | (3) positive flows | (4) positive flows |
|---|---|---|---|---|
| Peace | 0.658*** | 0.346*** | 0.502*** | 0.429*** |
| | (0.0989) | (0.115) | (0.125) | (0.154) |
| Observations | 5,849 | 6,665 | 8,036 | 6,880 |
| Number of countries | 211 | 215 | 189 | 195 |

Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. Table 8 present results of a poisson regression with an exposure variable capturing global flows in the respective sample. The dependent variable is "positive net flow investment", we present results from four different data sources: OECD data in column (1); Dutch investment data in column (2); UNCTAD in column (3) and World Bank in column (4). "Peace" is a dummy that takes a value of one if country $i$ at year $t$ is not affected by conflict, defined as violence above an intensity of 0.008 battle-related deaths per 1000 inhabitants.

Figure 18: FDI Inflows in Post-Conflict


In summary, foreign investment soars with the end of conflict. The size of the effect is very large and suggests that there could be significant economic benefits from the end of conflict. While this is an interesting finding on its own right it does not reveal anything about the possible link to expectations regarding recovery. Before we discuss this issue we introduce a basic model to guide further results.

## 6.4 Expectations and Investment: A Model

Investments are actions that lead to costs in the present and, potentially, returns in the future. As such they are a key mechanism by which resurgent violence, if anticipated, can affect economic activity even during peace. Besley and Mueller (2012) propose a model to think about future expectations of violence and find that it can explain housing prices in Northern Ireland quite well.[44] Their main idea is to model violence as a two-states Markov Chain.

The model supposes that there are two states: conflict and peace. Conflict in country $i$ in year $t$ is denoted $s_{it} = 1$ and peace is denoted $s_{it} = 0$. Assume that countries are characterized by two probabilities which are assumed constant across time. The first probability $p_i$ determines how likely it is that a period of conflict is followed by another period of conflict. Analogously the probability $q_i$ captures the likelihood that a period of peace is followed by another period of peace. The following table captures the whole model.

| | conflict next year | peace next year |
|---|---|---|
| conflict this year | $p_i$ | $1 - p_i$ |
| peace this year | $1 - q_i$ | $q_i$ |

If there is conflict in country $i$ this year then there is a likelihood of $p_i$ that the country will be in conflict next year as well. There will be a probability $1 - p_i$ that conflict has ended and the country is in peace. Similarly, if country $i$ is in peace this year there is a probability of $1 - q_i$ that the country will experience conflict next year. The stability of peace is $q_i$ in this model. Low levels of $q_i$ imply that country $i$ cannot keep the peace for long periods in a row. If investors know this then investment might stay away despite the fact that a country is in peace.

To see the impact of $p_i$ and $q_i$ on investment, note that the likelihood of peace next year is given by

$$\Pr(\text{peace next year}) = (1 - p_i) * s_{it} + q_i * (1 - s_{it})$$

which is saying that the probability of peace next year switches from $1 - p_i$ to $q_i$ when a country transitions enters recovery. That is, expectations change more in transition if $p_i$ and $q_i$ are large. We expect, for example, little changes in investments if investors can anticipate peace to be unstable (low $q_i$).

In practice $q_i$ could obviously vary by time as well. This will depend on what factors are taken into account by investors. If forecasts of instability are based on factors like political institutions, ethnic composition, climate or the availability of natural resources then we do not expect $q_i$ to vary with time as these factors are fixed or only slowly moving. However, given our discussion of refugees, for example, we expect at least some factors to be time-varying.

[44] Besley and Mueller (2015a) show that an adaption of the same model can make sense of investment data more generally.

## 6.5 The Role of Expectations: Evidence

From the model presented in the previous section we expect changes in investments to be largest if $p_i$ and $q_i$ are large. The simplest possible way to calculate these two values is to calculate

$$p_i = \frac{\text{conflict years - transitions to peace}}{\text{conflict years}}$$

and

$$q_i = \frac{\text{peace years - transitions to conflict}}{\text{peace years}}$$

for each country $i$. We then interact the peace dummy in (9) with these values to see whether there is any heterogeneity with regard to the persistence of peace and war. Table 9 shows the result in columns (1) and (2). Indeed, transitions to peace are particularly beneficial in terms of investment flows if peace in the country is persistent, i.e. if $q_i$ is high. Somewhat surprisingly, $p_i$ is not associated with any heterogeneous effects. This pattern is fairly robust across the other FDI data sources (except for data from the UN) and exclusion of outliers like Israel. It is also economically meaningful. If we take the coefficient in column (1) we get that a change of persistence by 10 percentage points, from say 0.9 to close to 1 raises investment flows in peacetime by about 15 percent.

What drives this heterogeneity? Up until now we assumed $q_i$ to be constant over time and both forward and backward looking. If investors have an understanding of the conditions in the respective country then this might not be the best model of expectations. Instead, it could be that investors have a model to forecast instability which is taking factors like the quality of a cease-fire agreement into account. Investors could know, for example, that the stability of peace ($q_{it}$) rises sharply with the duration of peace - from only 72 percent in the first year after conflict to about 90 percent five years later. This implies that the first five years after conflict feature a particularly high risk of relapsing, i.e. low $q_{it}$. Only about 40 percent of all recoveries last longer than five years. To explore this, we construct a dummy that takes a value of 1 in the first five years of recovery. In column (3) we show that the dummy takes on a negative sign but is insignificant. In light of Figure 18 this is not surprising. If investors would systematically wait with their investments we would expect slowly increasing flows in recovery which is not what we see.

However, if investors are able to distinguish situations which are stable from those that are not then we expect investment to be linked to actual future outcomes. In column (4) we test this by adding an additional dummy which takes a value of 1 if the country is during its first five years of recovery but will re-enter conflict within the next five years. This dummy captures the actual fragility of peace in the crucial first five years of recovery. Adding this leads to a striking result, inflows are significantly lower in situations which are fragile. Without fragility, the increase in inflows is now 80 percent instead of 66 percent. Inflows in years of fragile peace are 40 percent lower. Of course, reverse causality is a serious concern here: perhaps it is that investment inflows secured stable peace and not the other way around. However, given the interview

results discussed above it appears at least plausible that forward looking multinationals develop a notion of the risk of reversal to conflict and react to it.

Table 9: Fragility and Investment Flows

| | (1) investment flows | (2) investment flows | (3) investment flows | (4) investment flows |
|---|---|---|---|---|
| peace | -0.693** | 0.565** | 0.741*** | 0.803*** |
| | (0.292) | (0.270) | (0.178) | (0.166) |
| peace * persistence of peace | 1.485*** | | | |
| | (0.358) | | | |
| peace * persistence of conflict | | 0.138 | | |
| | | (0.432) | | |
| first 5 years of peace | | | -0.148 | -0.0616 |
| | | | (0.246) | (0.264) |
| fragile peace | | | | -0.437*** |
| | | | | (0.125) |
| Observations | 5,849 | 5,849 | 5,849 | 5,849 |
| Number of Countries | 211 | 211 | 211 | 211 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, *p<0.1.Table 9 presents results of a poisson regression with an exposure variable capturing global positive net investment flows in the OECD sample. "Peace" is a dummy that takes a value of 1 in country $i$ during year $t$ there is no civil war, defined as violence above an intensity of 0.008 battle-related deaths per 1000 inhabitants. "Persistence of peace" is the likelihood, calculated at the country level that a year of peace is followed by another year of peace. "Persistence of conflict" is the likelihood that a year of conflict is followed by another year of conflict. "First five years of peace" is a dummy that indicates if the end of the most recent conflict has been less than five years ago. "Fragile peace" is a dummy that takes a value of 1 if a year is peaceful, within five years of the last conflict and reverts back to conflict within the next five years.

We illustrate this channel by estimating an actual risk model for the critical period of the first five years after conflict and bringing this model to the FDI data. The technique we deploy is akin to a two stage least squares IV estimation. We first estimate a risk model and then use the fitted values of this model to explain investment. However, the aim here is not to provide identification but to illustrate the plausibility of the idea that multinationals build expectations based on observables and are influenced by these in their decision to invest. The model we use is based on two variables highlighted in this report: "political exclusion" and "refugees". In Table 10 column (1) we use the share of the population that is excluded from political power, the share of the population that is discriminated, the number of refugees per capita and a dummy that indicates the absence of refugees to predict fragility. In this regression we focus on all years that were five years after conflict and use our explanatory variables to distinguish the years that are followed by a relapse to conflict from those that do not. All variables have the expected sign and are significantly correlated with conflict relapse. The fitted values from this risk model vary between 0.12 and 0.88 and have a mean of 0.25.

In columns (2) to (5) of Table 10 we bring these numbers to the various foreign investment data. We use the fitted values instead of the actual fragility dummy and set all years outside of the first five years after conflict equal to zero. Expected fragility, estimated with refugees and political exclusion, explains foreign direct investment extremely well. An increase by 10 percentage points in the estimated fragility is associated with a reduction of flows by about 50 percentage points. In Table 11 we use FDI data from OECD dataset. We show that this result is robust to adding a large set of controls like democracy scores, log-GDP and growth of GDP. What is more, we can even add

the original variables used to predict fragility as controls without changing results. It is only in the post-war period that exclusion and refugees become a factor that influences foreign investment flows. Finally, the results we find are robust across all datasets of foreign investment we use.

These results make it at least plausible that political exclusion and refugees matter because they predict a relapse to more intense violence. As final piece of evidence for this idea we use data on political short and mid-term credit risk from the Belgian insurer Delcredere Ducroire (ONDD). We collected data on political risk evaluations from ONDD who, according to their annual report, insured transactions worth about 7 billion EUR in 2011. The variable we use measures the risk of a credit default for reasons beyond the control of the debtor, i.e. due to political or financial macroeconomic events. We choose this variable because it provides the most consistent time-series in the ONDD data. ONDD measures both short- and mid-term risk on a scale from 1 (low risk) to 7 (high risk). Table 12, columns (1) and (4) show that risk ratings are decreasing in peacetime. Note that, as before, we control for country fixed effects which implies that we look at changes within country. Within-country risk falls significantly in peacetime. The effect is also economically meaningful - about one quarter of a standard deviation in the case of short term risks. In columns (2) and (5) we show the specification in which we add a dummy for the first five years of recovery and fragile peace. The coefficient on fragile peace is positive and of similar size in both cases. Mid-term risk is evaluated significantly higher in periods that are followed by conflict. In columns (3) and (6) we include the fitted values gained from a regression of fragility on refugees and political exclusion. Again the fitted values predict higher risk evaluations by ONDD. The estimate is not very precise but quantitatively large both for short- and mid-term evaluations. A rise in the fitted risk by 10 percentage points coincides with an increase in risk evaluations by 0.08 to 0.16. Evaluations like this have real-life repercussions as they are used to decide on insurance premiums.

