Working paper

# The Economic Costs of Conflict

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# The Economic Cost of Conflict (IGC Report)

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## Contents



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# 1 Introduction

Recent years have seen a surge in the literature on armed conflict and terrorism.[1] This report aims to answer five (sets of) questions with a recently emerging part of this literature.

1. What evidence is there that upstream conflict prevention (in the form of capacity building etc) has materially/economically benefitted either the donor or receiving country?

2. What are the economic benefits in UN peacekeeping to either the UK or wider world?

3. What are the economic costs to a society without an effective or functioning security or defence apparatus?

4. Is it economically efficient to invest in defence engagement/upstream capacity building/conflict prevention? Is there a correlation between political stability/security and economic development?

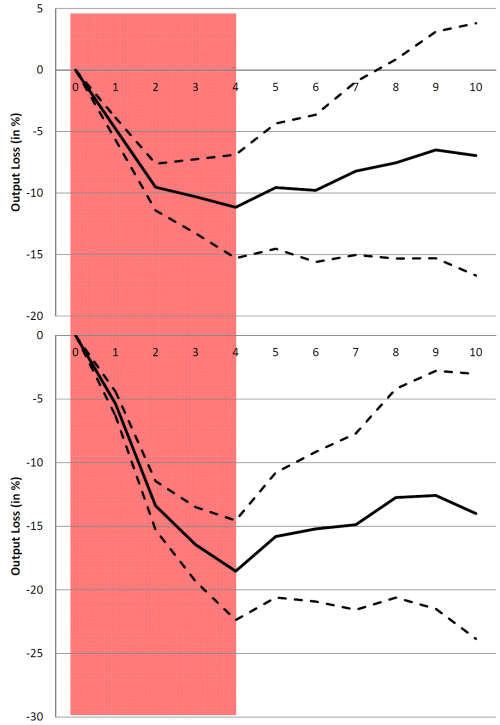
5. Is the UK's economy routinely negatively affected by conflict and instability around the world? Are there any examples of states whose instability has a negative impact on the UK economy? What are the economic costs to the UK in ignoring 'failed' states?

The economic cost of insecurity and violent conflict lies at the heart of most of these questions. How is violent conflict affecting economic outcomes? At the face of it the answer to this question is answerable with data on income and data on armed conflict. We can, for example, analyze what happens to the level of GDP per capita of a country when an armed conflict breaks out. Figure 1 shows a simulation of the effects of 4 years of civil war (shaded area) on GDP per capita with two different sets of data on violent conflicts. The top figure uses the UPCD/PRIO Armed Conflict database. It shows a decline of roughly 11 percent of output from civil war, followed by a recovery of about 4-5 percent. The graph on the bottom uses the exact same methodology but applies it to the correlates of war (COW) definition of a civil war. The loss of output in this dataset is around 18 percent of output with a recovery of about 5 percent. If we use the error bands around these estimates as an additional guide, output contracted between 7 and 22 percent in a civil war of four years.[2]

[1] Literature reviews are provided by Blattman and Miguel (2010) and Collier, Hegre, Hoeffler, Reynal-Querol and Nicholas Sambanis (2003). For policy reports see the project documents of the "Global Economic Costs of Conflict (GECC)" project, the "Copenhague Consensus" project or the "Spending to Save" project used in Chalmers (2005).

[2] In a similar analysis, Collier et al (2003) show that civil wars reduce GDP per capita by about 10 to 15 percent permanently.

Figure 1: Simulation of the Impact of Civil War (4 years) on Output




This illustrates two points. First, an exact estimate for the economic cost of violent conflict is hard to derive. The very existence of a conflict makes measurement of economic activity problematic. All numbers provided in this report need to be interpreted with this in mind. Secondly, regardless of which estimate we use, the impact of civil war on output is disastrous. Even a loss of 7 percent of GDP per capita implies a huge economic cost.[3]

The remainder of this report is structured as follows. Section 2 discusses some of the logical pitfalls that policy makers and researchers in this area face. The report then summarizes the evidence - this summary is conducted relatively close in spirit to the original academic work. In section 3 we review the literature on the cost of insecurity. In section 4 we discuss the role of interventions. Section 5 translates the reviewed results into comparable numbers.

Section 6 provides the answers to the posed question. This part also summarizes the most important parts of the earlier discussion and can therefore be referred to directly by the impatient reader.

[3] Still, the material economic costs are far below the more broadly defined welfare loss brought about by terror, death and destruction. For a discussion regarding happiness as a measure of this welfare loss see Frey et al (2007).

## 2 Methodological Pitfalls

In this section we illustrate the main problem behind answering the posed questions convincingly. We do this at the example of the question "If a city hires more policemen, will its crime rate fall?".

The first, superficial answer, after comparing crime rates and the number of policemen across US cities, would be no.[4] If anything, the number of policemen and the crime rate are positively associated. The tempting conclusion then would be to fire all police to solve the crime problem.

The problem with this view is that the plain correlation between police and crime does not reveal anything about the causal relationship between the two. We would, for example, expect cities to recruit more policemen if crime is a problem. This *reverse causality* from crime to the number of policemen leads to a positive association between the two variables. This is a common problem in social science research and is especially problematic if the treatment (policemen) is not allocated randomly but with a purpose.

This is exactly the problem faced by a study that tries to identify the effect of violent conflict on the economy and the effect of foreign interventions on the level of violence. For example, bad economic conditions can lead to more violence. Even if we find a negative relationship between violence and economic development there is no guarantee that this is because violence leads to economic decline. Causality can go both ways. Similarly, interventions could be targeted at areas that are most affected by violence (similar to the policemen example). So if we found a positive relationship between lasting violence and UN peacekeeping missions this could be driven by the fact that interventions try to target the worst cases of violence internationally.

Academic research has tried to get around these problems in several ways. One element of the solution is to focus on micro-studies in smaller geographic areas in order to be able to identify cause and effect more carefully. This report will, wherever possible, rely on this part of the literature to derive estimates of the cost of conflict. In this way we hope to add to an already large literature on the cost of conflict.[5]

The problem with this approach is that it is far from clear how well the findings in micro-studies generalize to other cases. In addition, it is not clear at all exactly how to adapt findings from on context to other cases. In section 5 we argue that this issue leads to a complementarity between micro-studies and the cross-country evidence. We will use mostly micro-findings but translate them with the help of the cross-country evidence.

[4] See Levitt (1997).

[5] The existing policy reports were written before the surge in micro-evidence and use only the cross-country evidence like, for example, Collier and Hoeffler (2002, 2004) or Collier et al (2008).

# 3 The Cost of Conflict

This section discusses the first part of the evidence needed to answer the questions. It is organized in three main building blocks. The first sub-section on *disruption* discusses the various ways in which a lack of security affects the economy.

In section 3.2 we discuss why violence affects the economy even when violence itself has receded. The *permanence* of some of the effects of violence are very important to understand the relative benefits of conflict prevention compared to stopping a conflict.

The sub-section on *externalities* discusses the negative effects that insecurity in one country has on the economies of other countries. In a world connected through trade and migration it is likely that what happens in one country affects other countries. The extent of these externalities is hard to measure except for a few clear examples which we discuss.

## 3.1 Disruption

There is a large number of channels through which insecurity disrupts economic activity. Violence leads to death and destruction. The resulting fear hinders economic activity directly through an increase in transport costs, capital flight or postponing of investments. However, there are also indirect effects like the break down of public services and political institutions.

A first view of the effect of violence can be gathered from Abadie and Gardeazabal (2003). They study the impact of the Basque terror campaign on the Basque economy and find a loss of 10 percent of GDP per capita. This loss was realized not when the campaign started in 1968 but when it intensified in the late 1970s. If we interpret this as a causal effect, the Basque terror cost the inhabitants of the Basque country 20.1 *billion USD* in lost output.[6]

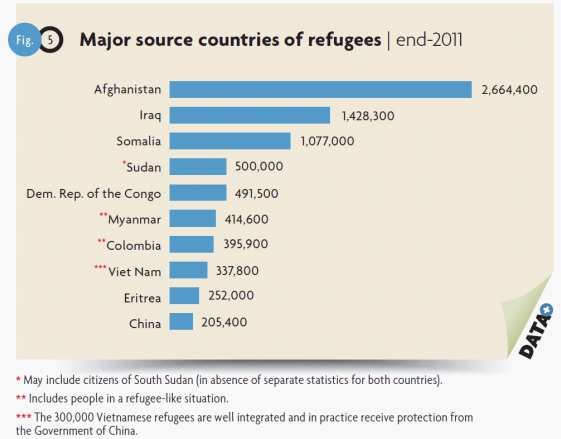
A main channel through which violence harms economic activity is the fear that it spreads in the population. One way to understand the extent of the economic disruption this implies is provided by Ksoll, Macchiavello and Morjaria (2010) who study the impact of election violence on the Kenyan flower industry. An estimated 1,200 people were killed during the violent episode of three months.[7] The fear of this violence drove labour costs in affected areas up by 70 percent. About 50 percent of the labor force did not come to work for at least one week during the period of the violence. The disruption also meant that following the disputed 2007 Kenyan presidential election, export volumes of affected firms dropped by 38 percent.

[6] This calculation uses GDP per capita from 1986 (5285.46), a population estimate of $2,000,000$ and assumes 20 years of conflict. The average intensity in these years was 0.017 killings per 1000 inhabitants.

[7] The intensity of violence implied by this is hard to estimate as violence affected only a part of the country. Nairobi and Mombasa, for example, were not affected according to the map in Ksoll et al (2010). As a rough estimate we assume half the population, or 20 Million people, were affected. This implies a yearly intensity of violence of 0.24 killings per 1000 inhabitants $(1,200 * 4/20,000)$.

Another way to grasp the scale of the labor market disruption is to look at the number of displaced persons. The UNHCR provides detailed statistics on the numbers of refugees and Internally Displaces Persons (IDPs). The global total number of IDPs in 2011 was 26.4 Million. We conducted a statistical analysis to understand how many people on average become refugees (people displaced over international boundaries) during a civil war. Our results, presented in the appendix, indicate that the average civil war produces more than 50,000 refugees within 5 years after its start. For each battle-related death during civil war more than 22 people flee the country. To get an idea of the resulting scale of refugee streams see figure 2. It shows numbers of refugees from the most recent UNHCR report. By the end of 2011 over 2.6 million Afghanis were, for example, residing outside Afghanistan due to the ongoing violence in their country.

Figure 2: UNHCR Report (2011)




It is one of the main themes in development economics that insecure property rights lead to a decline in economic activity.[8] This means even low intensities of violence can harm economic activity significantly. Besley, Fetzer and Mueller (2012) show that the insecurity caused by Somali pirates in the Gulf of Aden and the Indian Ocean led to an increase in shipping cost of between 8.2 and 12.1 percent. The loss accrues to the ship and cargo owners who ship through the area. It is important to note that this cost is far above the gain to pirates. In other words, the pirate's predation leads to a welfare loss due to the insecurity it creates. The disruption of transport is likely to be much higher in civil war areas but estimates of this channel are not available.[9]

An alternative way to measure the disruption is international trade. Blomberg

[8] Details are discussed in our answer to question 1.

[9] An estimate for the welfare effects of internal trade cost comes from Donaldson (2012) who analyzes the arrival of railways in India. According to Donaldson's estimate the trade/distance fell to between 12 and 25 percent of its original value with the advance of the railway. He finds that this decrease in trade costs raised real income by 16 percent. This shows that the disruption to the economy just through this channel can be huge.

and Hess (2006) argue that violence affects trade flows like a large tariff on trade. Martin, Mayer and

Thoenig (2008) analyze the effect of civil war on trade in a cross-country dataset. They do this by studying trade equations and introducing a civil war variable derived from the correlates of war dataset. They find a persistent decrease of trade of 40 percent for the most intense civil wars and a drop of 20 percent that is fully recovered for less intense civil wars.[10] It is difficult to attribute the effect on trade to a specific channel but it is important to note that Martin et al (2008) control for GDP per capita in their analysis. This means that the effect that they find, if interpreted as a causal effect, is something that does not work through the disruption of production.[11]

Another way in which the outbreak of violence inhibits economic activity is falling investment. Singh (2013) studies the impact of violence on farm investments. In particular, he studies farm investments in wells and fertilizer in the eleven Punjabi districts. Punjab was affected by an insurgency that took place between 1981 and 1993. This led to a decrease of investments in wells by between 6 and 28 percent in areas affected by killings.[12] Zussman et al (2006) show that stock market evaluations are affected by conflict. They use data on Israeli-Palestinian conflict since the late 1980s and match it to asset market data from Israel and the Palestinian Authority (PA). They find that major escalations in violence, such as the outbreak of the Intifada in 2000, lead to significant declines in asset prices in both Israel and the PA. Fielding (2003) also analyzes investment responses to the Intifada using time variation in killings and a dynamic investment model.[13] According to his model a complete stop of violence would lead to an immediate rise by 2.7 percent in non-residential construction and 6.5 percent in machinery and equipment investment. His model allows him to calculate the long run effect which suggests an increase in construction investment of 27.9 percent and increase in machinery and equipment by 14.6 percent. We will use the smaller short-term reaction of investments and re-interpret it as the impact of conflict on investments (not the effect of peace) because the estimates come from the start of the Intifada, not it's end.

In their study of house prices in Northern Ireland Besley and Mueller (2012) argue that much of the economic reaction to violence does not follow violence itself but changes in the expected future violence. In particular, the impact of violence on investments and asset prices depends almost entirely on its impact on expectations. They show that a shift from violence to peace in Belfast after the 1993 Downing Street Declaration, for example, led to an increase in house

[10] They use the COW defenition of civil wars and categorize a war as intense if it led to more than 50,000 battle-related deaths.

[11] The fall in trade anticipates the onset of the civil war which implies that causality is hard to establish.

[12] Interestingly, this effect is less strong for fertilizer. Singh argues that this is because investments in well equipment have a long term character that fertilizers have not. When the insecurity increases with violence the former investment is affected more severely.

[13] The average total number of politically related deaths in Israel over the sample period has been 42.47 per quarter or 170 per year. The Israeli population was 5.9 million in 1997 which suggests an intensity of conflict of 0.029 deaths per 1000 inhabitants.

prices by between 5.9 and 16.6 percent.

A more indirect channel of disruption is the way in which politics changes during times of insecurity. Besley and Persson (2008) argue that civil wars are very different from external wars in the way they influence politics. Civil wars pit groups within national boundaries against each other - this means that states cannot develop. External wars mean that states need to overcome external enemies to survive - this strengthens the incentives to develop the capacity of the state. In line with their theory they find that states with a history of civil wars have a lower state capacity while those states with external wars have a higher state capacity.

Collier et al (2003) point to increases in military spending as a sign that politics shift. During peacetime the average developing country (defined as a country with less than $3000 per capita GDP in 1995) spent about 2.8 percent of GDP on the military. During civil war on average this increases to 5.0 percent. In general, it can be expected that other public services suffer during civil war. These political changes also translate into the long run as we will discuss in the following section.

## 3.2 Permanence

Some of the effects of violence will last beyond the violent period. If we want to understand to which degree insecurity has a permanent effect we need to study the possible channels that can create lasting effects. Insecurity and armed violence is primarily a humanitarian disaster. This means that human health, behavior and skills, for example, can change permanently.[14]

It is first important to stress that permanence is not a given. Chen et al (2008) analyze 41 countries involved in internal wars over the period 1960–2003 and compare them to similar countries without war. They conclude that when the end of civil war marks the beginning of lasting peace, recovery and improvement can be achieved. Figure 1 also provides some evidence here. Due to the large error bands this figure is consistent with both permanence and significant recoveries.[15]

There is now considerable evidence that local aerial bombardments have little long-lasting economic effect. Miguel and Roland (2011) show that the bombing of Vietnam by the U.S., one of the most intense bombings in human history, had only insignificant effect on the long term development of districts. In their review Blattman and Miguel (2010) show that this finding generalizes to the long term effects of second world war bombings.[16] On the other extreme stands Acemoglu et al (2011) who find a large negative impact of the Holocaust in Russia on GDP per capita in 2002. They argue that this effect works through

[14] We avoid speculating about the permanent economic loss implied by death and focus instead on those who survive.

[15] Cerra and Saxena (2008) argue that civil wars as crisis are unique since they display significant recoveries. Mueller (2012) shows that this due to a methodological mistake.

[16] For evidence on Japan see Davis and Weinstein (2002) and for evidence on Germany see Brakman et al (2004).

political changes, triggered by the loss of the middle class, in areas that suffered from the Holocaust. What explains this marked difference in the results?

An important channel for permanent effects is health. A particularly large body of evidence has developed around the effects on children. Akresh, Bundervoet and Verwimp (2009) assess the effects of the civil war in rural Burundi on health outcomes shortly after the termination of the conflict. They find that an extra month of exposure to the conflict reduces the children's height significantly. In Latin America, Camacho (2009) shows that women's exposure to the Colombian conflict during pregnancy causes children to be born with lower weight. Violence in a municipality implies an average weight loss of 8.7 grams for newborns in this municipality.

In a recent paper Akresh, Bhalotra, Leone and Osili (2012) conduct a study of the long run impact of the of civil war in Biafra, Nigeria which waged from July 6, 1967 until January 15, 1970, killing between 1 and 3 million people.[17] The authors find not only lasting effects on individuals that were exposed to violence during early childhood but also during adolescence. The mean exposure duration at age 13-16 led to a 4.53 cm deficit in height relative to unexposed women. The mean exposure to war that led to this loss in height was (only) 20.6 months which implies a loss of height per year of exposure of 2.64 cm.

There is now considerable evidence that height is a good indicator of general health and productivity. Case and Paxson (2008), for example, show with UK and US cohort study data that an increase 1-inch increase in height is associated on average with a 1.4-2.9 percent increase in weekly earnings. They show this is to a large part due the fact that height is correlated with cognitive ability. It is, of course, somewhat dubious to use these estimates in the Nigerian context. However, there are good reasons to believe they are a lower bound. The effect of health deterioration, proxied by height, in the Nigerian civil war would therefore reduce income of those most affected by more than 1.46 and 3.02 percent per year exposed.[18]

Akresh, Lucchetti and Thirumurthy (2012) run a similar calculation with the health (height) effects they find in the Eritrean-Ethiopian civil war. Their main result indicates that children born during the war and living in a war region have 0.42 standard deviations lower height-for-age Z-scores.[19] From this they calculate that for affected children wages in adulthood would be an estimated 4.3 percent lower. If we assume that children born into the war were affected for one to two and a half years this provides a range of 1.72 to 4.3 percent of income lost per year affected. This estimate is somewhat higher then the estimates above, however, the Eritrean-Ethiopian civil war also lead to considerably higher

[17] Since Nigeria had a population of 49 million in the 1970s this makes the civil war extremely intense. According to these numbers it killed between 6.8 and 20.4 persons per 1000 inhabitants.

[18] We use the weekly earnings estimate since they seem to be the best "overall" earnings measure. The height loss due to the Nigerian Civil War episode in inches is $2.64/2.53 = 1.04$. From this we can calculate the lower bound as $1.04 * 1.4 = 1.46$.

[19] A Z-score is defined as the difference between the child's height and the mean height of the same-aged international reference population, divided by the standard deviation of the reference population.

intensities of violence.[20]

Similarly, education suffers during conflict and does not recover entirely. Annan and Blattman (2010) study abducted child soldiers in Uganda and find a large effect on educational outcomes from abduction. Abducted male youth attain 0.75 fewer years of education, a 10 percent reduction relative to the average in the non-abducted youth. This loss is not recovered later. But the educational effect reaches beyond those involved in combat directly. Shemyakina (2011) analyzes the effect of the 1992–98 civil conflict in Tajikistan. She finds that children who had experienced violence related shocks are less likely to be enrolled in school.

A particularly useful estimate of the effect of violence on education comes from León (2012) who studies political violence during the 1980s and 1990s in Peru. He finds that the average person exposed to political violence before school-age (during in utero, early childhood, and preschool age) accumulated 0.05 to 0.07 years of schooling less per year of exposure. Permanence comes from a decrease in mother's health status after a violence shock, which translates into a deterioration of child health.[21] He shows that an additional year of exposure to violence before birth implies that the person will accumulate 0.07 fewer years of education. If the shock happens during early childhood or in preschool age, it reduces long-term educational achievement by 0.05 years. Living in a district affected by violence during primary or secondary school age does not have a significant impact on long-run educational achievements.

We use two ways to express this effect in terms of lost personal income. Using estimates by Duflo (2001) we can calculate a rough transmission mechanism from education to wages. Using her estimates we calculate that a loss of 0.05 to 0.07 years of schooling as found by León (2012) would lead to a decrease of wages by between 1.08 and 1.52 percent for the affected generation.[22] Another way to translate the loss of education to income comes from Ichino and Winter-Ebmer (2004). Their study looks at the long-term impact of WWII on educational outcomes in Austria and Germany compared to Switzerland and Sweden. The average educational loss of the cohort born in the thirties amounts to 0.16-0.19 years of schooling in Austria and 0.23-0.26 in Germany. They calculate that, through this channel, the affected generation lost earnings of between 3 and 4 percent compared to the generations around them.[23] We can apply these findings to the estimates provided by León. The new calculations suggest a loss of income of 0.65 to 1.08 percent from violence in Peru which is somewhat lower

[20] The war lasted 2.5 years with a total number of battle-related deaths of 98,000. If we assume a population of 20 million was affected (a third of the population of Eritrea before the war) this implies an intensity of violence of about 1.96 deaths per 1000 population ($98000/(2.5*20000) = 1.96$).

[21] León argues along the lines of the "fetal origins hypothesis" (see Barker and Purslove (1998)) which suggests that a mother's nutrition in the fetal stage can translate into life-long effects for her child. Maccini and Yang (2009) show that weather shocks in early life have long lasting consequences in health, education, and income among Indonesian girls.

[22] Duflo (2001) uses an Indonesian school building project to show that an average increase of 0.12 years of schooling went hand in hand with an increase of wages by 2.6 percent.

[23] These estimates are from Germany, the estimates for Austria are very close to this.

than the estimate of 1.08 to 1.52 percent above. We will therefore use the whole range between 0.65 and 1.52 in our calculations of the effect of violence.

The main problem in interpreting all these findings from micro-evidence as an overall economic damage is that they correspond to a private loss. Competition with other individuals who are not affected by the shock implies that the effect could be an overestimate. On the other hand, labor relationships also mean that lower productivity of some workers can affect others. It is therefore unclear whether the general economic damage is larger or smaller than the private income losses on the individual level.

A recent paper by Caselli and Feyrer (2012) gives an important reason to believe that private productivity losses provide a lower bound of the overall effect of health and education on the economy. They show that labor inputs might actually be a critical constraint to the flow of capital into developing countries. This means that the inhibition of education and health of the labour force will press down the marginal productivity of capital and inhibit capital accumulation as well. Through this channel the permanent effects on health and education can inhibit long term capital accumulation in the aggregate. The overview provided in Strauss and Thomas (1998) points in a similar direction.