Our results signal a clear margin for policy. Attracting foreign investment appears to be a lot harder if a government excludes or even discriminates against parts of the population and refugees have not returned to their homes. We argue that this is true even if investors only care about stability. In this view, investment can be attracted to a country through policies that de-escalate conflict and commit the warring parties to peace in the period right after violence stops.

Table 10: Risk Factors and Investment Flows

| | (1) fragile peace | (2) positive net investment flows | (3) positive net investment flows | (4) positive net investment flows | (5) positive net investment flows |
|---|---|---|---|---|---|
| pop. excluded from access to power | 0.810** | | | | |
| | (0.351) | | | | |
| pop. discrimated against | 1.401*** | | | | |
| | (0.519) | | | | |
| refugees per 1000 pop. | 0.00549** | | | | |
| | (0.00241) | | | | |
| no refugees | -0.563** | | | | |
| | (0.243) | | | | |
| fragile peace (fitted values) | | -5.999*** | -6.107** | -3.885* | -4.927*** |
| | | (2.059) | (2.772) | (2.286) | (1.673) |
| first 5 years of recovery | | 1.344** | 1.863** | 0.933 | 1.156** |
| | | (0.623) | (0.746) | (0.685) | (0.461) |
| peace | | 0.780*** | 0.169 | 0.579*** | 0.545*** |
| | | (0.167) | (0.291) | (0.181) | (0.204) |
| Observations | 658 | 5,834 | 6,405 | 8,021 | 6,865 |
| Number of countries | | 211 | 214 | 189 | 195 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in column (1) is the dummy "fragile peace", which take a value of 1 if a year is peaceful, within five years since the last year of conflict, and revert back to conflict within the next 5 years. Data used in the first stage estimation (column (1)) is gathered from several sources: "share of the population that is excluded from political power" and "share of the population that is discriminated" variables are provided by GROWup dataset; information about "refugees" is provided by UNHCR dataset. In column (2)-(5) the dependent variable is "positive net investment flows". Data is gathered from four different data sources: OECD data in column (2); Dutch investment data in column (3); UNCTAD in column (4) and World Bank in column (5). Fitted values of "fragile peace" is coming from a regression of "fragile peace" on "share of the population excluded from political power", "share of the population that is discriminated" and "refugees per 1000 population". "Peace" is a dummy that indicates when a country is not in conflict, i.e. violence intensity is above a threshold of 0.008 battle-related deaths per 1000 inhabitants. "First five years of recovery" is a dummy that indicates if the end of the most recent conflict has been less than five years ago. "No refugees" is a dummy that takes a value of 1 if the yearly stock of refugees in a given country is equal to zero.

Table 11: Robustness Check: Risk Factors and Investment Flows

| | (1) positive net investment flows | (2) positive net investment flows | (3) positive net investment flows |
|---|---|---|---|
| fragile peace (fitted values) | -5.999*** | -5.402** | -8.486** |
| | (2.059) | (2.307) | (3.631) |
| first five years of recovery | 0.780*** | 0.747*** | 0.777*** |
| | (0.167) | (0.194) | (0.176) |
| peace | 1.344** | 1.094 | 1.900** |
| | (0.623) | (0.681) | (0.926) |
| polity score | | -0.0237 | |
| | | (0.0467) | |
| strong executive constraints | | 0.491* | |
| | | (0.296) | |
| GDP per capita (log) | | 0.262 | |
| | | (0.400) | |
| GDP per capita growth | | 1.992 | |
| | | (1.964) | |
| number of conflicts in contiguous countries | | 0.112 | |
| | | (0.100) | |
| share of population excluded from access to power | | | 1.400 |
| | | | (1.067) |
| share of population discrimated against | | | -2.682 |
| | | | (1.665) |
| refugees per 1000 population | | | 0.00178 |
| | | | (0.00322) |
| no refugees | | | 0.196 |
| | | | (0.350) |
| Observations | 5,834 | 4,012 | 4,190 |
| Number of countries | 211 | 160 | 156 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Table 11 present results of a poisson regression with an exposure variable capturing global flows in OECD sample. Fitted values of "fragile peace" is coming from a regression of "fragile peace" (i.e. a dummy that takes a value if a year is peaceful, within five years of the last conflict and reverts back to conflict within the next five years) on "share of the population excluded from political power", "share of the population that is discriminated" and "refugees per 1000 population". "Peace" is a dummy that indicates when a country is not in conflict, i.e. violence intensity is above a threshold of 0.008 battle-related deaths per 1000 inhabitants. "First five years of recovery" is a dummy that indicates if the end of the most recent conflict has been less than five years ago. Covariates used in the three specifications are gathered from several sources: "polity score" and "strong executive constraints" are provided by Polity IV dataset; GDP data are provided by Penn World Tables; "share of the population that is excluded from political power" and "share of the population that is discriminated" variables are provided by GROWup dataset; information about "refugees" is provided by UNHCR dataset. "No refugees" is a dummy that takes a value of 1 if the yearly stock of refugees in a given country is equal to zero. Variable "Number of conflicts in contiguous countries" counts the number of neighboring states of country $i$ that are in conflict during year $t$.

Table 12: Political Credit Risk Ratings

| | (1) short term risk (0-7) | (2) short term risk (0-7) | (3) short term risk (0-7) | (4) mid term risk (0-7) | (5) mid term risk (0-7) | (6) mid credit risk (0-7) |
|---|---|---|---|---|---|---|
| peace | -0.455*** | -1.017*** | -0.990*** | -0.197** | -0.366** | -0.418*** |
| | (0.156) | (0.264) | (0.242) | (0.0806) | (0.142) | (0.119) |
| first five years of recovery | | 0.699*** | 0.356 | | -0.136 | 0.106 |
| | | (0.181) | (0.294) | | (0.183) | (0.175) |
| fragile peace | | 0.352 | | | 0.334*** | |
| | | (0.294) | | | (0.0982) | |
| fragile peace (fitted values) | | | 1.648* | | | 0.824* |
| | | | (0.913) | | | (0.480) |
| Country FE | YES | YES | YES | YES | YES | YES |
| Observations | 3,619 | 3,619 | 3,613 | 3,600 | 3,600 | 3,594 |
| R-squared | 0.006 | 0.029 | 0.028 | 0.004 | 0.015 | 0.016 |
| Number of countries | 203 | 203 | 203 | 203 | 203 | 203 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1)-(3) is a measure of the short term risk of credit default on a scale from 1 (low risk) to 7 (high risk) provided by ONDD. The dependent variable in columns (4)-(6) is the ONDD proxy of the mid term risk of credit measured on the 1-7 scale. "Peace" is a dummy that indicates when a country is not in conflict, i.e. violence intensity is above a threshold of 0.008 battle-related deaths per 1000 inhabitants. "First five years of recovery" is a dummy that indicates if the end of the most recent conflict has been less than five years ago. "Fragile peace" is a dummy that takes a value of 1 if a year is peaceful, within five years of the last conflict and reverts back to conflict within the next five years. Fitted values of "fragile peace" is coming from a regression of "fragile peace" on "share of the population excluded from political power", "share of the population that is discriminated" and "refugees per 1000 population".

# 7 Access to Power and Institutions

Inequality across ethnic groups has been documented in the literature as one of the main potential sources of conflict. Besley and Persson (2011) present a theoretical framework in which fighting for control of the state is an important reason for conflict. Cederman et al. (2010) provide quantitative evidence suggesting that outbreaks of armed conflicts are the result of competing ethnonationalist claims to state power. Cederman et al. (2013) find also that disadvantaged and advantaged ethnic groups have higher propensity of entering into conflict but only where there is also political exclusion. Buhaug et al. (2014) show that countries with very poor (compared to the national average) ethnic groups and those with large discriminated groups from national politics are more likely to experience an armed conflict.

What are the sources of this inequality across ethnic groups? Burgess et al. (2015) provide an answer to this question by exploring the link between access to power, political institutions and inequality in the allocation of public investments. They show evidence for strong ethnic favoritism using variation in political leadership and data on road building in Kenyan districts across the 1963-2011 period. Most importantly, they show that this favoritism in road investments vanishes during periods of "democracy". The authors argue that in the African context where presidential power is based on ethnicity, even weak democratic institutions translate into a decrease in favoritism towards groups in power as political leaders are forced to share public goods across the wider population. Hodler and Raschky (2014) also find that sub-national regions have more intense night light when being the birth region of the current political leader and this favoritism is most prevalent in countries with weak political institutions and poorly educated citizens.[45]

At the country level, institutions have often been linked to differences in mean economic performance. However, the fact that strong institutions keep conflict from escalating will obviously also have an impact on volatility. In this aspect our work relates to recent research that shows that growth volatility is higher for countries with weak institutional constraints. Besley and Mueller (2015b) show that countries with weak executive constraints have a chance of experiencing negative growth which is about 50 percent higher compared to countries with strong constraints. Also they are more than twice as likely to have a growth rate below -5% and are over three times more likely to experience a growth rate below -10%. The authors argue that this effect is driven by the fact that weak executive constraints increase the risk of observing a prolonged period of economic contraction. In the absence of strong executive constraints, we expect the misallocation of public goods suggested by Burgess et al. (2015) to translate into cross ethnic group inequalities. These inequalities lead to a higher risk of conflict outbreak as shown in Alesina et al. (2015) which in turn increases the risk of a prolonged period of contraction. The conflict mechanism is valid even when a country does not actually experience two-sided violence. For example, massive investments in state repression capacity by ethnic groups in power might keep the lid on

[45] They use a panel of 38,427 sub-national regions from 126 countries with yearly observations from 1992 to 2009.

violent conflict. Besley and Mueller (2015a) argue that foreign investors seem to know that growth volatility changes with strong executive constraints and therefore react significantly to their adoption.