Changes in the political environment are another possible channel of permanence. Chen et al (2008) find that, compared to similar countries, conflict countries develop their political systems slower. Looking at the long-run development of the state, Besley and Persson (2008) show that countries with a history of internal conflict have a GDP share of taxes around 7 percent lower than countries without conflict. While there are obvious reverse causality issues with this finding it should be stressed that the opposite is true for external wars. It is not the violence itself which correlates negatively with the capacity of the state but internal violence.

This correlation in the long run cross-country data stands in stark contrast to recent within-country micro studies on the effects of violence on civic engagement. Bellows and Miguel (2006, 2008), for example, use household data from Sierra Leone to study the impact of the 1991-2002 Sierra Leone civil war on postwar economic outcomes, local politics and collective action. They find little consistent evidence regarding economic outcomes among the victimized groups. However, they find positive impacts on several measures of political participation like attendance of village meetings and voting. Similarly, Blattmann (2009) finds a link from past violence to increased political engagement among ex-combatants. His survey data from Northern Uganda suggest that abduction leads to substantial increases in voting and community leadership, largely due to elevated levels of violence witnessed.

Voors et al (2012) use a series of field experiments in rural Burundi to examine the impact of exposure to conflict in the period 1993–2003 on social, risk, and time preferences. They run a series of experiments to elicit preferences in 35 randomly selected communities in 2009 and compare communities that were affected by violence with those that were not. In line with the work of Blattman, Bellows and Miguel they find a positive correlation between altruistic behavior and conflict intensity at the community level as well as at the household level.

However, they also observe a positive correlation between community-level conflict intensity and risk seeking and an increase in discount rates.

How can these results be squared with the correlations in the cross-country data? The theory developed in Rohner et al (2013) can provide a guide here. They argue that the breakdown of inter-ethnic trust is one of the main variables to look at. Since conflict disrupts trade is also shatters trust and, through this channel, affects outcomes in the long run. They test this idea in a study of the civil conflict Uganda in 2002-2004.[24] Using individual and county-level data they find that more intense fighting decreases generalized trust and increases ethnic identity. Importantly, they document that the post-war effects of ethnic violence depend on ethnic fractionalization. Using Satellite light data in 2000 and 2008 they find that fighting is associated with a large and significant fall in living conditions in high-fractionalization counties, and with no significant effect in less fractionalized counties.

This hints at a mechanism of permanence that has not been researched very much. Even if within-group trust and political activism increase it could still be that past grievances increase the likelihood of renewed outbreaks of violence between groups. This lack of stability inhibits investments in physical and human capital beyond the respective violence episode.

### 3.3 Externalities

To what degree is the outbreak of mass violence in a country bad for other countries? What are the channels through which insecurity spills over?

The most immediate spillover of a civil war for other countries is through its effect on trade. We have discussed the effects above. If trade falls by 40 percent, as suggested by Martin, Mayer and Thoenig (2008), then this affects both trading partners.

The break-down of states in violence can have several effects on its surroundings and further abroad. The channels here are sometimes subtle, sometimes transparent. One of the more transparent ways in which insecurity in one state affects others is maritime piracy. Besley et al (2012) calculate that the shipping industry lost between 1 billion and 3 billion USD in 2010 due to Somali piracy. This loss accrues to the industry but is also handed down to the consumers. The problem has spread from the Gulf of Aden to the Indian Ocean. Piracy has therefore become a truly global problem affecting a large fraction of world maritime trade.

Drug production is both destabilizing countries and harming consumers in developed countries. An increase in drug production can be seen as a global bad as it not only harms production and recipient countries but also distorts the trafficking economies (Mexico is an example here). Is there a causal relationship from conflict to drug production? A recent working paper by Lind et al (2012) suggests a strong link.[25] They combine information on opium cultivation in

[24] See Rohner et al (2012).

[25] Note that causality is hard to establish because the rents created by drug production are likely to lead to violence. See, for example, Angrist and Kugler (2008). To establish causality

the 329 Afghan districts and data on the location of casualties in the NATO's ISAF forces and US forces in Operation Enduring Freedom. They find that going from no conflict to conflict in the average district leads to an increase in the area of cultivation of 368.3 hectares. Enough to produce 1.2 metric tons of heroin or more then six million user doses of 200 mg.

Often refugees flee across national boundaries. Our findings suggest that the average neighbor of a civil war country hosts about 11,000 refugees. While this is a comparably small number this average hides huge peaks. Pakistan, for example, hosts more than 1.5 million Afghan refugees. This inflow has an economic cost to the recipient. More importantly, perhaps, refugee streams at this scale can destabilize regions or whole countries politically. Gleditsch and Salehyan (2006), for example, provide the following table.

*Table 1 – Refugees and Conflict Onset*

| | *Conflict onset* | | |
|---|---|---|---|
| *Refugees from neighboring states* | *No* | *Yes* | *Total* |
| *No* | 4,826 | 156 | 4,982 |
| | (97%) | (3%) | (100%) |
| *Yes* | 1,101 | 127 | 1,228 |
| | (90%) | (10%) | (100%) |
| *Total* | 5,927 | 283 | 6,210 |

*Note:* Pearson chi$^2$ = 117.7695. $p \leq 0.001$. Percentages listed in parentheses.

This table suggests that the civil war risk more than triples if refugee streams are involved. However, it might be a mistake to attribute this risk to refugees themselves. Refugee streams might just proxy for ethnic groups split across national boundaries. The recent destabilization of Mali, for example, was attributed to ethnic groups in the North arming themselves in the Libyan civil war and then transporting the arms across the border. Recent empirical work by Michalopoulos and Papaioannou (2011) makes clear that split ethnic groups are indeed an important driver of the likelihood of civil war within countries.

# 4 The Role of Interventions

In this section we turn towards the role played by interventions. We first discuss three channels which are important for the way that interventions (can) work. We then turn towards the existing evidence on interventions themselves.

Lind et al (2012) use information on the planting season to show that a correlation between violence and crop surface only exists in the months before and during planting season, not thereafter.

## 4.1 Persistence, Expectations and Reverse Causality

**Persistence:** What are the benefits of preventing violent conflict? To answer this question it is first important to understand the very basic dynamics of mass violence. If we use existing data on civil wars to categorize all countries and years as being in civil war or not we can calculate two probabilities. The probability that a country in peace enters civil war and the likelihood that civil war lasts one more year given that it started. The two numbers are in table 2.

*Table 2 – Conflict Risk Conditional on Previous Year*

| | peace in previous year | civil war in previous year |
|---|---|---|
| likelihood of civil war this year | 1% | 87% |

In other words, once violent conflict breaks out, the likelihood of future violence increases by 86 percentage points. The mere fact that conflict is so persistent is a strong argument for conflict prevention.

**Expectations:** Evidence provided by Zussman, Zussman and Nielson (2008) and Willard et al (1996) show that asset prices react to changes in expectations. Events that change expectations can therefore have large economic effects. The flip side to this is that a transition to peace will help investments much less if people do not believe that it is sustainable.

Besley and Mueller (2012) provide a way to analyze the effect of expectations. Take the example of Belfast. We calculate that violence dropped by about 7 killings per quarter when the region transitioned into peace. The likelihood (calculated ex post) that peace would hold from one quarter to the next was 95.6 percent. In other words, if people in Belfast anticipated the sustainability of peace correctly they only put a likelihood of 4.4 percent to renewed violence. This belief in the persistence of peace it what drives large part of our estimate of the peace dividend. If people had only believed that peace would hold with a probability of 50 percent, for example, then house prices would have increased by only 3 percent instead of 13 percent.

**Reverse causality:** Economic shocks can threaten security and economic growth can stabilize a fragile peace. This effect needs to be taken into account when thinking about the effects of interventions.

There is now a large literature on the effect of income shocks on violence. Miguel, Satyanath and Sergenti (2004), for example, use rainfall shocks to show that a negative growth shock of five percentage points increases the likelihood of conflict by 12 percentage points in the following year. Hildalgo et al (2010) provide a closer look in the Brazilian context and show that land occupations (land conflicts) significantly increase after negative rainfall shocks. Brückner and Ciccone (2010) show that a 25 percent drop in the international commodity price index over a 3-year period raises the probability of civil war onset by about

1.5 percentage points - 50 percent of the background probability of civil war in Sub-Saharan Africa.

Several recent papers analyze the channel of the labor market in reducing violence. Iyengar et al (2011) study the US intervention in Iraq and find that a 10 percent increase in labor-related spending generates a 15-20 percent decline in labor-intensive insurgent violence. Overall the spending increase is associated with a reduction in violence of nearly 10 percent. Similarly, Dube and Vargas (2009) find that an expansion in the demand for labor triggered by price increases of coffee reduced insurgency violence in Colombia. They argue that this is due to the fact that coffee is a labor intensive good so that an expansion of coffee agriculture takes away the labor supply for paramilitary groups.[26]

This reverse causality from economic opportunity to violence gives rise to a vicious cycle. Violence disrupts the economy and breeds bad expectations and thereby reduces investments. This leads to less economic opportunities and, potentially, to more violence. Collier et al (2003) stress the appearance of a conflict trap in which conflicts are hard to stop. What happens during conflict increases both the risk and duration of subsequent conflict. They calculate that countries that have had a war have a two to four times higher risk of a subsequent war, even when controlling for country characteristics.

## 4.2 The Impact of Interventions

In the study of interventions reverse causality is a significant problem. UN missions could, for example, be targeted at difficult cases which means their impact is under-estimated.[27] A recent study by Draca, Machin and Witt (2011) provides one of the few examples in which the allocation of security personal can be treated as random. Their study uses the impact of the July 2005 terror attacks in central London to identify the impact of police presence on crime. The attacks resulted in a large redeployment of police officers to central London as compared to outer London. During this time, crime fell significantly in central relative to outer London. Their instrumental variable approach uncovers an elasticity of crime with respect to police of approximately -0.3 to -0.4. In other words, a 10 percent increase in police activity reduced crime by 3 to 4 percent.

The UK army experience in Northern Ireland provides another piece of evidence regarding the impact of military presence. In July 31, 1972 the UK army asserted control over so called "no-go" areas in Northern Ireland which had previously served as safe havens for the IRA. The operation involved 28,000 soldiers of which about 4,000 had been brought in the previous days. The operation has been credited as a turning point in the conflict.[28]

Figure 3 shows the number of persons killed in the Troubles around the date of Operation Motorman around no-go areas and wards further away from no-

[26] Contradictory evidence comes from Berman et al (2011) who study province/district level data in the Phillipines, Iraq and Afghanistan but do not find a robust positive correlation between unemployment and insurgent violence.

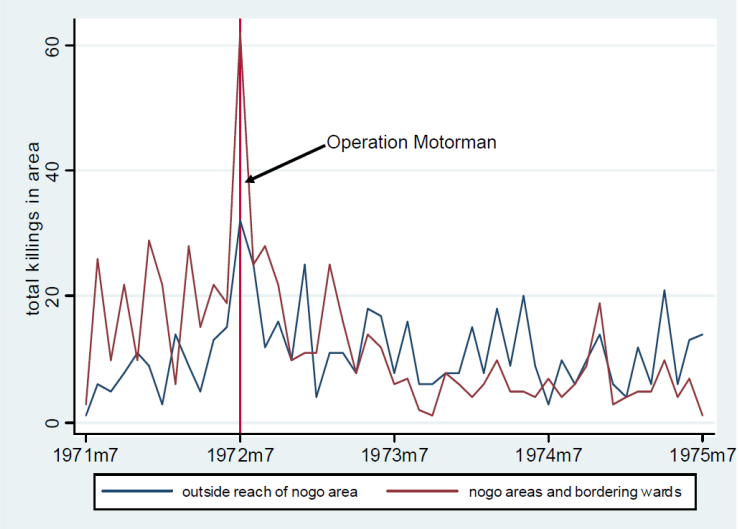
[27] See the discussion in Fontana (2004) who argues that this is the case.