In summary, the literature suggests that a lack of constraints on executive power at the country level could play a key role in building inequalities across regions and ethnic groups. In the absence of strong executive constraint, we expect regions populated by ethnic groups that have access to executive power to perform better relative to others due to ethnic favoritism. Conversely, excluded ethnic groups should experience relatively worse economic performance compared to other groups in the absence of such constraints. [46]

To test these hypothesis we use data on ethnic groups' access to executive power and night light intensity from the GROW$^{up}$ Research Front-End (RFE Release 2.0) dataset and executive constraint data from the Polity IV dataset. We use night light intensity as a proxy for economic activity at the ethnic group level.[47] Night light data has the benefit of being available on a yearly basis and of being measured at the local level where there is poor availability of statistical data. As in previous sections we follow Henderson et al. (2012) who argue that the relationship between GDP and night light at the country level can be expressed fairly well in a constant elasticity model in which an increase of night light by 1 percent implies an increase of GDP of about 0.25 percent. Hodler and Raschky (2014) also look at the relationship between log nighttime light intensity and log GDP at the regional level using the panel data of regional GDP per capita assembled by Gennaioli et al. (2013) [48] and they confirm that the relationship is linear and also find an elasticity of around 0.3.

Access to political power is ranked on a scale from 1 to 7 in the GROW$^{up}$ dataset. Ethnic groups are "powerful" (monopoly of power or dominant group in power), have access to central power through a formal system of power sharing (as "Senior" or "Junior" partner) or are "excluded" from power (self excluded, powerless or discriminated).

Strong executive constraint is measured as a dummy indicating whether or not we have executive parity or subordination of the executive at the country level, a value 7 for "xconst" variable in Polity IV dataset.

Our main empirical specification to test our hypothesis is as follows :

$$\begin{aligned} log(lightpc)_{i,j,t} &= \beta * Power\_Status_{i,j,t} + \gamma * Power\_Status_{i,j,t} \times exconsthigh_{i,t} \\ &+ C_{i,t} + \eta_j + \epsilon_{i,j,t} \end{aligned}$$

Where $log(lightpc)_{i,j,t}$ is the logarithm of per capita night light intensity for ethnic group $j$ in country $i$ at time $t$. The variable $exconsthigh$ is a dummy for strong executive constraint at the country level. $Power\_Status$ is the power access status (powerful or excluded) of the different ethnic groups. $C_{i,t}$ is a set of country/year dummies to control for shocks and changes that are common to all ethnic groups within a country/year, as well as for changes in satellites and their sensor settings. We also

[46] The discussion in this section relies on Mueller and Tapsoba (2015).

[47] We divide night light by (interpolated) ethnic group population size to have a per capita variable.

[48] They provide regional GDP per capita for 1,503 regions from 82 countries.

include ethnic group fixed effects to control for ethnic groups' permanent unobserved characteristics.

The results in table 13 show that, in absence of strong executive constraints, being an excluded ethnic group decreases night light intensity by 8.2% on average, which is equivalent to a decrease of 2.5% in GDP per capita.[49] However, this effect vanishes when strong executive constraints are present. Discriminated groups do not systematically perform worse compare to other groups in countries with strong constraints. These results are robust to the inclusion of lagged dependent variable as control in column (3).[50]

Our interpretation of these findings is that having less political to power from one period to another does not make powerful ethnic groups poorer than others. However, it makes them fall behind relatively to other groups. Conversely, groups that were previously excluded from access to power will not be immediately richer than other groups in the same country, but they will see a significant improvement in their economic activity.

Column (2) shows that being dominant or having a monopoly on executive power increases per capita light intensity by 8.5% corresponding to a 2.6% increase of GDP per capita only when executive constraints are weak. This effect also vanishes completely with strong executive constraints. Column (4) shows that these estimates are robust to the inclusion of lagged night light as well.

Hence, our results confirm the absence of ethnic favoritism (at least as captured by levels of night light) in countries with strong executive constraints. These results go beyond the findings in Burgess et al. (2015) and suggest that ethnic favoritism is a general phenomenon. This makes executive constraints a key mediating factor in conflict. In this context it is useful to come back to the main argument in Besley and Persson (2011) who find that factors which do otherwise predict political violence lose their bite in the presence of strong political constraints. Their explanation is that government has to distribute rents more equally in the presence of strong executive constraints. The results presented in this section lend a lot of credibility to this argument.

[49] Henderson et al. (2012) estimated elasticity between log GDP and log Night light intensity to be around 0.3.

[50] Results including group fixed effects and lagged dependent variables suffer however from the well-known bias (Nickell, 1981). The presence of auto-correlation in error term here make it impossible to have consistent estimates with both lagged dependent variables and group fixed effects. Angrist and Pischke (2008) recommend estimating a specification with fixed effects (but no lagged dependent variable) and one with the lagged dependent variable (but no fixed effects) in case of doubt and argue that the true effect should lie between these two estimates. Here we believe more in the group fixed effects specification.

Table 13: Executive Constraint, Access to Power and Cross Ethnic Group Economic Performance

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Log (light per capita) | Log (light per capita) | Log (light per capita) | Log (light per capita) |
| excluded | -0.082*** | | -0.060** | |
| | (0.027) | | (0.026) | |
| excluded*high executive constraint | 0.067** | | 0.042* | |
| | (0.027) | | (0.023) | |
| powerful | | 0.085*** | | 0.052* |
| | | (0.030) | | (0.030) |
| powerful*high executive constraint | | -0.085*** | | -0.053** |
| | | (0.029) | | (0.026) |
| Lag-Log (light per capita) | | | 0.381*** | 0.381*** |
| | | | (0.059) | (0.059) |
| Country-Year FE | YES | YES | YES | YES |
| Group FE | YES | YES | YES | YES |
| Year FE | NO | NO | NO | NO |
| Observations | 9,210 | 9,210 | 8,601 | 8,601 |
| R-squared | 0.991 | 0.991 | 0.796 | 0.796 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. "Log (light per capita)" is the natural log of night light per capita intensity for each ethnic group. Variable "excluded" is a binary flag indicating whether ethnic group is assigned a status of "Self-excluded", "Powerless" or "Discriminated". Variable "powerful" is a binary flag indicating whether an ethnic group is assigned status of "Monopoly" or "Dominant". Variable "high executive" constraint is a dummy that takes a value of one if "ex-const" (executive constraint) variable in Polity IV dataset equals 7. Each observation is weighted by group's population size as a fraction of the country's total population.

# 8 Conclusions

Economic growth before and after conflict seems, on average, only marginally lower than in non-conflict countries. Cycles of violence are the single most important reason for the lack of long term development in these countries. Interestingly, this is what Aguiar and Gopinath (2007) find for emerging markets more generally: the cycle is the trend. In this respect political violence could be regarded as a leading cause of extreme volatility. This focus on conflict has led to a particular angle on the recovery process. In what follows we describe the corollaries of this view in more detail.

## 8.1 Measure Expectations

As the section on expectations and foreign investment illustrates, expectations could be a crucial factor in explaining economic activity in recovery. The change from a situation which appears stable to one which does not can make the difference between a doubling of investment inflows and no change at all. This means a crucial role in policy making goes to measuring expectations. Otherwise feedback to policy is impossible. Standard possibilities are stock markets and exchange rates. Our research adds refugee streams as an additional possibility.

Apart from these benefits the return of refugees can also be regarded as the ultimate measure of success for policy makers. Our findings throughout the report indicate that the return of refugees is closely associated with contemporaneous and future economic growth. At the same time, the return of refugees is a strong predictor of capital inflows. Our interpretation of these facts is that individuals hold information about the conditions at their former homes which are useful to policy makers. Government policies of reconciliation and recovery work if people decide to return.

## 8.2 Alleviate the Humanitarian Crisis

Our results point to a special role of played by the humanitarian relief effort especially targeted at the development of children. The evidence suggests that this relief effort helps not only help in the short run but has long run effects on economic development. We have shown that humanitarian crisis of the dimensions experienced in Afghanistan or Syria imply that labor productivity in the affected population is lowered significantly, irreversibly and for the duration of a whole generation. Our results suggest that the economic costs caused at the micro level are so big that they show up at the macro level.

This is important because humanitarian relief efforts are currently not sufficient to help refugees adequately. For example, the Regional Refugee and Resilience Plan (3RP) in Syria, an appeal for funding by UN agencies and NGOs, lists a funding gap of USD 3.47 billion in March 2015. At the time a preliminary analysis of the Comprehensive Food Security Monitoring Exercise (CFSME) in Jordan indicated that the proportion of Syrian refugee households considered food insecure or vulnerable to food insecurity had risen from 47 percent in 2014 to 86 percent in 2015. According to the report, underfunding of the 3RP would include further cuts to food assistance to

1.6 million people across the region. A staggering 1.7 million refugees would face the winter without heating fuel, insulation or extra blankets and 752,000 Syrian refugee children would continue to not participate in education. The report stresses the dire situation of children more generally pointing out that between 13 to 40 percent of refugee households in the region admit sending their children to beg or work as an emergency coping strategy.

The attention of Western Media to the case might have prevented a worsening of the situation. However, with 14 million refugees worldwide in 2014 the funding requirements are enormous and will probably depend crucially on the respective case.

Mental health is another mechanism which should be addressed. In a recent study Kaysen et al. (2013) report on the adoption of Cognitive Processing Therapy (CPT), an empirically supported treatment for posttraumatic stress disorder (PTSD), to the population in Kurdistan, Iraq. The adaptation process included addressing training needs of therapists with little to no training in cognitive–behavioral or manualized treatments and tailoring CPT for the high rates of illiteracy in the client population and the specific beliefs and structures of Kurdish culture. CPT seemed to be well tolerated by clients and their symptoms appeared to improve.

## 8.3 Ensure Stability

A first, clear priority which emerges from our study is that efforts should be targeted at preventing violent conflict and working towards disabling the root causes of the respective conflict.

Foreign actors have often a very dubious role in ensuring stability. Foreign policy, foreign aid and military operations are not, generally, used in the name of stability.[51] International coordination and transparency in foreign interventions would therefore likely lead to a significant increase of stability. This implies that there are clear advantages in using multilateral organizations and clear rules for these efforts.

In what follows we will discuss particular angles on policy arising from the focus on stability. Remember that the large majority of conflicts re-emerge within five years. This cycle needs to be broken if economic development is to be ensured. We can distinguish two key stages in recovery from conflict.[52] In the first stage fear of imminent attacks has to be replaced by non-violent coexistence of the parties in conflict. In the second stage confidence and trust has to be built. It is important to distinguish these two as they clearly require different policy responses.