[28] See, for example, Smith and Neumann (2005).

go areas. First, the figure clearly shows that violence trends turned around in all areas in July 1972. Second, the figure shows that violence was consistently higher around no-go areas than in other areas before the operation. After the operation violence shifted out of the no-go areas to the rest of Northern Ireland. This can be taken as relatively strong evidence that troop presence can indeed curb violence, including sectarian violence.

Note, however, that there were at this point roughly 17 soldiers per 1,000 inhabitants in Northern Ireland. A similar concentration in Afghanistan, for example, would imply over 600,000 soldiers. Also, it is important to note the bigger picture - terrorist violence did not stop until two decades later. The factors for the end of violence are numerous and include a large set of political factors.

Figure 3: Effects of a Large Troop Surge in Northern Ireland




Similar evidence comes from Greenstone (2007) who provides a broad statistical picture of the effects of the surge in US troops in Iraq in 2007. He shows that the surge appears to have decreased violence and changed violence trends. However, using bond market data he shows no positive change in market's expectation regarding the possibility of default by Iraq. In other words, the surge in troops appears to have managed to change the security situation but failed to move expectations about the economic future of Iraq. This view is consistent with Hanson and Schmidt (2011) who argue that the Coalition offensive in Iraq led to more counter-attacks by insurgents later.

What is the effectiveness of economic factors in fighting violence? Berman et al (2011) study counter-insurgency efforts in Iraq using data that include geospatial information on violent incidents against U.S. and Iraqi forces, reconstruction spending, and community characteristics (social cohesion, sectarian

status, and natural resources). In order to understand the role of spending on public goods the authors focus on the $2.9 billion in U.S. reconstruction funds allocated through the Commander's Emergency Response Program (CERP) and related smaller programs. CERP is explicitly designed to provide military commanders with resources to engage in small-scale projects that meet the needs of local communities with the aim of improving security and protecting forces.

The authors first show that violence and CERP spending are positively correlated because the counter-insurgency effort focused on those districts that were most violent. However, after controlling for district characteristics the authors find that an additional dollar of per capita CERP spending led to 1.59 fewer violent incidents per 100,000 residents, both over the span of half a year. To put that estimate in context, average incidents per capita were 58.6 per 100,000 residents per half year during the entire period. This means attacks could be remediated at $74 per capita of CERP spending per year.

The relative gain of this public good spending should probably be regarded as an upper bound. This view is reinforced by the fact the U.S. government spent $29 billion on various reconstruction programs in Iraq from March 2003 through December 2007.[29] Berman et al (2011) find that the vast majority of this spending had no violence-reducing effect. Whether that was due to unconditional implementation, poor local knowledge, or poor oversight is an open research question.

Importantly, the relatively large effect is only found in the period after the surge in 2007. Also, their estimates indicate that small projects are six or seven times more violence-reducing than large projects. The authors claim that both these findings can be explained by better targeting of spending.[30] Another possibility is that there is some complementarity between the level of security and the public good effect. This possibility is backed up by two recent working papers. Beath et al (2012) study the effect of development aid 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 suggest 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.

While some of these results might still be affected by endogeneity issues this is some evidence for a complementarity between measures of development aid and troop presence in reducing insurgent violence. How well these findings can be generalized to peace keeping missions is an open question. Note first that the mandate and equipment for troops might differ significantly. The presence

[29] See Tarnoff (2008).

[30] The view that intelligence and targeting are key parameters in counter-insurgency is supported by Kocher et al (2011). They show that aeriel bombardments as a counter insurgency strategy in Vietnam had no or a negative effect.

of troops will also be seen differently - the very existence of insurgency violence already implies that a part of the population strongly opposes troop presence. It is likely that spending by a third party in a setting of sectarian violence might not reach the desired effect. If anything, recent evidence by Nunn and Qian (2010) points the opposite direction. Provision of aid can become a source of conflict.

The little evidence we have on UN peacekeeping missions sends a mixed message. Doyle and Sambanis (2000) use a data set of 124 post-World War II civil wars to study the effect of UN peace building missions. They do not find a significant correlation between the persistence of peace and the presence of peace missions. Fontana (2004) and Collier et al (2008) find a significant correlation between higher peace duration and peace missions controlling for a large set of economic and political controls. The effects found in these studies are quite encouraging. However, unobserved heterogeneity and reverse causality remain a concern.

# 5 The Costs of Civil War - A Framework

We started this report with a cross-country result. The cumulative output loss in the average civil war (of 4 years length) was between 7 and 22 percent. How does this cross-country view relate to the within-country micro-studies provided in sections 3 and 4? How can we learn from this for the questions posed in the beginning? In this section we will answer these questions by providing a framework to relate the micro-findings to each other and to the cross-country evidence. We will then use both to translate the findings in the previous sections to a benchmark case of "civil war".

Our discussion in the previous section lacked a common scale to establish a link between the different empirical results. As a basic measure of violence intensity we choose conflict-related deaths per 1000 inhabitants per year. Depending on the data used the definition of "conflict-related" will vary. Still, in order to compare the empirical findings this seems like a reasonable common measure to base our discussion on. As a benchmark for conflict related deaths we use data provided by the Uppsala Conflict Data Project (UCDP/PRIO). Victims here are only counted if they arise due to a fight for political power or territory, from the use of armed force between two parties, and result in at least 25 battle-related deaths. Of these two parties, at least one has to be the government of a state.[31] The median violent conflict year in this dataset led to 0.055 battledeaths per 1000 inhabitants. The most intense civil war year produced over 18 victims per 1000 inhabitants (Lebanon 1976).

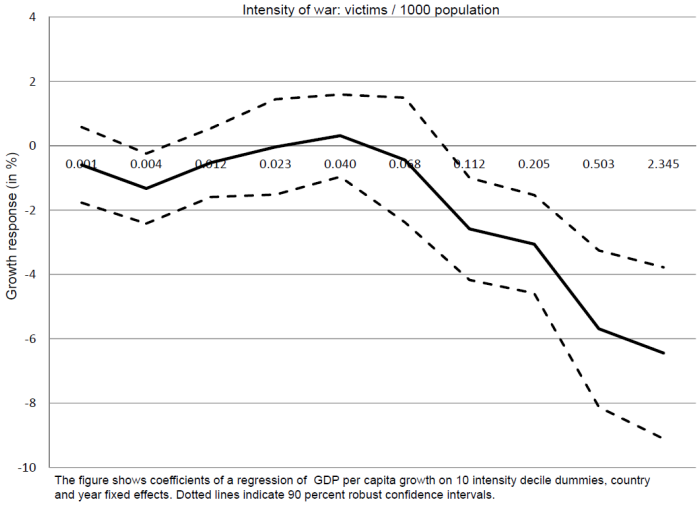
Figure 4 provides an overview over the effect of one year of armed conflict on economic growth at different violence intensities.[32] The solid line shows the

[31] While this definition seems rather restrictive it is worth noting that, for example, over 3000 killings in the Northern Ireland conflict are recorded in this dataset (compared to about 3500 in the microdata used by Besley and Mueller (2012).

[32] We provide a discussion of the underlying statistical analysis in the appendix.

effect found by our statistical analysis. The dashed line provide a sense of the precision of this estimate. The graph shows, for example, that an armed conflict year with an intensity around 0.112 led to a decrease in the growth rate by about 2.6 percentage points. Below this intensity the effect of armed conflict is small or close to zero. While there is some evidence for a negative growth response this evidence is not overwhelming. This changes a lot when conflict exceeds the median level of intensity. The shape of the curve between a level of intensity of 0.04 and 2.345 suggests an almost linear relationship between log intensity and economic damage. As intensity doubles (for example, from 0.068 to 0.112 or from 0.112 to 0.205) the damage to growth increases by about roughly the same amount in percentage points. In the highest intensity decile civil wars lead to a drop in the yearly growth rate by between 3 and 9 percentage points.

Figure 4: Civil War Intensity and the Effect on Growth




The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 90 percent robust confidence intervals.

Where on this scale are the empirical findings in the literature? To answer this question table 3, columns (1)-(3) summarize some of the findings in the previous sections. We have included all estimates that provide scalable estimates of the economic damage caused by conflict.

Conflict intensities are provided in column (4). These are calculated with estimates of the number of conflict-related deaths and estimates of the size of the affected population.[33] Column (4) illustrates the large heterogeneity in conflict intensities in the cases discussed in the literature. This heterogeneity makes results in column (3) incomparable.

We therefore use the findings from figure 4 to translate the findings in column (3) to a common scale. We assume that the functional relationship between intensities and damage to growth also applies to other findings. We then use this functional relationship between intensity and economic damage as follows.

[33] Both these numbers are bound to be connected to relatively large margins of error. The appendix discusses details.

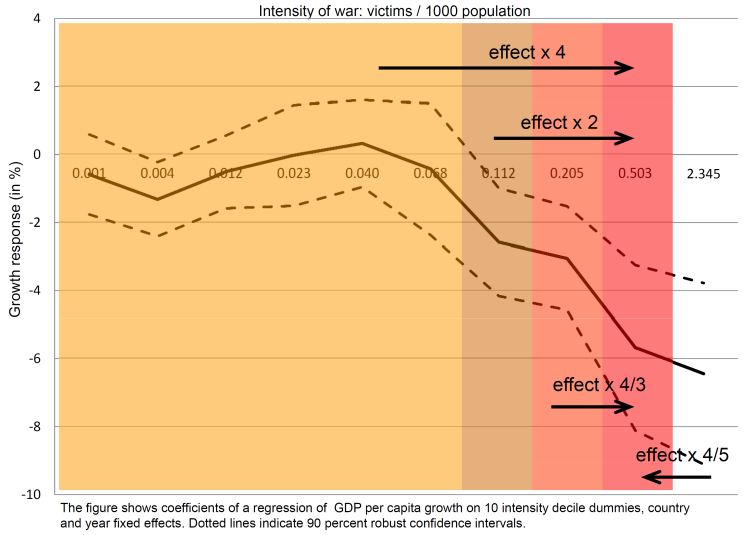
*Table 3: Summary and Scaling of Empirical Findings*

| (1) paper | (2) country / sample | (3) impact | (4) conflict intensity* | (5) scaling factor* | **(6) scaled to benchmark** |
|---|---|---|---|---|---|
| Abadie and Gardeazabal (2003) | Basque country | level of GDP per capita lowered by 10 percent | 0.017 | x 4 | **reduction of per capita GDP of 40 percent** |
| Ksoll, Macchiavello and Morjaria (2010) | Kenya | labor costs increase by 70 percent, affected firms export 38 percent less | 0.24 | x 4/3 | **labor costs increase by 93 percent, affected firms export 50 percent less** |
| Martin, Mayer and Thoenig (2008) | Cross country | trade decreases by 20 percent in less intense and by 40 percent in more intense conflicts | 0.125-18 | x 4/5 for intense conflicts | **trade decreases by 32 percent permanently** |
| Besley and Mueller (2012) | Northern Ireland | house prices in Belfast rose by between 5.9 and 16.6 percent in the transition to peace | 0.055 in Belfast | x 4 | **house prices rise by between 24 and 66 percent in the transition to peace** |
| Singh (2013) | Punjab (India) | farm investments decrease by between 6 and 28 percent in affected districts | >0.04 | x 2 | **farm investments decrease by between 12 and 56 percent** |
| Fielding (2003) | Isreal | non-residential construction decreases by 2.7 percent and investment in machinery and equipment by 6.5 percent | 0.029 | x 4 | **non-residential construction decreases by 10.8 percent and investment in machinery and equipment by 26 percent** |
| León (2012) | Peru | permanent decrease of 0.05 to 0.07 years in education for those exposed to violence at very young age of -1 to 6, calculations imply a loss of 0.65 to 1.52 percent of income | >0.04 | x 4 | **permanent decrease in education of 0.2 to 0.28 years for those exposed to violence at very young age of -1 to 6, calculations imply a loss of 2.6 to 6.1 percent of income** |
| Akresh, Bhalotra, Leone and Okonkwo Osili (2012) | Nigeria | loss in height for those affected at age 0-12 of 0.53 cm and those at age 13-16 of 2.64 cm per year exposed, calculations imply a loss of income between 1.46 and 3.02 percent for the more affected group | 6.8-20.4 | x 4/5 | **deterioration of health of children, calculations imply a loss of income between 1.2 and 2.4 percent for the more affected group** |
| Akresh, Lucchetti and Thirumurthy (2012) | Eritrea-Ethiopia | loss in height by 0.42 standard deviations compared to other children at similar age, calculations imply a loss of 1.72 to 4.3 percent of income | 2 | x 4/5 | **deterioration of health of children, calculations imply a loss of 1.4 to 3.4 percent of income** |

*Conflict intensity is the author's approximation of the yearly conflict related deaths/1000 inhabitants. The scaling factor is derived from a scaling to our benchmark of civil war. For details see discussion in the text and figure 5.