### 8.3.1 The Role of Aid in Stabilization

Donors need to keep in mind that aid flows are rent flows which do not rely on the capacity of the state as discussed in Besley and Persson (2011). Rent flows have

[51] Typically, research on this issue has focused on the United States. Dube et al. (2011) present evidence that US interventions benefit private enterprise. Albornoz and Hauk (2014) find that civil wars around the world are more likely under Republican governments and that the probability of civil wars decreases with the U.S. presidential approval rates.

[52] See Sørensen et al. (2003).

the effect of increasing incentives to engage in conflict unless local actors regard the distribution of rents as unchangeable. This condition is clearly violated in a conflict situation.

The literature has found strong support for this. Recent evidence by Nunn and Qian (2014) shows that the provision of aid can become a source of conflict. Their analysis exploits time variation in food aid shipments due to changes in US wheat production and cross-sectional variation in a country's tendency to receive any US food aid. They find that an increase in food aid of 1000 MT by the US raises the likelihood of conflict incidence by 0.3 percentage points. However, they do not find significant effects during the recovery period. We confirmed this in our data. If anything, food aid shocks seem to play a positive role after civil war - at least if we control for the fact that countries that are more likely to receive food aid are more unstable.

But even if aid itself works it might increase violence. Crost et al. (2014) estimate the causal effect of a large development program on conflict in the Philippines through a regression discontinuity design that exploits an arbitrary poverty threshold used to assign eligibility for the program. They find that barely eligible municipalities experienced a large increase in conflict casualties compared to barely ineligible ones. This increase is mostly due to insurgent-initiated incidents in the early stages of program preparation. According to Crost et al. (2014) this is because insurgents try to sabotage the program because its success would weaken their support in the population. A more optimistic view on aid in the post-conflict context comes from the results in Fearon et al. (2009). They study the impact of a Community-Driven Reconstruction (CDR) program which was implemented by a major international nongovernmental organization in 42 communities in Northern Liberia. They find that recipients of the programme provided more resources in a public good provision experiment that was played later.

A lot of recent research has taken place in the context of ongoing insurgencies with US military involvement. This research points towards a complementarity of aid and security. Beath et al. (2012) study the effect of development aid program on well-being, attitudes towards the government, and levels of security in surrounding areas in Afghanistan. They find that the program has a positive effect on all three measures in relatively secure regions, but no effect on attitudes and security in areas with high levels of initial violence. Research in Berman et al. (2013) on Iraq suggests that it is the interaction between troop strength and (some) aid programs that reduces violence. They find that spending is more violence-reducing as the number battalions stationed in a district increases. They also find that the presence of Provincial Reconstruction Teams, their proxy for development expertise, increases the effectiveness of spending significantly.

This highlights that aid is a double-edged sword. It can clearly have a role but its effect will depend crucially on whether it can be captured and how well peace can be kept while it is distributed. A big problem is that foreign interventions and aid are often not actually driven by needs in the recipient country. Foreign aid is an arm of foreign policy in many countries and research has demonstrated this quite unambiguously.[53]

[53]See, for example, Kuziemko and Werker (2006). Qian (2014) provides a literature review.

### 8.3.2 The Role of Peace Missions

UN peacekeeping missions are an important instrument for external actors in the recovery period. Here there are no instruments or randomized control trials, which makes clean identification more difficult. Doyle and Sambanis (2000) argue that peace missions can contribute to peace. Collier (2008) finds a significant correlation between higher peace duration and peace missions controlling for a large set of economic and political controls. Doyle and Sambanis (2006) conclude that the deeper the underlying hostility and the shallower the residual state capacity in the affected country, the greater the international effort required for any successful peace building.

A main concern for identifying the effect of peace missions is selection which, according to Fortna (2008), exerts a downward bias on estimates. Peace missions are selecting into hard cases so that the effects that are found are a lower bound. However, there is no consensus in the literature regarding this so that unobserved heterogeneity remains a concern.[54] Gilligan and Sergenti (2007) use matching techniques on a sample of UN interventions in post-Cold-War to correct for non random assignment of UN peacekeeping missions and find that UN interventions are effective in the sample of post-civil conflict interventions. However, there is no causal effect of UN interventions while civil wars are still ongoing.

Disarmament is an obvious element leading over from short term stabilization to a sustainable peace.[55] In 31 months, the Sandinista National Liberation Front in Nicaragua was reduced from 90,000 members to just 15,520 active soldiers. A staggering 370,000 combatants were demobilized in Bosnia-Hercegovina in the five years following the Dayton peace settlement, leading to a noteworthy reduction in the number of arms in circulation. In Sierra Leone, expectations were even exceeded. Although previous estimates suggested that 45,000 combatants needed to be demobilized from the Revolutionary United Front (RUF), the Civil Defence Forces (CDF) and other militant groups, in practice no fewer than 75,490 combatants handed in their weapons. All three countries experienced economic recoveries thereafter.

There are, however, few reliable studies of the impact of these initiatives. An exception is Blattman and Annan (2015) who study the importance of job provision through a randomized experiment in Liberia. They conclude that work training programs supported by capital inputs decrease the incentives for ex-fighters to pursue illegal activities.

The World Bank is committed to DDR and has, for example, been heavily involved in the planning and implementation of a multi-country demobilization and reintegration program in the Great Lakes region.[56] In its final report the Bank writes *From the outset of the MDRP, greater consideration should have been given to the political dimensions of DDR, which hampered key programs such as in the DRC from moving ahead.* (World

[54]See Fortna (2008) for an excellent discussion.

[55]For a detailed discussion of DDR's see Banholzer (2014).

[56]Of the seven countries involved, Angola, Burundi, the Central African Republic, the Democratic Republic of Congo, the Republic of Congo (ROC), Rwanda and Uganda, the ROC stands out as relative failure in the demobilization effort followed by the DRC. It is striking that these are also the countries with the worst performance of recovery.

Bank (2010), p. 3) This point brings us to one of the core issues of this report. Politics is at the heart of stable peace and recovery.

### 8.3.3 Political Exclusion

We find both at the country and ethnic group levels that the share of excluded population as measured by the GROWup can predict conflict. Other recent studies support the idea that political exclusion has real effects on the distribution of resources, i.e. it could be part of a latent conflict within countries. Exclusion implies huge risks as it amplifies economic imbalances and could in this way increase the willingness to engage in violence. In the GROWup data we find that countries which exclude more than 20 percent of their population from power are markedly more likely to experience violence and destabilization. This is particularly interesting as it fits perfectly to the observation made by Rodrik (1999) more than a decade ago: sudden economic reversals can be explained by how societies deal with internal conflict.

Strikingly, political exclusion is also a key variable in a recent literature in political science that tries to forecast conflict out of sample. Goldstone et al. (2010), for example, come up with a list of risk factors which predict the risk of conflict onset when comparing two countries on the same sub-continent. The list includes state-led discrimination. A more recent project, the International Crisis Early Warning System (ICEWS), provides a 3 month prediction of the incidence of events like rebellions, ethnic conflict and insurgencies. Again, the structural variables identified in this forecasting exercise include the number of excluded groups and the share of excluded population.

But can this mechanism be actually addressed by policy? A lot of research has gone into showing that institutions are essential ingredients for economic development generally and the results in this report also indicate that they might be key mediating factors. However, in a post-conflict setting changes in formal institutions might not appear possible or even risky.[57] It might then still be possible to introduce informal institutions. Blattman et al. (2014) study the role of new institutions in support of the formal ones in the development of Liberia. They argue that the promotion of "Alternative Dispute Resolution" institutions for the protection of property rights inhibits local violence.

The codebook published for the EPR data reveals how these variables are coded.[58] All politically relevant ethnic groups were categorized according to the degree of access to central state power by those who claimed to represent them. State power refers to executive power only, disregarding access to legislative and judicial institutions. Depending on where political power is effectively exercised, this can be the presidency, the cabinet, and senior posts in the administration in democratic regimes; the army command in military dictatorships; or the ruling party leadership in one-party states. The three categories included in excluded groups are

- *powerless*: Elite representatives hold no political power (or do not have influence

[57] Flores and Nooruddin (2009), for example, argue that post conflict democratizations hinder growth because they reduce commitment power.

[58] See codebook for Vogt et al. (2015).

on decision making) at the national level of executive power – although without being explicitly discriminated against.

- *discriminated*: Group members are subjected to active, intentional, and targeted discrimination by the state, with the intent of excluding them from political power. Such active discrimination can be either formal or informal, but always refers to the domain of public politics (excluding discrimination in the socio-economic sphere).

- *self-exclusion*: The special category of self-exclusion applies to groups that have excluded themselves from central state power, in the sense that they control a particular territory of the state which they have declared independent from the central government.

From this perspective it should be clear that policy changes are possible on this dimension. Discriminating policies in particular appear to be part of a political situation that can escalate into violence. Amending this could be easier than formal institutional changes. Discrimination by the ethnic group in power could, of course, be endogenously determined. One part of this is inter-ethnic trust which has received a lot of attention in recent research.

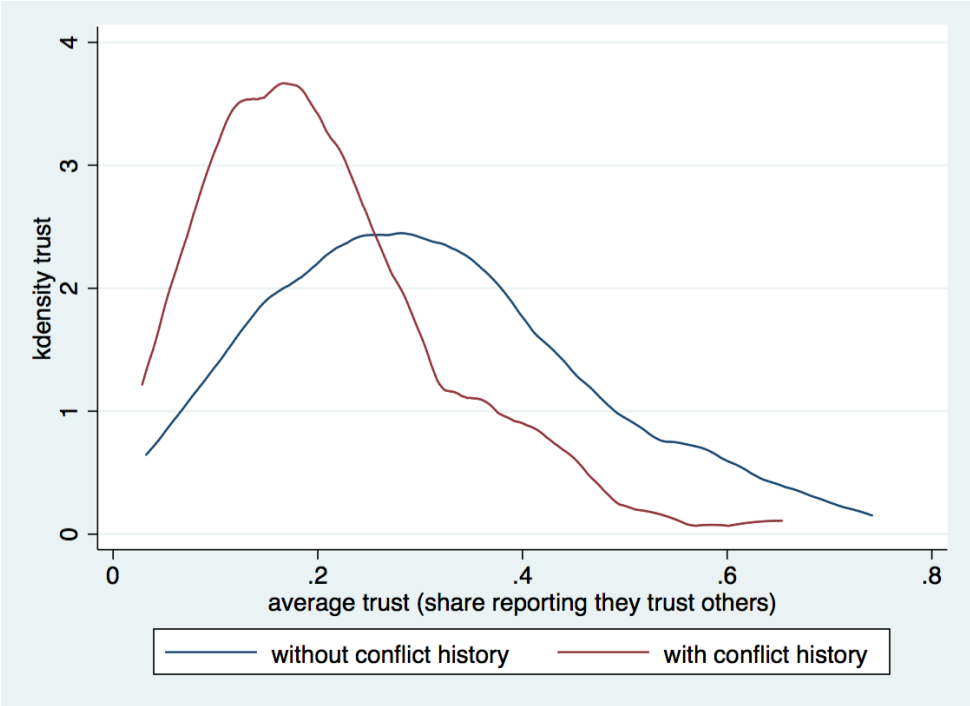
### 8.3.4 Trust and Conflict

Figure 19 shows the share of people of people who report that "Most people can be trusted" in the World Value Survey (the alternative is "You can't be too careful."). The blue line shows the distribution in countries that have not experienced civil conflict in the sample. The red line shows the distribution of trust in countries that have. Countries with a conflict history show drastically lower levels of trust.

These findings are taken up by Rohner et al. (2013b) who argue that this pattern could be explained by a three-way relationship between interethnic trust, trade and conflict. Low levels of trust lead to low levels of economic interactions which, in turn, makes conflict more likely. Conflict, on the other hand, destroys trust. The incidence of conflict can be reduced by policies abating cultural barriers, fostering inter-ethnic trade and human capital, and shifting beliefs. In this view peacekeeping forces by themselves or externally imposed regime changes, have no enduring effects.

Rohner et al. (2013a) bring this idea to data on trust and ethnic identity in Uganda. Using individual and county-level data, they document large causal effects on trust and ethnic identity of an outburst of ethnic conflicts in 2002–2005. Using data from the Afrobarometer and ACLED they find that more intense fighting decreases generalized trust and increases ethnic identity. Controlling for the intensity of violence during the conflict, they also document that post-conflict economic recovery was slower in ethnically fractionalized counties. Again, the interpretation of this fact is that trust is needed for economic activity and that this trust breaks down across ethnic groups.

Figure 19: Trust and Conflict in the Cross Section




The problem with a lack of trust and strong group identities is that they penetrate and pervert formal institutions. The ethnic politics analyzed by Burgess et al. (2015) is just one example. Shayo and Zussman (2011), for example, use data from Israeli small claims courts to show that Arab and Jewish judges displayed significant judicial ingroup bias. Furthermore, this bias is strongly associated with terrorism intensity in the vicinity of the court in the year preceding the ruling. Confidence-building is also a crucial ingredient for the establishment of a fertile investment climate, which in turn is a trigger of economic development post conflict. This is the core message of the World Bank Report by Mills and Fan (2006).

An important role of increasing trust doubtlessly goes to the media. It has been shown, for example, that hate radio in Rwanda played a critical role in the extent of ethnic violence during the genocide.[59] Other research has shown that media coverage can have strong effects on political preferences more generally.[60] Perhaps the most direct proof of the crucial role played by the media in the post-conflict situation comes from DellaVigna et al. (2014). The authors exploit variation in radio reception of nationalistic Serbian radio in border regions in Croatia. The authors argue that Croats listened to Serbian radio for its consumption value but reacted negatively to nationalistic messages intended for Serbian ears. Election results and street surveys are used to elicit preference for extremist nationalist parties among Croats who are able to listen to Serbian radio and those that do not. The authors find that 3 to 4 percent of those

[59]See Yanagizawa-Drott (2014).

[60]See, for example, Enikolopov et al. (2011) and DellaVigna and Kaplan (2007) who find large effects on voting shares.

Croatians who received the signal radicalized politically. This a relatively small effect but it nonetheless demonstrates that media messages sent in the aftermath of conflict affect attitudes and behavior.

Quantitative studies of reconciliation efforts are less common. Staub et al. (2005) evaluate a training of reconciliation they give to individuals in Rwanda who would then use this training in their communities. The effects of the training were evaluated not on the participants in the training, but on people in community groups they subsequently worked with. The participants in the trained group showed a significant reduction in trauma symptoms, both over time and in relation to the control groups, which showed slight deterioration. Bert and Marijke (2015) argue that the post conflict trials in Rwanda (gacaca) played an important role in building inter ethnic trust. Trust here is measured through structured interviews in which respondents are asked to tell their life. Respondents are also asked for every year to recall their level of trust towards the other ethnicity. This allows the researchers to construct time series of reported trust and at the same time link changes in trust to specific factors. They find a robust recovery in trust in the period 2007-2010 which relates to the unfolding and ending of the gacaca.

The impact of justice on stability can even be traced back to our findings regarding foreign investment. Appel and Loyle (2012) analyze the role of Post Conflict Justice (PCJ) institutions in attracting FDI in post-conflict countries. They show that post-conflict states that adopt PCJ are more likely to receive higher levels of FDI compared with post-conflict states that refrain from implementing these institutions.

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# Appendix

## A1. Robustness Check on Conflict Incidence and Economic Performance

In this appendix we show several robustness checks of the models described in equation (1). In Table A1 we add to the model described in equation (1) the first lag of GDP/night light per capita growth rate and results are robust to this.[61] In order to exclude the hypothesis that the measured impact is driven by time varying characteristics of the country-level economy rather than conflict itself, we ran specifications that include country-specific time trends. Table A2 reports the results. Again, the estimated coefficients of the "conflict incidence" variable are very close to the ones reported in Table 1.

Tables A3 and A4 report results obtained from a subsample of countries, i.e. data used in Miguel and Satyanath (2011) . Table A3 Panel A shows results of the regression model of equation (1), while Panel B includes the rainfall shocks variables used in Miguel and Satyanath (2011). Specifications reported in Table A4 Panel A and B include country-specific time trends. Again, results are completely robust. This suggests that when controlling for the most common instrument for GDP shocks directly nothing happens to the correlation between violence and GDP growth. This to us indicates that our results stem from a causal chain that must run the other direction.

[61] However, this specification is not correct, strictly speaking, as it is affected by the so-called "Nickel bias". From Nickell (1981) we learn that the demeaning process implemented in fixed effect regressions creates a correlation between regressors and error.

Table A1: Controlling for Lagged Economic Performance

**Panel A**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.009** | -0.014*** | -0.047*** |
| | (-0.004) | (-0.004) | (-0.015) |
| Lagged growth | 0.139*** | 0.193*** | -0.148** |
| | (-0.036) | (-0.048) | (-0.075) |
| Observations | 7,887 | 7,884 | 3,737 |
| R-squared | 0.117 | 0.158 | 0.290 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

**Panel B**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.017*** | -0.025*** | -0.067*** |
| | (-0.005) | (-0.005) | (-0.018) |
| Lagged growth | 0.137*** | 0.190*** | -0.147* |
| | (-0.036) | (-0.048) | (-0.075) |
| Observations | 7,887 | 7,884 | 3,737 |
| R-squared | 0.118 | 0.162 | 0.291 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). Variable "Lagged growth" controls for one period lagged GDP per capita growth in columns (1) and (2), and one period lagged night light per capita growth in column (3). Panel A uses as "conflict incidence" a dummy that takes a value of one if in country $i$ at time $t$ the number of battle related deaths is higher than 0. In Panel B "Conflict incidence" dummy takes a value of one if the number of battle deaths is above a threshold of 0.008 fatalities per 1000 population.

Table A2: Controlling for Country-specific Time Trend

**Panel A**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.010** | -0.015*** | -0.034** |
| | (-0.004) | (-0.004) | (-0.015) |
| Observations | 8,004 | 8,076 | 3,924 |
| R-squared | 0.116 | 0.151 | 0.307 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Country-time trend | YES | YES | YES |

**Panel B**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.020*** | -0.028*** | -0.078*** |
| | (-0.005) | (-0.005) | (-0.027) |
| Observations | 8,004 | 8,076 | 3,924 |
| R-squared | 0.119 | 0.156 | 0.309 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Country-time trend | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). Panel A uses as "conflict incidence" a dummy that takes a value of one if in country $i$ at time $t$ the number of battle related deaths is higher than 0. In Panel B "Conflict incidence" dummy takes a value of one if the number of battle deaths is above a threshold of 0.008 fatalities per 1000 population.

Table A3: Using Miguel and Satyanath (2011) Data

**Panel A**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.039** | -0.034*** | -0.145** |
| | (-0.01) | (-0.01) | (-0.048) |
| Observations | 1,189 | 1,128 | 697 |
| R-squared | 0.120 | 0.153 | 0.336 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

**Panel B**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.039*** | -0.034*** | -0.145** |
| | (-0.011) | (-0.008) | (-0.056) |
| Rainfall (*t*) | 0.027** | 0.028*** | -0.02 |
| | (-0.012) | (-0.010) | (-0.051) |
| Rainfall (*t-1*) | -0.026* | -0.012 | -0.008 |
| | (-0.015) | (-0.012) | (-0.067) |
| Rainfall (*t-2*) | -0.015 | -0.024** | -0.165 |
| | (-0.014) | (-0.011) | (-0.107) |
| Observations | 1,073 | 1,014 | 592 |
| R-squared | 0.141 | 0.224 | 0.346 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). Variable "conflict incidence" is a dummy that takes a value of one if the number of battle deaths is above a threshold of 0.008 fatalities per 1000 population. Panel B adds rainfall variation variables: variable "rainfall(*t*)" measures the log of rain precipitation in country *i* at time *t*, variables "rainfall(*t-1*)" and "rainfall(*t-2*)" are its first and second lag respectively.

Table A4: Using Miguel and Satyanath (2011) Subsample and Country-specific Time Trends

**Panel A**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.038*** | -0.031*** | -0.153*** |
| | (-0.01) | (-0.01) | (-0.056) |
| Observations | 1,189 | 1,128 | 697 |
| R-squared | 0.147 | 0.186 | 0.386 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Country-time trend | YES | YES | YES |

**Panel B**

| | (1) GDP growth | (2) GDP growth | (3) Night light growth |
|---|---|---|---|
| Conflict Incidence | -0.038*** | -0.031*** | -0.160** |
| | (-0.011) | (-0.008) | (-0.069) |
| Rainfall ($t$) | 0.032** | 0.039*** | -0.006 |
| | (-0.013) | (-0.011) | (-0.057) |
| Rainfall ($t$-$1$) | -0.027* | -0.011 | -0.038 |
| | (-0.015) | (-0.012) | (-0.094) |
| Rainfall ($t$-$2$) | -0.014 | -0.026** | -0.172 |
| | (-0.014) | (-0.012) | (-0.114) |
| Observations | 1,073 | 1,014 | 592 |
| R-squared | 0.174 | 0.261 | 0.399 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Country-time trend | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable in columns (1) and (2) is the GDP per capita growth computed using Penn World Table data and World Bank data respectively. Column (3) uses growth of night light per capita form the National Oceanic and Atmospheric Administration (NOAA). Variable "conflict incidence" is a dummy that takes a value of one if the number of battle deaths is above a threshold of 0.008 fatalities per 1000 population. Panel B adds rainfall variation variables: variable "rainfall($t$)" measures the log of rain precipitation in country $i$ at time $t$, variables "rainfall($t$-$1$)" and "rainfall($t$-$2$)" are its first and second lag respectively.