We first attribute a non-zero effect to the lowest bracket of intensities up to 0.08 (the boundary between the deciles with average 0.068 and 0.112) and assume this effect is added for every intensity decile higher than this. This way of attributing effects leads to the scaling factors shown in figure 5. We use these factors to scale the effects found in the sections 3 and 4 up or down. As our benchmark, we are scaling to the intensity decile with 0.503 killings per 1000 inhabitants.[34] It should be noted that this way of scaling leads to considerably smaller scaling factors than suggested by a linear model. The average intensity in the decile around 0.503 is almost ten times higher than the intensity around 0.068. Our re-scaling function only implies a factor of only 4.

Figure 5: Scaling the Effects




The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 90 percent robust confidence intervals.

Table 3, column (5) presents the scaling factors provided by figure 5. Column (6) shows the final result. We will use these figures in the our answers below. They are, of course, subject to considerable errors in the scaling process in addition to the inherent errors in the estimation. It is important to note, however, that our scaling only uses the functional form derived from figure 4 and not the slope. The information we use is that the impact of conflict stands in a log-linear relationship to conflict intensity.

Our estimates from investment losses are fairly close to each other. Scaled accordingly, the range of losses in farm investments in Punjab are in a similar range as the estimates on investments in manufacturing in Isreal. Both should be seen as a lower bound, however. We have focused on the smaller short-term numbers from Isreal and assumed a fairly high intensity of 0.12 killings per 1000 inhabitants in Punjab.

[34] The reason is that this level of intensity is very close to the average intensity in civil wars as defined by UCDP/PRIO - armed conflicts with more than 1000 battle-related deaths in a year. This makes the findings here comparable to other cross-country studies who use the UCDP/PRIO definition of civil war.

We will translate the gain in house prices with peace of between 24 and 66 percent into a loss of between 20 and 40 percent with the outbreak of civil war. Again, this is probably a lower bound. Given that recovery from conflict is rarely complete, the loss into civil war is likely larger than the benefit coming out of civil war.

The estimates of permanent effects in the last three rows of table 3 are fairly close to each other. This is re-assuring given that they come from very different contexts and have been translated to income effects with different methods. It is noteworthy that the estimates coming from the direct effect of conflict on education (León (2012)) are somewhat larger.

# 6 Answers

## 6.1 Question 1

**What evidence is there that upstream conflict prevention (in the form of capacity building etc) has materially/economically benefitted either the donor or receiving country?**

Successful conflict prevention implies that violence does not occur but would have occurred without the intervention. The economic benefit of this to the receiving country depends on the intensity of the prevented conflict. In the previous section we have translated the empirical literature on this question to one common scale - the outbreak of a civil war with a violence intensity around 0.5 killings per 1000 inhabitants.

Such a conflict displaces masses of people internally. More than 22 persons become refugees for each person killed in battle-related violence. The fear of violence and worker absences lead to an increase of labor costs by 93 percent.

Affected firms are not able to export any more due to problems in production and transport. Exports drop by an estimated 50 percent in affected firms. Overall external trade decreases by 32 percent permanently, i.e. the disrupted trade does not recover completely after violence recedes. One way to interpret the economic impact of this result is to assume that the effect is coming from an increase in transport costs. One can then use the elasticity of income with respect to trade derived in Feyrer (2009). He shows that it is between 0.15 and 0.4. In other words, a country with average exports and imports of 20 percent of its GDP will experience a permanent loss of between 1 percent and 2.6 percent of its GDP per capita just through the impact of conflict on trade costs.

Internal trade is likely to suffer as well. This has a large impact on welfare as local food shortages, for example, cannot be balanced.[35] Most victims of civil war do not die from violence directly but from the starvation and illness it brings about.

Starvation and illness are not only affecting the population during the conflict but prevent economic recovery later. A series of recent academic work has

[35] Burgress and Donaldson (2010) illustrate this link for India. Regions affected by weather shocks were much less likely to have famines with the advance of the railway in the country.

found disastrous permanent health effects of violence in children - this includes babies en utero to children in adolescence. Estimates in the literature and our own calculations suggest that a person that was affected by violence as a child suffers a permanent loss of income between 1.2 and 3.4 percent for each year affected.

Other estimates that directly measure the impact on education suggest that affected children lose 0.2 to 0.24 years of education permanently for each year that they are affected by civil war. We calculate that this effect leads to a permanent income loss between 2.6 to 6.1 percent per year affected. This means that even relatively short episodes of violence can have a long term impact on human capital accumulation. It is important to note that this, in turn, will affect capital accumulation. Unproductive labor will not be able to attract capital to a country. Through this channel the humanitarian disaster during conflict becomes an economic liability for the future.

House prices fall by between 20 to 40 percent when a civil war starts. Non-residential construction declines by 10.8 percent and investment in machinery and equipment by 26 percent with the start of violence. Farm investments decrease by between 12 and 56 percent. This effect is only reversible if peace after conflict changes expectations about the future significantly. If peace is seen as fragile, investments will not recover.

Recent survey work and experimental studies find that political engagement in the affected population increases, risk taking increases and the affected population is less willing to save. While some of these changes may be positive, the overall preference change does not favour capital accumulation. What is particularly worrying is that growing identification and political activism within communities goes hand-in-hand with a decrease in generalized trust and a strengthening of ethnic divisions. Conflict lowers the economic interaction between ethnic groups and increases the likelihood of renewed conflict in this way.

If we analyze the overall impact of violence on GDP growth we find that civil wars reduce GDP per capita growth by between 3.3 and 8.1 percentage points for every year in civil war. The level of GDP per capita falls by up to 40 percent in longer civil wars.

What do these numbers imply in absolute terms? Take, for example, Syria. Syria has a population of 22 million inhabitants and a GDP per capita of about 5000 USD. In order to approximate the impact of the current conflict it is first necessary to gauge its intensity. In the first year of the Syrian civil war the UCDP/PRIO data reported 842 battle-related deaths. This leads to an intensity of war of around 0.05. The intensity of the conflict has increased dramatically in 2012. While the UCDP/PRIO numbers are not available, yet, the UN reported more than 60,000 victims by January 2013.[36] This would put the 2012 Syrian civil war in the highest bracket of war intensity provided in section 5. We should therefore multiply our benchmark numbers above (3.3 and 8.1 percent) by 5/4.

[36] There is considerable controversy on the death toll. The UN relied on a study by Price, Klingner and Ball (2013).

The economic damage of this drop in GDP growth is between

$$22 \text{ million} * 5,000 * 0.033 * \frac{5}{4} = 4.5 \text{ billion } USD$$

and

$$22 \text{ million} * 5,000 * 0.081 * \frac{5}{4} = 11.1 \text{ billion } USD.$$

Moreover, a large part of this contraction could be permanent. The humanitarian problems triggered by the conflict will lead to permanent changes in the health of Syrian children. Even if we discount the future somewhat this implies an economic loss to the Syrian economy of somewhere between 38 and 165 billion USD.[37]

As a simple test of our prediction we can look at the actual growth performance compared to Syria's previous growth experience. The World Bank forecast for growth was between -1 and -3 percent in the years 2011 and 2012 compared to growth numbers between 3 and 5 percent before the conflict. A change of -4 to -8 percentage points which is at the lower bound of our prediction.

It is the permanence of the effect of violence which provides the strongest argument for capacity building. Civil war has nonreversible economic effects - especially if the affected population suffers hunger. Children born into or growing up in conflict become permanently less productive because they cannot develop. This makes conflict prevention so important from a purely material perspective.

One caveat for capacity building arises from the literature on state capacity, however. Capacity building from outside implies that more resources for repression are laid into the hands of those who control political power. Thus, foreign help in building capacity is in danger of preventing armed conflict at the cost of aiding repression.[38]

A key indicator of this danger is the extent to which political power of the government is constrained institutionally.[39] High institutional restrictions of executive power mean that the incentives of the group in power to abuse the build-up in capacity are muted. However, it is hard to imagine a fragile state at the brink to civil war with strong executive constraints. This implies that capacity building needs to take a holistic approach if it wants to prevent negative side effects.

[37] For discount factors between 0.9 and 0.95 the current loss is multiplied by a factor of 8.6 and 14.9 (we assume a 30-year horizon in this calculation).

[38] In a similar vein, Collier (2006) warns that increased military spending does not seem to aid development or stability. He suggests that reducing military spending in developing countries would have considerable welfare benefits.

[39] In the work by Besley and Persson (2011) executive constraints are measured using data from the Polity project. This project indexes political institutions on a scale between 1 and 7 in a large set of countries.

## 6.2 Question 2

**What are the economic benefits in UN peacekeeping to either the UK or wider world?**

As we have argued in this report, there is little hard evidence regarding UN peacekeeping. The main reason is that UN peacekeeping missions are sent to countries of strong internal divisions. This means that we cannot compare them to the development in other countries easily. In as far as peacekeeping fulfills its purposes and keeps peace, however, the potential benefits are significant.

Civil war is highly persistent. That means that the risk of civil war in a given year increases dramatically (from 1 percent to 87 percent) once violence breaks out. In other words, even the worst post-conflict peace imposed by peacekeeping is likely to provide a better future outlook than civil war. This is bound to improve investment incentives. The Northern Ireland peace accord, for example, led to a boom in houseprices because it changed expectations about the future. Besley and Mueller (2012) estimate that if the inhabitants in Belfast, for example, had only believed that peace would hold with a probability of 50 percent (instead of 96 percent) then house prices would have increased by only 3 percent instead of 13 percent.

The crucial question for the resumption of economic activity is then by how much expectations about the future change due to the intervention. Is the transition to peace seen as something that is permanent? Changes in expectation are likely down to factors that are hard to measure. One crucial factor is the level of cooperation between the previously warring factions and their ability and willingness to share political power. The empirical results in the literature suggest that this is likely to be an uphill battle. Post conflict ethnic identities are strengthened and trust towards outsiders decreases. This makes an improvement of inter-ethnic relations harder. One glimpse of hope is the increased political awareness that is brought about by the horrors of violence. It could be possible to mobilize this awareness for reconciliatory activities. A strengthening of local political institutions, constraints on executive power in particular, will also improve economic dividends in the long run.