## A2. Recovery after Civil Conflict at the Local Level

We explore economic impact of conflict and recovery from a group perspective, using GROWup dataset. This dataset provides satellite night light data at the ethnic group level. Data is provided on 502 groups for the period 1995-2010. We use night light as a proxy of economic activity. Conflict incidence is defined through more than 25 fatalities in ethnic conflict. We run the following regression:

$$g_{it} = \theta_i + \eta_t + \beta incidence_{it} + \gamma recovery_{it} + \epsilon_{it}$$

where $g_{it}$ is night light per capita growth of group $i$ in year $t$, $incidence_{it}$ is conflict incidence, $recovery_{it}$ controls for the years that follow the end of the conflict, $\theta_i$ and $\eta_t$ are group and year fixed effects respectively.

Table A5 reports the results. In columns (1) and (2) we find a negative and statistically significant effect of incidence on per capita light growth. The specification of column (2) suggests a significant catch up during the three years after the conflict ends. This recovery is not driven by any specific phase of the recovery. In fact, this is not driven by a particular year as shown in column (1). The estimated coefficient of variables *first-second-third-fourth year after conflict*, are all positive but not statistically significant. In columns (3) and (4) we show that the reduction and the increase in light per capita growth are composed by two factors; light growth falls (raise) during conflict (recovery) and this is partially offset by a negative (positive) effect on population growth.

Table A5: Country level GDP growth during peace, war and recovery

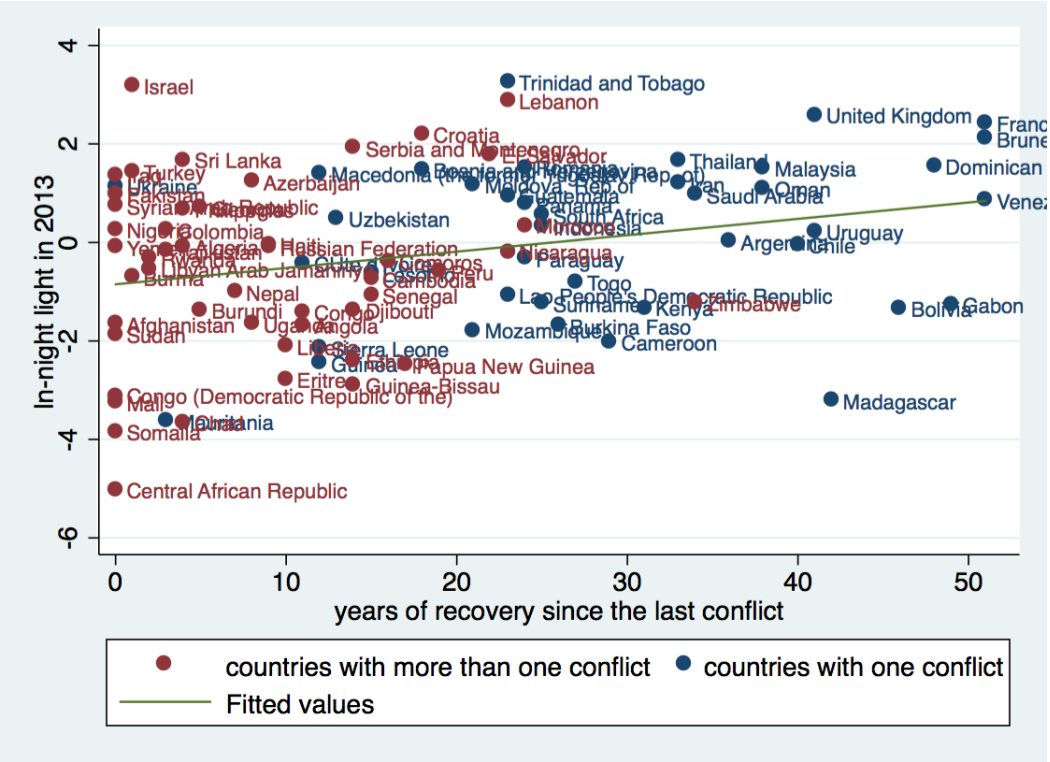
| | (1)<br>light per capita growth | (2)<br>light per capita growth | (3)<br>light growth | (4)<br>population growth |
|---|---|---|---|---|
| Conflict Incidence | -0.045* | -0.046* | -0.048* | -0.002** |
| | (0.026) | (0.027) | (0.027) | (0.001) |
| first three years after conflict | | 0.063* | 0.065* | 0.001 |
| | | (0.034) | (0.034) | (0.001) |
| first year after conflict | 0.051 | | | |
| | (0.036) | | | |
| second year after conflict | 0.079 | | | |
| | (0.054) | | | |
| third year after conflict | 0.070 | | | |
| | (0.055) | | | |
| fourth year after conflict | 0.015 | | | |
| | (0.048) | | | |
| Group fixed effects | YES | YES | YES | YES |
| Year fixed effects | YES | YES | YES | YES |
| Observations | 7,949 | 7,949 | 7,949 | 7,949 |
| R-squared | 0.268 | 0.268 | 0.268 | 0.045 |
| Number of groups | 502 | 502 | 502 | 502 |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. We use data over the period 1995-2010. Unit of observation are ethnic groups. "Light per capita growth", "Light growth" and "Population growth" are the log difference of the variable to the previous year. "Conflict incidence" is a dummy defined through more than 25 fatalities in ethnic conflicts. "First three years after conflict" is a dummy that takes a value of 1 if the group is experiencing one of the first three years after the conflict ends- Dummies "First year after conflict", "Second year after conflict", "Third year after conflict" and "Fourth year after conflict" control respectively for the first, second, third and fourth year after conflict.

## A3. Country-level Economic Performance and Recovery Length

Figure A1 shows the country-level log of night light in 2013 while the x-axis reports the number of years a country has been in recovery after the last episode of violence (violence is defined as a year with at least 0.008 battle related death per 1,000 population. We can observe the same pattern shown in Figure 7:[62] the relationship between night light and length of the last recovery is positive.

Figure A1: Night light in 2013 and Recovery Length




[62] Where we used the log of GDP per capita in 2014 as a proxy of country level economic performance.

## A4. Robustness Check on Internal Conflicts and Refugee Flows

In this appendix, we consider famine episodes as alternative source of refugee movements and we check robustness of the estimates in table 6 when accounting for it. In the data, we indeed observe a strong correlation between presence of conflict and famine. Descriptive statistics shown in table A6 suggest that we have famine episodes 0.4% of all country-year observations without conflict versus 4.2% for country-year observations with conflict (10 times higher).

Table A6: Descriptive Statistics: Conflicts and Famine Episodes

| **Variable** | **Obs** | **Mean** | **Std. Dev.** | **Min** | **Max** |
|---|---|---|---|---|---|
| Famine incidence without conflict | 11470 | 0.004 | 0.061 | 0 | 1 |
| Famine incidence with conflict | 1314 | 0.042 | 0.200 | 0 | 1 |

This difference also holds within countries. When regressing famine incidence on conflict controlling for country fixed effects, the coefficient obtained is positive and significant. This means that even within the same country, famine episodes are more likely to occur during conflict years and this may lead to substantial bias in estimates shown in table 6.

However, even after controlling for famine incidence, table A7 shows that these estimates do not change substantially suggesting that the direct effect of famine on refugee flows is orthogonal to the effect of conflicts on refugee flows.

Table A7: Civil Conflict and Refugee Stock: Robustness to Famine Episodes

| VARIABLES | (1) Refugees | (2) Refugees | (3) Refugees | (4) Refugees | (5) Refugees | (6) Refugees |
|---|---|---|---|---|---|---|
| 25+ battle deaths | 142,234*** | | | | | |
| | (11,994) | | | | | |
| 1000+ battle deaths | | 335,925*** | 487,063*** | 422,675*** | 462,213*** | 465,089*** |
| | | (31,232) | (46,288) | (42,036) | (43,964) | (44,026) |
| 25-1000 battle deaths | | 66,257*** | 66,828*** | 57,385*** | 41,491*** | 38,514*** |
| | | (7,049) | (7,135) | (6,775) | (6,414) | (6,425) |
| Incidence of Famine Event | 66,109* | 27,663 | 12,274 | 26,516 | 25,411 | 24,149 |
| | (35,806) | (34,261) | (35,128) | (34,463) | (34,155) | (34,123) |
| year before war | | | -5,904 | | | |
| | | | (20,702) | | | |
| first year of war | | | -384,260*** | | | |
| | | | (52,456) | | | |
| last year of war | | | | -259,647*** | -256,688*** | -256,248*** |
| | | | | (52,898) | (52,540) | (52,521) |
| 1st recovery year | | | | 102,460*** | 155,753*** | 160,886*** |
| | | | | (27,452) | (28,373) | (28,363) |
| 2nd recovery year | | | | | 123,301*** | 128,104*** |
| | | | | | (20,554) | (20,534) |
| 3rd recovery year | | | | | 112,489*** | 117,143*** |
| | | | | | (20,410) | (20,407) |
| 4th recovery year | | | | | 103,265*** | 107,637*** |
| | | | | | (19,980) | (19,979) |
| 5th recovery year on | | | | | 77,023*** | |
| | | | | | (8,617) | |
| 5 + recovery years | | | | | | 116,015*** |
| | | | | | | (22,658) |
| 6th recovery year | | | | | | 109,942*** |
| | | | | | | (23,734) |
| 7th recovery year | | | | | | 108,840*** |
| | | | | | | (24,807) |
| 8th recovery year | | | | | | 89,189*** |
| | | | | | | (15,645) |
| 9th recovery year | | | | | | 84,825*** |
| | | | | | | (16,099) |
| 10 + recovery years | | | | | | 73,544*** |
| | | | | | | (8,679) |
| Observations | 12,784 | 12,784 | 12,763 | 12,784 | 12,784 | 12,784 |
| R-squared | 0.436 | 0.467 | 0.489 | 0.478 | 0.484 | 0.485 |
| Country and Year FE | YES | YES | YES | YES | YES | YES |

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Country-level data on yearly stocks of refugees are gathered from UNCHR database. In column (1) "25+ battle deaths" is the definition from PRIO dataset of at least 25 battle related deaths in a given year. In column (2)-(6) internal conflict, i.e. variable "1000+ battle deaths", is defined as a year in which violence involves more than 1000 fatalities. Variable "25-1000 battle deaths" controls for years in which fightings cause a number of deaths between 25 and 1000. "Year before war" is a dummy that controls for years with no violence or violence that involves between 25 and 1000 fatalities, followed by a year with at least 1000 battle related deaths. Variables "first year of war" and "last year of war" are dummies that take a value of one during the first and the last year of civil war respectively. Dummies "$1^{st}$ recovery year", "$2^{nd}$ recovery year", etc. take a value of 1 in the $x^{th}$ year after the war ends.

## A5. Recovery after Conflict and Peace Stability

Table A8 reports GDP per capita growth rates of a subset of countries. We exclude countries that, during the observed time period, never had an armed conflict and countries which experienced less than 5 years of recovery. In Panel A we report growth rates of GDP during four periods: conflict years; peace years; first five recovery years and fragile peace years.[63] Panel B reports information about countries that experienced at least one year of armed conflict, but that cannot be classified as "fragile peace" countries. As mentioned in the main text, on average, the growth rate of GDP per capita during recovery period which is followed by conflict is not lower than the average growth rate during recovery.

[63] A country is in a fragile peace year if it is experiencing one of the first five years of recovery but will relapse into conflict within the next five years.

Table A8: Country level GDP growth during peace, war and recovery

**Panel A: Countries with fragile peace years**

| Country | GDP growth (war) | GDP growth (peace) | GDP growth (first 5 years of recovery) | GDP growth (fragile peace) |
|---|---|---|---|---|
| Liberia | -0.069 | 0.008 | -0.064 | -0.012 |
| Eritrea | -0.009 | -0.001 | -0.031 | -0.006 |
| Somalia | -0.010 | -0.009 | -0.029 | -0.021 |
| Comoros | -0.036 | 0.006 | -0.025 | -0.039 |
| Serbia and Montenegro | -0.070 | 0.008 | -0.018 | -0.044 |
| Papua New Guinea | 0.049 | 0.010 | -0.017 | 0.043 |
| Djibouti | 0.021 | -0.020 | -0.014 | -0.030 |
| Congo, Rep. | -0.010 | 0.022 | -0.004 | 0.006 |
| Côte d'Ivoire | -0.027 | 0.009 | -0.004 | -0.005 |
| Sudan | 0.025 | 0.004 | -0.002 | -0.013 |
| Haiti | -0.037 | 0.002 | 0.001 | -0.018 |
| Niger | -0.008 | -0.008 | 0.001 | 0.001 |
| Venezuela RB | 0.016 | 0.005 | 0.003 | 0.009 |
| Morocco | 0.030 | 0.036 | 0.005 | 0.001 |
| India | 0.039 | 0.018 | 0.010 | 0.026 |
| Mexico | 0.035 | 0.019 | 0.011 | -0.104 |
| Senegal | 0.009 | 0.000 | 0.012 | 0.007 |
| Iran,Islamic Rep. | 0.006 | 0.030 | 0.019 | 0.026 |
| Pakistan | 0.023 | 0.027 | 0.021 | 0.017 |
| Spain | 0.020 | 0.033 | 0.021 | 0.027 |
| Ethiopia | 0.016 | 0.012 | 0.022 | 0.019 |
| Congo, Dem. Rep. | -0.027 | -0.012 | 0.026 | 0.030 |
| Peru | 0.007 | 0.028 | 0.026 | 0.036 |
| Nicaragua | -0.067 | 0.024 | 0.026 | 0.293 |
| Mali | 0.013 | 0.015 | 0.026 | 0.026 |
| United Kingdom | 0.025 | 0.022 | 0.027 | 0.028 |
| Indonesia | 0.032 | 0.044 | 0.030 | 0.056 |
| Burundi | -0.020 | 0.017 | 0.032 | 0.009 |
| Cambodia | 0.000 | 0.050 | 0.037 | -0.040 |
| Nigeria | 0.008 | 0.008 | 0.037 | 0.044 |
| Malaysia | 0.035 | 0.045 | 0.038 | 0.068 |
| Croatia | -0.041 | 0.018 | 0.040 | 0.027 |
| El Salvador | -0.017 | 0.024 | 0.041 | 0.037 |
| Sri Lanka | 0.037 | 0.042 | 0.045 | 0.037 |
| Uzbekistan | 0.046 | 0.013 | 0.053 | 0.024 |
| Tajikistan | -0.044 | 0.048 | 0.054 | 0.002 |
| Georgia | 0.087 | 0.052 | 0.055 | 0.095 |
| Zimbabwe | -0.007 | 0.008 | 0.064 | 0.134 |
| Iraq | 0.040 | 0.034 | 0.082 | 0.025 |
| Chad | -0.002 | 0.058 | 0.092 | 0.092 |
| Lebanon | -0.046 | 0.056 | 0.099 | 0.097 |
| Azerbaijan | -0.002 | 0.120 | 0.120 | 0.115 |
| Rwanda | -0.011 | 0.030 | 0.172 | 0.206 |

**Panel B: Countries without fragile peace years**

| Country | GDP growth (war) | GDP growth (peace) | GDP growth (first 5 years of recovery) |
|---|---|---|---|
| Suriname | -0.005 | 0.016 | -0.087 |
| Cameroon | 0.042 | 0.005 | -0.055 |
| Romania | -0.082 | 0.044 | -0.045 |
| Bolivia | 0.061 | 0.007 | -0.026 |
| Paraguay | 0.054 | 0.016 | -0.021 |
| South Africa | -0.016 | 0.016 | -0.011 |
| Guinea-Bissau | 0.016 | -0.001 | -0.006 |
| Togo | 0.016 | 0.002 | -0.002 |
| Guinea | 0.021 | 0.000 | 0.000 |
| Burkina Faso | -0.028 | 0.013 | 0.001 |
| Chile | -0.070 | 0.030 | 0.006 |
| Kenya | -0.016 | 0.006 | 0.006 |
| Madagascar | -0.053 | -0.006 | 0.008 |
| Argentina | 0.001 | 0.019 | 0.010 |
| Guatemala | 0.015 | 0.014 | 0.016 |
| Syrian Arab Republic | -0.106 | 0.025 | 0.017 |
| Nepal | 0.018 | 0.015 | 0.020 |
| Egypt, Arab Rep. | 0.028 | 0.036 | 0.023 |
| Bangladesh | 0.011 | 0.010 | 0.026 |
| Trinidad and Tobago | 0.014 | 0.031 | 0.028 |
| Uruguay | -0.033 | 0.020 | 0.033 |
| Macedonia (the former Yugoslav Rep. of) | -0.041 | 0.012 | 0.033 |
| Lao PDR | 0.062 | 0.039 | 0.035 |
| Mozambique | 0.007 | 0.023 | 0.037 |
| Panama | 0.006 | 0.037 | 0.037 |
| Gabon | 0.036 | 0.018 | 0.041 |
| Ghana | -0.052 | 0.014 | 0.041 |
| Oman | 0.106 | 0.029 | 0.042 |
| Lesotho | -0.062 | 0.030 | 0.043 |
| Thailand | 0.037 | 0.047 | 0.043 |
| Dominican Republic | -0.129 | 0.036 | 0.043 |
| France | 0.044 | 0.023 | 0.044 |
| Algeria | -0.008 | 0.028 | 0.067 |
| Yemen | 0.014 | 0.032 | 0.070 |
| Sierra Leone | -0.047 | 0.038 | 0.081 |
| Bosnia and Herzegovina | 0.125 | 0.091 | 0.249 |

GDP per capita growth rates are computed using data from Penn World Table over the time period 1950-2010. Information is provided for a subset of countries. "Conflict" is defined as a year in which the number of battle related deaths is greater than zero. In Panel A and Panel B countries are sorted by the average growth rate of GDP per capita during the first five years of recovery.

# Data Appendix

## D1. Uppsala Conflict Data Program Battle-Related Dataset

The Uppsala Conflict Data Program (UCDP) collects information on a large number of aspects of armed conflicts occurred since 1946. The UCDP provides several datasets that allow to explore different features of armed conflicts. In this report we make a large use of the UCDP Battle-Related Dataset. This dataset provides yearly information on country-level number of fatalities related to combat, the time period covered is 1946-2014.

The data on battle-related deaths is collected through the use of news sources. All reports which contain information about individuals killed or injured in fighting are gathered and coded manually into an event-year level dataset. For every event, several details are recorded and translated into variables: the date and location of the event, the reporting source, the primary source, the actors involved, what happened, and three estimates of fatalities caused by the event (low, high, and best estimate).

For the purpose of the present report, we focus on three variables provided by the UCDP Battle-Related Dataset that we describe below. These variables describe the *type* of the violent event, its *location* and the estimate of the *number of fatalities*.

### Type of conflict

The UCDP/PRIO Armed Conflict Dataset identifies four different types of conflict. For each conflict event coded in the dataset we can distinguish among:

1. Extra-systemic conflict: occurs when a government of a state is fighting to retain the control of a territory outside the state system.

2. Interstate conflict: occurs between two or more different states.

3. Internal conflict: occurs when the government of a state fights against one or more internal groups. In this type of conflict there is no intervention from other states.

4. Internationalized internal conflict: occurs when the government of a state fights against one or more internal groups and external states intervene to support one or both sides.

Given that in this report we analyze civil conflicts, we only focus on two types of conflict reported in this dataset, namely internal conflict and internationalized internal conflict, i.e. conflict of types 3 and 4.

### Location

In order to assign a location to conflict events, we make use of the variable *locationinc*, that reports "the name of the country/countries whose government(s) has a primary claim to the object in dispute". In case that more than one country name is included,

the location is assigned to the country where the conflict is fought. If the territory over which the conflict is fought covers more than one country (e.g. the fighting takes place on the border between two countries), the same estimate is assigned to each country that is covered by the territory.