Can peacekeeping alleviate the permanent effects of civil violence? Here the evidence provides a relatively pessimistic view. A lot of the damage (for example due to food shortages) are not reversible. Civil conflict harms the population permanently and inhibits the potential for economic growth. This implies that peacekeeping will, in all likelihood, not lead to strong growth reversals even if expectations improve.

However, even if economic growth does not pick up, the combination of violence reduction and humanitarian aid in peace keeping can prevent further permanent harm to the population. Studies on the permanent effects of violence stress the impact of health in early life as a driving factor of the negative permanent effects. Estimates in the literature and our own calculations suggest, for example, that a person that was affected by violence as a child suffers a permanent loss of income between 1.2 and 3.4 percent for each year affected. Other estimates that calculate the impact of health through its impact on educational

attainment suggest a permanent income loss between 2.6 to 6.1 percent per year affected.

As an illustration, imagine a stop to violence in Syria enforced by an UN peacekeeping mission. According to our higher estimates this could prevent a permanent loss of future income for the children at an age of -1 to 6 now by between 2.6 to 6.1 percent. Approximately 4 million Syrians are in this age bracket. If we assume an average wage of $3,600 this implies a total private income loss of between

$$4 \text{ million} * 3,600 * 0.026 * \frac{5}{4} * 8.6 = 4 \text{ billion } USD$$

and

$$4 \text{ million} * 3,600 * 0.061 * \frac{5}{4} * 14.9 = 16 \text{ billion } USD$$

just for the group of children who are now between -1 and 6 years old and just through this channel.[40] Even if peacekeeping missions do not lead to measurable growth successes they prevent a large permanent income loss.

What are the economic benefits to the UK? The UK hosted over 145,000 refugees in 2011. The possible return of refugees is an immediate economic advantage of providing peace. Similarly, the recovery of trade will benefit not only the country that is kept in peace (more on this below).

## 6.3 Question 3

**What are the economic costs to a society without an effective or functioning security or defence apparatus?**

There are two ways in which the weakness of a state, in terms of its security and defence apparatus, affects the economy. First, a weak state is not able to protect the property of citizens living in it. Hence, even if the weakness of the state does not go hand-in-hand with armed violence, the insecurity brought about by a lack of law enforcement suppresses economic activity. Second, a weak state will fail to control the activity of armed groups in its own territory. The results are a rise in organized crime and, possibly, armed conflict.

When states are not able to provide formal property right protection, informal institutions typically replace formal arrangements. The protection granted by these informal institutions is often linked to political or even military power and therefore inhibits investment by the weak. What is the impact of this on investments? Besley (1995) studies farm investments in Ghana and shows that informal land rights lead to an increase of farm investments of up to 28 percent for those protected. In other words, those not protected invest up to 22 percent less. Goldstein and Udry (2008) study the impact of political power on farm investments in Ghana. They find that the low levels of investment by farmers

[40] In our calculations we have to scale up our estimates of 2.6 and 6.1 percent by 5/4 to account for the higher intensity of violence in Syria. We have again assumed a discount factor between 0.9 and 0.95 so that yearly income loss is multiplied by a factor of 8.6 and 14.9 (assuming a worklife span of 30-years).

without political power lead to a significant loss of farm productivity and profits. If applied to the whole country their results suggest a total profit loss of just under 1 percent of national GDP.

These findings of large effects are confirmed by the cross-country literature. Johnson et al (2002), for example, study business decisions in transition countries in the 1990s. They find that a lack of property rights protection hindered reinvestments in these countries significantly.[41] An estimate of the costs of lack of security in terms of long term development comes from Acemoglu and Robinson (2005). They analyze the impact of institutional restrictions which ensure that individuals are safe from "protection against expropriation". Their estimates suggest, for example, that an improvement in the protection against of expropriation by 1 point on the index scale of 0-10 will lead to an increase in long run GDP per capita of between 22 and 117 percent.[42] The extent of this impact is driven by the central role of the state in supporting economic activity. A lack of capacity to ensure safety is a fundamental problem for development.

The lack of state capacity can also mean that other groups challenge the "monopoly of violence" of the state. The spread of organized crime in some of the transition countries, for example, is what has likely driven the marked rise in the "need to pay for protection" found by Johnson et al (2012). Quantitative estimates of this channel come from Besley et al (2012) who study the insecurity caused by Somali pirates in the Gulf of Aden and the Indian Ocean. They find that the piracy risk led to an increase in shipping cost of between 8.2 and 12.1 percent for shipments through this area. This is a loss between 1 and 3 billion USD each year. This cost can be directly linked to the failure of the Somali state to establish a monopoly of power over its territory.[43]

The fragility of the state can even lead to a collapse of the state or large armed conflicts as in Afghanistan or Colombia. At this extreme, the costs of low state capacity is armed conflict. We have discussed the economic effects to this in our answer to question 1. Among the consequences are a decrease of agricultural investments by between 12 and 56 percent and a fall in house prices by between 20 to 40 percent. Non-residential construction declines by 10.8 percent and investment in machinery and equipment by 26 percent. Through this and other channels GDP per capita growth is reduced by between 3.3 and 8.1 percentage points for every year in civil war. In weak states armed conflicts can last for a very long time. Both Afghanistan and Colombia, for example, have experienced decades of violence.

A large part of the economic effect of insecurity comes from its impact expectations. This means, for example, that even where violence is absent investment only takes place if economic actors expect peace to be stable. The Northern Ire-

[41] Their measure of property rights is the reported necessity to make extralegal payments for licenses, extralegal payments for services, and payments for protection.

[42] Their instrument estimates in table 5 suggest an increase of 0.7 of in log GDP per capita with a standard error of 0.25 around this estimate. The standard deviation of property rights protection is 1.05. We calculate the 95 percent intervals so that the lower bound is given by $(0.7 - 0.25 * 1.96) * 1.05 = 0.22$.

[43] A recent literature on road projects finds similar effects of conflict on costs. See, for example, Benamghar and Iimi (2011) or Collier, Kirchberger and Söderbom (2013).

land peace process, for example, led to a boom in houseprices because it changed expectations about the future. Besley and Mueller (2012) estimate that if the inhabitants in Belfast, for example, had only believed that peace would hold with a probability of 50 percent (instead of 96 percent) then house prices would have increased by only 3 percent instead of 13 percent. Similarly, stock markets in Israel reacted positively to political steps towards peace even if these steps did not change levels of violence immediately. The role of expectations for economic activity implies that the provision of security in the present is not sufficient to improve economic conditions. Investments need changes that make peace permanent. The examples in the literature suggest that changes in political institutions and other political commitments play an important role here.

One way to illustrate the importance of political institutions is the difference between internal and external wars. Civil wars pit groups within national boundaries against each other - this means that states cannot develop. It has been shown, for example, that countries after civil war develop their political institutions slower and invest less in their legal and fiscal capacity. External wars mean that states need to overcome external enemies to survive - this strengthens the incentives to develop the capacity of the state. In the long run this means that countries with civil wars develop slower while states with external wars are less affected. Any capacity building in the security and defence apparatus needs to take this institutional dimension into account. The development of the violence capacity of a state without a simultaneous development of political institutions could increase conflict.

## 6.4 Question 4

**Is there a correlation between political stability/security and economic development?**

The correlations in the cross-country data are in line with what we presented in our answers to questions 1) and 3). The poorest economies today have a history of growth reversals - their economies shrank in 44 percent of all recorded years. The richest economies today only shrank in 19 percent of all years.[44]

One reason for these growth reversals are crisis and a main culprit is violent conflict. Low income countries are much more likely to face civil wars. The likelihood of facing a civil war year in the poorest countries is 14 percent, compared two almost no risk in the highest income bracket. At the same time poor countries tend to have a lower legal and fiscal state capacity than rich countries. This makes them more vulnerable to economic and political shocks.

Of course, establishing causality is a problem here. The correlations between state capacity, poverty and conflict do not answer to what degree causality goes one or the other way. Poverty and lack of state capacity make countries vulnerable to economic shocks which can then translate into conflict. Evidence from Africa, for example, hints to a link between weather phenomena like droughts

[44] For more details and sources of this data see the appendix.

and conflict in agricultural economies. This mechanism makes these low income states also fragile.

The emerging picture is that poverty is not due to a lack of growth per se but due to a lack of consistency in growth. Armed conflict is therefore an important factor for the lack of development and the prevention of conflict through capacity building can help economic development.

**Is it economically efficient to invest in defence engagement/upstream capacity building/conflict prevention?**

One way to understand the trade-off at hand is to build a simple model of the choice between an active prevention or an intervention that only takes place if conflict really breaks out. We maintain the assumption that prevention and intervention works. To simplify the analysis we assume that both prevention and intervention reduce the conflict probability to zero. We then have then a model with four variables: the cost of conflict ($D$), the cost of prevention ($C_{prevent}$), the cost of intervention ex post ($C_{intervene}$), the probability that conflict starts without prevention ($p_{start}$). Prevention is optimal if the cost of prevention is lower than the expected cost of not preventing, i.e. if

$$C_{prevent} < p_{start} \times (D + C_{intervene}) .$$

For a given set of costs $C_{prevent}$ and $C_{intervene}$, prevention is the better option if the costs of conflict is high (high $D$). Also, the higher the likelihood that a conflict starts the more useful is prevention. This is because early intervention prevents both damages and later intervention costs. Figure 6a shows a graphic representation of the model. Both graphs display the cost of intervention (once conflict has broken out) on the x-axis and the cost of prevention on the y-axis. The dashed line represents the line of indifference between intervention and prevention for a given set of values $p_{start}$ and $D$. For higher prevention costs (above the line) it is optimal not to prevent. Figure 6b shows the reaction to an increase in $p_{start}$. The curve shifts upward and pivots counterclockwise. The area in which prevention is better expands significantly.

This model highlights the importance of our discussion of the permanence of conflict costs. If permanence is high then $D$ is large and prevention is better. Our discussion of the permanent effects of violence suggests that, even for relatively small values of $p_{start}$, the prevention of conflict can be economically more efficient than late intervention. The reason is that violence has strong permanent effects which cannot be reversed once is has already broken out.

In addition, understanding conflict risk, $p_{start}$, is essential for making decisions on when to intervene. At a first look intervention is most cost effective right before conflict breaks out - when the conflict probability is high but damage not yet visible. The problem with this view in practice is, however, that there will be very close links between $p_{start}$ and $C_{prevent}$. It might then be most cost-effective to intervene at very low levels of $p_{start}$ if $C_{prevent}$ is also very low. In other words, it will save costs to be engaged further upstream if $C_{prevent}$ falls over-proportionally with falling $p_{start}$. Hence, the connection between cost of intervention and conflict risk is crucial here.