### Number of battle-related deaths

The UCDP Battle-related deaths Dataset provides three estimates of the number of fatalities that each violent event implies. These variables are:

- *bdlow*: this variable provides the low estimate of the occurred battle related deaths for each conflict event and year. This estimate is the results of the aggregation of low estimates for all the fatalities related to battle-related incidents.
- *bdhigh*: this variable results from the aggregated high estimates for all battle-related incidents in a given conflict event and year.
- *bdbest*: the estimate consists of the aggregated most reliable numbers for all battle-related fatalities in a given conflict event and year. If different reports provide different estimates, the estimate provided by the most reliable source is provided. If no such distinction can be made, the lowest among these numbers is used.

In this report we mainly use variable *bdbest*.

Recall that in the analyzes where we use this data the unit of observation is country-year. Since the UCDP Battle-related deaths Dataset provides information at conflict event-year level, we aggregate *bdlow*, *bdhigh* and *bdbest* by summing them for each country year.

To sum up, we make a three step re-coding of the dataset. We first exclude the observations that are not related to internal conflicts. We then locate each observation to one (or more) country. Finally we sum the estimated battle related deaths by country-year. We end up with a panel that reports three estimates of battle related deaths.

## D2. Geographical Research on War, Unified Platform ($Grow^{up}$) Dataset

$Grow^{up}$ federated data platform provides access to disaggregated, integrated and spatially explicit conflict related data. It offers research-ready data on ethnic groups and intrastate conflict compiled from various sources and provided in group-year and country-year format.

The sample universe of ethnic groups in the RFE group-level data is adopted from the EPR (Ethnic Power Relations) Core dataset (Cederman et al., 2010). It covers all countries between 1946 and 2013 except failed states, overseas colonies and countries with fewer than 500,000 inhabitants. Newly independent states are included in the dataset beginning with the year of independence. From this country-year list, the EPR

Core dataset defines ethnicity as "any subjectively experienced sense of commonality based on the belief in common ancestry and shared culture". Only politically relevant ethnic groups are included in the dataset. An ethnic group is classified as relevant if "at least one political organization claims to represent it in national politics or if its members are subjected to state-led political discrimination". This yields 817 politically relevant ethnic groups in 141 countries in the EPR Core dataset.

**Access to Power**

Access to state power at national level for different ethnic groups is taken from the EPR dataset. In this dataset, state power refers to executive power only and disregards access to legislative and judicial institutions. The coding also focuses on absolute access to power, rather than under- or over-representation relative to demographic size. EPR measures power access with a roughly ordinal scale composed of three main categories. Ethnic groups either control power alone, share it with other ethnic groups, or are excluded from executive state power. Each of these categories can be divided into several sub-categories that rank power access on a scale from 1 (discriminated) to 7 (monopoly); self-exclusion ranks at 3. They are described as follows in the EPR 2014 codebook:

- The group rules alone:
  - Monopoly: Elite members hold monopoly power in the executive to the exclusion of members of all other ethnic groups.
  - Dominance: Elite members of the group hold dominant power in the executive but there is some limited inclusion of "token" members of other groups who however do not have real influence on decision making.
- The group shares power:
  - Senior Partner: Representatives of the group participate as senior partners in a formal or informal power-sharing arrangement. By power sharing, we mean any arrangement that divides executive power among leaders who claim to represent particular ethnic groups and who have real influence on political decision making.
  - Junior Partner: Representatives participate as junior partners in government.
- The group is excluded:
  - Powerless: Elite representatives hold no political power (or do not have influence on decision making) at the national level of executive power- although without being explicitly discriminated against.

- Discrimination: Group members are subjected to active, intentional, and targeted discrimination by the state, with the intent of excluding them from political power. Such active discrimination can be either formal or informal, but always refers to the domain of public politics (excluding discrimination in the socio-economic sphere).
- Self-exclusion: The special category of self-exclusion applies to groups that have excluded themselves from central state power, in the sense that they control a particular territory of the state which they have declared independent from the central government".

### Ethnic Conflicts

The information on ethnic conflicts in the RFE group-level data is compiled from two different sources: The ACD2EPR dataset (Wucherpfennig et al., 2012), the UCDP Actor Dataset (Uppsala Conflict Data Program 2014), and the Uppsala/PRIO Armed Conflict Database (ACD) (Gleditsch et al., 2002). The conflict data focuses on ethnic civil wars (Internal, and Interna- tionalized Internal Conflicts). For all conflict onset and incidence variables in the RFE group- level dataset, a conflict episode is only considered terminated if there is no conflict-related activity in the following two calender years where "Conflict-related activity" refers to the UCDP threshold of at least 25 battle deaths per annum.

### Geographical Data

Geographical data (night light intensity and population) at ethnic group level are raster derived data, created by overlaying the GeoEPR 2014 settlement polygons with geospatial raster datasets. Night light intensity data is taken from DMSP-OLS [64] Nighttime Lights Time Series (Average Visible, Stable Lights, and Cloud Free Coverages). All nightlights within the group polygon are aggregated.

## D3. Polity IV Dataset

The Polity datasets aim at coding authority characteristics of states in the world system for purposes of quantitative analysis. The Polity IV dataset covers all major (around 167 countries), independent states in the global system over the period 1800-2014.

### Location of the data

This dataset covers a very extended time period, thus it provides information about countries that do not exist anymore. In particular, in this report we deal with three countries (confederation of countries) that separated in the early 1990's, namely the Soviet Union, Yugoslavia and CzechoSlovak Republic. For each country belonging to these confederation, we do not have distinct information until year 1990-1991. For example, until year 1990, we have observations for CzechoSlovak Republic, but not for

[64] Defense Meteorological Satellite Program.

Czech Republic or the Slovak Republic. We deal with this issue in a very simple way: we impute to each member state the observations made on the confederation, until the last year the confederation existed. Hence, until year 1991, we assign to Czech Republic and Slovak Republic observations made on CzechoSlovak Republic. We apply the same procedure for each member state of the Soviet Union and Yugoslavia. Hence, until year 1990-1991 observations made on the Soviet Union will be assigned to Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, the Russian Federation, Tajikistan, Ukraine, Uzbekistan and information on Yugoslavia will be imputed to Croatia, Macedonia, Serbia and Montenegro and Slovenia.

### Variable *xconst*

In this report we use variable *xconst* to build our measure of strong executive constraint as in Besley and Mueller (2015b). This variable is on a seven point scale and the manual explains its construction as follows: "Operationally, this variable refers to the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities. Such limitations may be imposed by any "accountability groups". In Western democracies these are usually legislatures. Other kinds of accountability groups are the ruling party in a one-party state; councils of nobles or powerful advisors in monarchies; the military in coup-prone polities; and in many states a strong, independent judiciary. The concern is therefore with the checks and balances between the various parts of the decision-making process." [p. 24, Polity IV Dataset Users' Manual 2010]

We create a dummy that takes value 1 when *xconst* equals 7 following Besley and Mueller (2015b). The highest score of the variable *xconst* is only allocated if important legislation can be initiated by a parliament which holds the executive to account.

## D3. FDI data

We use four different datasets on foreign investments: data from the OECD, data from the UNCTAD, data from the World Bank Database and a unique data set from the Dutch Central Bank.

### OECD data

This data is provided by OECD international direct investment database. The dataset reports information on FDI financial flows (inward and outward) of the 34 OECD members over the time period 1985-2013.

Our goal is to have information on FDI financial flows regarding each single country in the world. We thus invert the point of view from which this data is interpreted. To do so, for each listed partner country and year we sum the inflows (outflows) received by (transferred to) OECD countries. The variable *inflows* is created by summing information on FDI outward flows from OECD countries. Conversely, the variable

*outflows* is generated by aggregating information of FDI inflows received by OECD countries.

As mentioned above, the data covers a time period that goes from 1985 to 2015. The dataset provides information on three countries that stopped existing in 1990-1991, namely Soviet Union, Yugoslavia and CzechoSlovak Republic. We deal with these three countries (confederations of countries) in a very simple way: we impute to each member state the observations made on the whole confederation until the last year the confederation existed. Hence from year 1985 to 1990-1991:

- information on CzechoSlovak Republic is imputed to Czech Republic and Slovak Republic;
- information on Soviet Union is imputed to Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russia, Tajikistan, Ukraine, Uzbekistan;
- information on Yugoslavia is imputed to Croatia, Macedonia, Serbia and Montenegro and Slovenia.

### UNCTAD data

UNCTADstat provides yearly country-level information FDI inflows and outflows. The time period covered is 1970-2013. As the OECD dataset, the UNCTAD dataset provides information on three countries that stopped existing in 1990-1991, namely Soviet Union, Yugoslavia and CzechoSlovak Republic. We implement the same "rule" we used with OECD data. Again, from year 1970 to 1990-1991:

- information on CzechoSlovak Republic is imputed to Czech Republic and Slovak Republic;
- information on Soviet Union is imputed to Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russia, Tajikistan, Ukraine, Uzbekistan;
- information on Yugoslavia is imputed to Croatia, Macedonia, Serbia and Montenegro and Slovenia.

### Wold Bank data

The World Bank database provides information at the country level on net inflows of FDI. The time span covered goes from 1970 to 2014.

### Dutch Central Bank data

The data comes from the Dutch central bank, De Nederlandsche Bank (DNB). This dataset provides information about investment inflows at country/year/sector level over the time period 1982-2013. We aggregate the data into sectors to avoid having too many zeros.

## D4. Refugees data

We exploit country-level data gathered from several sources. Data about refugees is provided by the UNHCR Population Statistics Database. The database provides information about UNHCR's populations of concern from the year 1951 up to 2014. This database lists seven categories: refugees, asylum-seekers, returned refugees, internally displaced persons (IDPs), returned IDPs, stateless persons and others of concern. For each group the database provides yearly information about their composition by location of residence and origin. We exploit only the data on refugees.

According to the UNHCR definition, refugees are "individuals recognized under the 1951 Convention relating to the Status of Refugees; its 1967 Protocol; the 1969 OAU Convention Governing the Specific Aspects of Refugee Problems in Africa; those recognized in accordance with the UNHCR Statute; individuals granted complementary forms of protection; or those enjoying temporary protection; and people in a refugee-like situation".

In particular, we are interested in the annual stock of refugees for each country of origin, i.e. how many people with refugees status have left their home country each year. Hence, for each country of origin we sum the stock of refugees reported in each host country. The resulting number will be the variable *refugees*.