Figure 6a: Prevention or Intervention

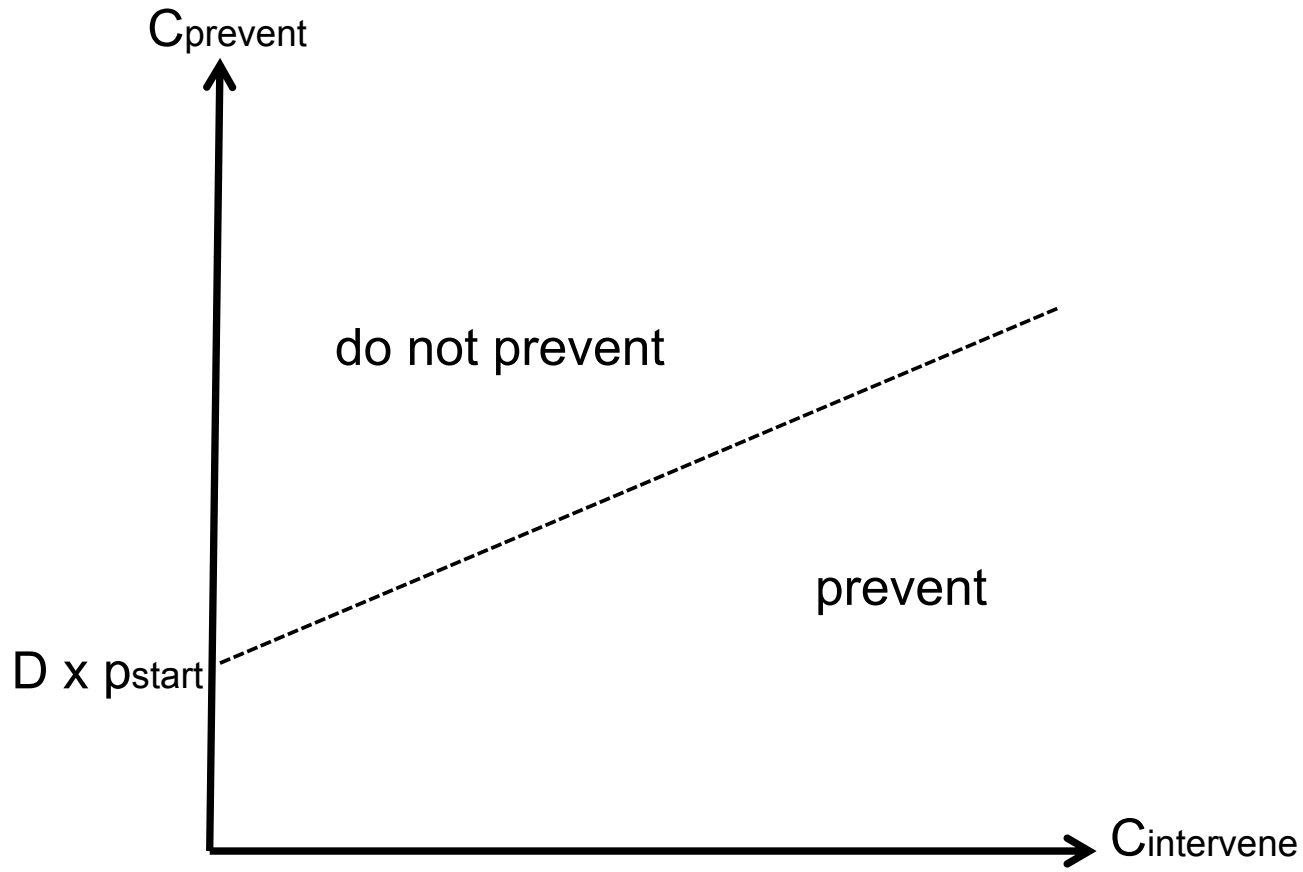
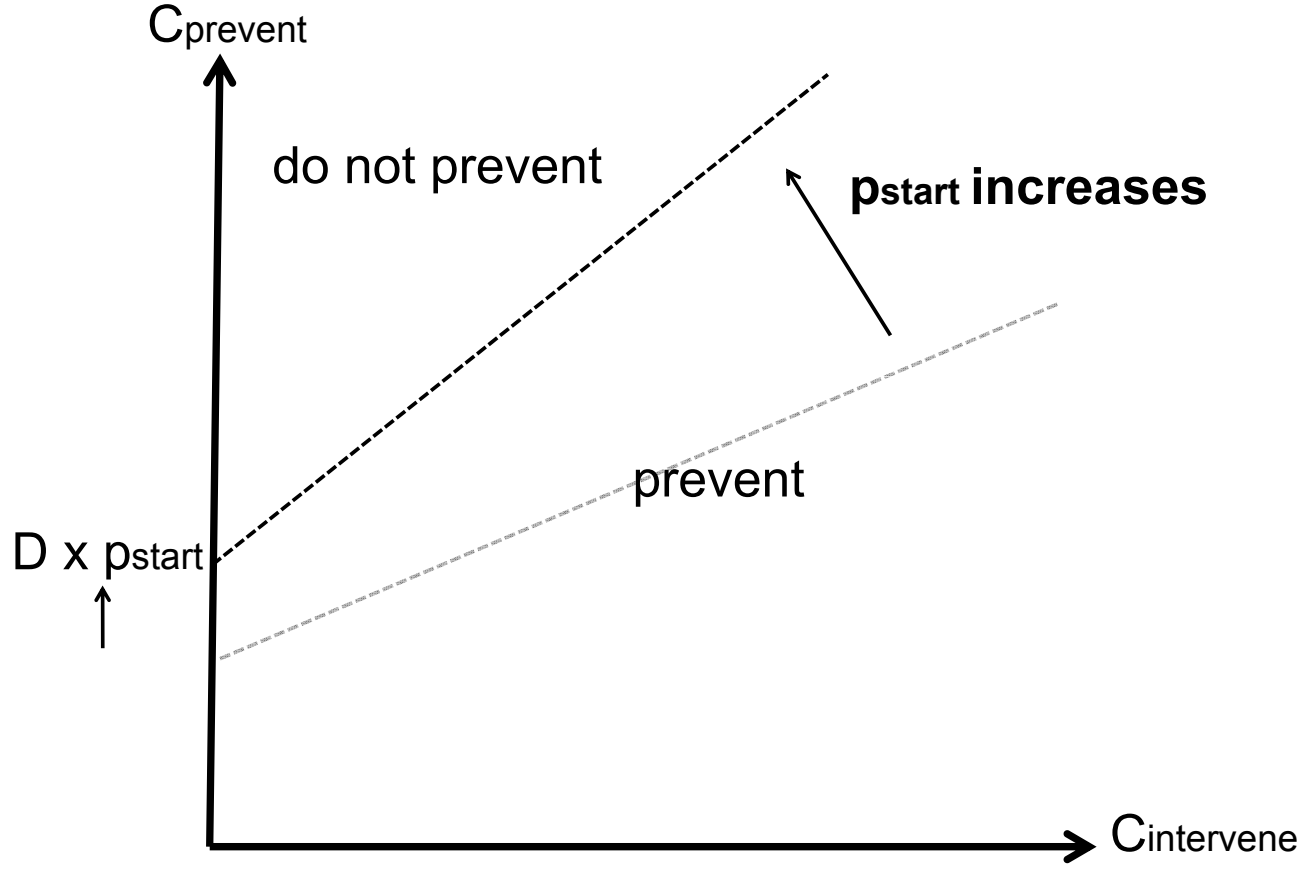



Figure 6b: Increase in the Conflict Probability



This brings us the discussion of the most cost-effective mix of measures. We have discussed troop surges in Iraq and Northern Ireland in more detail in section 4. In both cases the surge contributed to a turnaround in violence trends. However, by itself stronger troop presence did not improve economic expectations in Iraq and could not stop a long terror campaign in Northern Ireland. Detailed data for Iraq indicates that well-targeted aid spending is most effective in reducing violence when it is coupled with troop presence. The flip side to this is that the provision of security is most effective if it is combined with aid efforts.

The economic effectiveness of aid is best illustrated with estimates from Berman et al (2011). Their paper suggests that violence in Iraq could have been resolved if the surge of troops had been combined with $74 per capita of a particular form of aid spending (CERP) per year. Assuming a constant population of 31 million, the total cost of this effort over four years would have been $9.1 trillion. What would be the economic returns to this aid spending? Note that according to the PRIO data the Iraq suffered 49.000 battle-related deaths between 2004 and 2007. This is an intensity of 0.395 deaths for every 1000 inhabitants per year.[45] This is very close to our benchmark case of civil war so that we can apply our estimates directly. The absence of violence would have increased growth between 3.3 and 8.1 percentage points per year. This would have led to the generation of extra income of between $18 trillion and $45 trillion in 4 years and a GDP per capita gain of between 10 and 27 percent at the end of 2007.[46] This means that aid spending targeted this way would have led to a two- to fivefold economic return through a prevention of violence. It is an important message from this study that even the provision of basic security depends on several channels of intervention working together. It is never only "boots on the ground".

There are numerous important caveats. Most importantly, CERP is just a small part of all spending. Berman et al (2013) show that only some kinds of US aid spending had the desired effect. Most bigger programs were ineffective and so it is questionable whether CERP could have been scaled up. From our overview of the research on COIN it seems that labour intense projects and projects that are small, conditional on cooperation and well-targeted improve security most. The second caveat is that all these findings are derived in situations of COIN. How well these findings can be generalized to other situations is an open question. Note first that the mandate and equipment of security personal might differ significantly. The presence of foreign troops will also be seen differently - the very existence of insurgency violence already implies that a part of the population strongly opposes troop presence. In addition, public

[45] We use a population estimate of 31 million so that the intensity per year is 49,000/(31,000*4).

[46] In these calculations we assume a GDP per capita of $957 at the beginning of violence. The numbers are derived from calculating a counter-factual growth rate and applying it to this starting point. Iraq featured very volatile but positive growth rates in this period. Thus, the change in GDP per capita level in the whole period is *not* given by, for example, $\left(1.033^4 - 1\right) * 100$. Details are available from the author.

good spending might have very different effects outside COIN. The fact that it is effective is due to a particular kind of conditionality which links absence of aggression to aid provision. It is unlikely that this can be applied one-to-one in other circumstances. The effect labor intense projects on the other hand will likely generalize as the mechanism of high opportunity costs is applicable more generally.

The overall economic effects of capacity building can only be predicted with its political dimension in mind. Changes in the political climate are important economically because they affect expectations (see answers to questions 2 and 3 for details). Investors need to feel protected from future violence and expropriation. Any change in the current security environment can therefore be made more effective if it goes hand-in-hand with an effort of political reconciliation and institution building. Improved expectations can become self-fulfilling because investments bring about work and make violence less attractive. A combination of money spent on aid, institutions and capacity building that manages to trigger this virtuous cycle will be extremely effective. Money that is poured into an ongoing vicious cycle will have no effect.

## 6.5 Question 5

**Is the UK's economy routinely negatively affected by conflict and instability around the world?**

- **Are there any examples of states whose instability has a negative impact on the UK economy?**
- **What are the economic costs to the UK in ignoring 'failed' states?**

There are several ways in which the UK population is directly or indirectly affected by the public bad of instability. The first and most immediate impact of instability is the collapse in trade it brings about. As an example we use Nigeria which is not on the brink to civil war but is facing a resilient armed insurgency in its north. Trade between the UK and Nigeria in 2011 was GBP 1.85 billion.[47] Our calculations suggest that if a civil war broke out in Nigeria this would reduce its trade by 32 percent. If we use this estimate and combine it with the estimates by Feyrer (2009) we arrive at a direct cost to the UK economy between GBP 90 million and GBP 240 million per year. Since this cost is permanent a calculation similar to our answer in question 1 would imply a loss of between GBP 770 million and GBP 3.6 billion over the course of 30 years.[48]

[47] Numbers are from HM Revenue and Customs. Total trade was GBP 3.9 billion. However, Feyrer (2009) uses average trade flows we therefore calculate: $(exports + imports)/2$.

[48] It is questionable whether the full cost of permanence would apply. Trade that breaks down because of a failure of the trade partner could be substituted with trade from and to other countries.

State failure makes it easier for organized crime groups to remain unchallenged in an area. In the case of Somalia this has led to an increase in maritime piracy which affects shipping directly. Quantitative estimates of this channel come from Besley et al (2012) who study the insecurity caused by Somali pirates in the Gulf of Aden and the Indian Ocean. They find that the piracy risk led to an increase in shipping cost of between 8.2 and 12.1 percent for shipments through this area. This is a loss between 1 and 3 billion USD each year. Besley et al (2012) stress that the activity of pirates can be directly linked to the failure of the Somali state to establish a monopoly of power over its territory.

Another way in which the rise of organized crime affects other countries is drug production. There is recent evidence from Afghanistan on this issue. The findings by Lind et al (2012) suggest that going from no conflict to conflict in the average Afghan district led to an increase in the area of cultivation of 368.3 hectares. Enough to produce 1.2 metric tons of heroin or more then six million user doses of 200 mg. This implies a clear negative externality for other countries both in terms of public health and in terms of crime rates for trafficking countries. In this way drug production is very similar to maritime piracy. While the operational basis is local the indirect effect on other countries is potentially large.

Most of the public debate on the global effects of state failure have focused on terrorism. The spill-over from the fragility of Afghanistan here are clearly apparent. A similar, or possibly far worse, outcome could arise if other countries with more sophisticated weapons collapse. The link between Libyan civil war and the flow of weaponry to Islamic groups in Mali and Algeria provides anecdotal evidence for this effect.

A central element of the costs of state fragility is that they affect a large number of countries. This implies that any response requires strong coordination and effective cost sharing across different states. How old this problem is can be illustrated with a correspondent report on Chinese piracy in The London and China Telegraph from 4th February 1867:

*"Besides we are not the only Power with large interests at stake. French, Americans, and Germans carry on an extensive trade [...] Why should we then incur singly the expense of suppressing piracy if each provided a couple of gunboats the force would suffice for the safety foreign shipping which is all that devolves upon [..] why should the English tax payer alone bear the expense?"*

In order to understand the scale of this coordination problem note that Nigeria had total average exports and imports of more than $83 billion in 2012. The total economic damage for all trading partners from a trade collapse in Nigeria would therefore be $34 and $158 billion compared to the GBP 770 million and GBP 3.6 billion that would be borne by the UK.[49]

[49] These are caulcated as $83 * 0.15 * 8.6 * 0.32 = 34$ and $83 * 0.4 * 14.9 * 0.32 = 158$.

# A Refugees

The refugee data has been extracted from the UNHCR Statistical Online Population Database, United Nations High Commissioner for Refugees (UNHCR): www.unhcr.org/statistics/populationdatabase. The time period covered depends on the data availability for each country, but in most cases it goes from 1961 to 2011.

Specifically, the data provides the total refugee population by origin and destination country. The category total refugees excludes several other similar groups, like: asylum-seekers (those who have applied for refugee or asylum status but have not yet received a final answer); returned refugees (those who have returned to their country of origin); internally displaced persons (IDP – those who left their usual place of residence due to violence, armed conflict of violation of human rights, but have not crossed international borders), returned IDPs, and stateless persons.

We use two conflict databases. One of them comes from the Correlates of War (COW) Project, and it is the Intra-State War v.4.0, this base covers wars that take place predominantly within the recognized territory of a state. The period covered is 1960-2007. The second database is the Battle Death data set of the UPCD/PRIO Armed Conflict Dataset – version 3.0-, one of its main differences with the previous data set is that it takes into account conflicts with a minimum of 25 deaths per year of war. Besides, it keeps track of the flows of battle deaths, year by year, and not just the accumulated sum, as in the previous base. The period covered is 1960-2008.

The following two tables summarize our empirical results. The first column in the table below shows the effect of a civil war start (according to the COW definition). The second column shows the effect of battle deaths on refugees in the same year.

The second table shows the effect of a civil war start as defined by the COW and the PRIO data on refugee inflows to neighboring countries.

# B Scaling the Effect

The following table shows our cross-country results when we categorize armed conflict years in 10 categories according to the intensity of violence in conflict they imply. In figure 4 we display the results from column (1). Columns (2) and (3) show that results are fairly robust to the inclusion of the lagged growth rate and country-level fixed effects.

We now provide details on the calculation of intensities in two cases. The remaining calculations are provided in footnotes in the main text.

It turns out that most conflicts analyzed by micro studies were of relatively low intensity. Take the study of educational attainment in Peru provided in León (2012). Districts that experienced violence saw an average of about 13.12 killings per 19,700 inhabitants spread over 17 years. This implies an average yearly intensity of 0.04 killings in 1000 inhabitants per year - an area where

| Total Number of Refugees | | |
|---|---|---|
| | Triggered by Civil War Start | Triggered per Battle Death |
| CWstart | 11792.2 | 22.54*** |
| | (0.88) | (31.83) |
| L.CWstart | 35968.0*** | |
| | (2.70) | |
| L2.CWstart | 38588.5*** | |
| | (2.91) | |
| L3.CWstart | 43449.5*** | |
| | (3.28) | |
| L4.CWstart | 56040.5*** | |
| | (4.27) | |
| L5.CWstart | 55629.5*** | |
| | (4.26) | |
| L6.CWstart | 37724.6*** | |
| | (2.90) | |
| L7.CWstart | 42735.7*** | |
| | (3.30) | |
| L8.CWstart | 35404.6*** | |
| | (2.74) | |
| L9.CWstart | 21643.6* | |
| | (1.68) | |
| L10.CWstart | 24935.7* | |
| | (1.93) | |
| Country Fixed Ef.: | Yes | Yes |
| Time Fixed Ef.: | Yes | Yes |
| Obs: | 7794 | 9694 |
| Countries: | 190 | 190 |

| Number of Refugees Received if at Least one Civil War in Neighboring Country | | |
|---|---|---|
| | (COW Civil War) | (PRIO Civil War) |
| Wcont | 1746.5 | -486.6 |
| | (0.29) | (-0.08) |
| L.Wcont | 11684.4* | -1552.3 |
| | (1.95) | (-0.25) |
| L2.Wcont | 12498.9** | 528.5 |
| | (2.10) | (0.09) |
| L3.Wcont | 12460.4** | 8217.2 |
| | (2.12) | (1.38) |
| L4.Wcont | 10515.9* | 11508.4** |
| | (1.81) | (1.96) |
| L5.Wcont | 8812.6 | 7952.2 |
| | (1.52) | (1.35) |
| L6.Wcont | 5779.9 | 480.5 |
| | (1.00) | (0.08) |
| Country Fixed Ef.: | Yes | Yes |
| Time Fixed Ef.: | Yes | Yes |
| Obs: | 8550 | 8550 |
| Countries: | 190 | 190 |

*Table: Regression Basis for Figure 4*

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | GDP per capita growth | GDP per capita growth | GDP per capita growth |
| armed conflict year of intensity decile 1 | -0.598 | -0.567 | 0.00340 |
| | (0.712) | (0.712) | (0.917) |
| armed conflict year of intensity decile 2 | -1.331** | -1.369** | -2.137*** |
| | (0.659) | (0.659) | (0.652) |
| armed conflict year of intensity decile 3 | -0.526 | -0.363 | -1.353** |
| | (0.647) | (0.636) | (0.651) |
| armed conflict year of intensity decile 4 | -0.0374 | 0.0666 | -0.696 |
| | (0.898) | (0.871) | (1.017) |
| armed conflict year of intensity decile 5 | 0.312 | 0.363 | -0.353 |
| | (0.775) | (0.778) | (0.870) |
| armed conflict year of intensity decile 6 | -0.444 | -0.483 | -1.251 |
| | (1.173) | (1.174) | (1.336) |
| armed conflict year of intensity decile 7 | -2.587*** | -2.583*** | -3.665*** |
| | (0.962) | (0.950) | (1.164) |
| armed conflict year of intensity decile 8 | -3.060*** | -2.904*** | -3.557*** |
| | (0.925) | (0.940) | (0.988) |
| armed conflict year of intensity decile 9 | -5.690*** | -5.463*** | -6.574*** |
| | (1.474) | (1.491) | (1.893) |
| armed conflict year of intensity decile 10 | -6.444*** | -6.260*** | -6.633*** |
| | (1.615) | (1.614) | (1.878) |
| growth (1 year lag) | | 0.0362 | -0.0166 |
| | | (0.0319) | (0.0256) |
| country fixed effects | yes | yes | yes |
| year fixed effects | yes | yes | yes |
| country specific time trer | no | no | yes |
| Observations | 7,618 | 7,486 | 7,486 |
| R-squared | 0.129 | 0.128 | 0.178 |
| Number of countryid | 179 | 179 | 179 |

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered on the country level, in parentheses. Dependant variable is growth rate in percent. Armed conflict intensity is the number of battle-related deaths per 1000 inhabitants. Deciles are calculated excluding 0 values.

the aggregate growth numbers do not suggest an economic damage. However, according to León's estimates the exposure to violence lead to a permanent decrease in the education of children between 0.05 and 0.07 years per year of exposure. This difference could be driven by the significant fluctuation of the intensity between districts and across time. This heterogeneity can be gathered from the graph on page 996 of León (2012). The maps reveal high spatial fluctuation of violence so that the total intensity is created by relatively calm periods interrupted by some years of intense violence. However, we are not able to discern this effect properly due to a lack of population and violence estimates on this level.

Our estimate for the impact on farm investments comes from Singh (2012) and are translated as follows. In total the Punjab area experienced 5,070 civilian killings spread over a period of 8 years and affected a population of ca. 16 million people. This implies an intensity of the conflict of 0.04 killings per 1000 inhabitants. Again the point here is that effects come from the district level, some of which experienced much higher intensities. Amritar, a region with 2.1 million inhabitants in 1981, for example, experienced over 2000 killings in 8 years. This suggest an intensity of violence of 0.12 killings 1000 inhabitants. Furthermore killings were targeted at the rural population so that farmers were likely to be more affected. We therefore use the intensity of 0.12 here.

# C Poverty and Crisis

In the analysis used in the text we use two tables constructed with data from North et al (2009). The first table summarizes growth data for different groups of countries according to their per capita GDP in 2000. Rising GDP goes hand in hand with a decrease in the average growth rate during years of positive growth and an increase in the share of years with positive growth. In other words, what separates rich and poor countries today is the volatility of their growth history more than high versus low growth in itself.

Table: Growth rates in good and bad years by per capita income in 2000

| | Per capita income in 2000 | Number of Countries | Number of years observed | Percent positive years | Average positive growth rate | Average negative growth rate |
|---|---|---|---|---|---|---|
| 1) | $ 300 to $ 2000 | 44 | 1706 | 56% | 5.37 | -5.38 |
| 2) | $ 2000 to $ 5000 | 46 | 1708 | 66% | 5.39 | -4.75 |
| 3) | $ 5000 to $ 10,000 | 37 | 1245 | 73% | 5.25 | -4.59 |
| 4) | $ 10,000 to $ 15,000 | 14 | 528 | 71% | 5.27 | -4.07 |
| 5) | $15,000 to $ 20,000 | 12 | 491 | 76% | 5.59 | -4.25 |
| 6) | Over $ 20,000 | 31 | 1468 | 81% | 4.19 | -3.49 |

The second table shows the civil war risk for the different income categories. Here the data and categorization is taken from Cerra and Saxena (2008) who

use the COW definition of civil war. The table indicates that the civil war risk reduces considerably from low to high income. While low and lower mid income countries face a substantial risk of a civil war this risk disappears in the higher income brackets. The table also shows that, on average, the two lower categories are almost 7 times as likely to face a civil war than the higher income categories.

Table : Concentration of Civil War in Low Income Countries

| | share of years in crisis | standard error | relative conflict likelyhood* (low vs. other incomes) | relative conflict likelyhood* (low + lower mid vs. other incomes) |
|---|---|---|---|---|
| **civil war** | | | | |
| low income | 0.143 | 0.012 | 2.310 | 6.779 |
| lower mid | 0.143 | 0.014 | | |
| upper mid | 0.042 | 0.010 | | |
| high income | 0.000 | 0.000 | | |

*Relative conflict likelyhood is the average probability of a civil war year in the lower income countries compared to the average likelyhood in the higher income countries.

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