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Conflict in Neighbouring (Developing) Countries: Direct and Indirect Effects on Economic Growth

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Conflict In Neighbouring (Developing) Countries: Direct and Indirect Effects on Economic Growth[1]

Summary

Conflicts in developing countries have been known to cause havoc well over the borders within which they are fought. A recurring question is to measure the externalities arising from niehgbour's conflict. Specifically, this paper looks at the effects of conflict in one country, on the economic growth of its neighbours but also the effect on growth enhancing variables.

The empirical analyses include 72 countries, 40 from sub-Sahara Africa, 4 from North Africa and 14 from Asia and Latin America respectively. Using data from the 'States in Armed Conflict Report 2000', the empirical relationship between the existence and duration of conflict in developing countries and economic growth of its neighbours is confirmed. The study uses standard methods of panel data estimation (fixed effects and random effects), which makes it possible to control for time-invariant country-specific effects. The study finds that conflict in one country does not only reduce economic growth of its neighbours but also significantly affects other growth enhancing variables. The main policy implication of the study is that the resolution of conflict should take a regional perspective since costs arising from conflict spread over several countries in the neighbourhood. And also post conflict reconstruction should take these costs into account to avoid further conflicts within the region.

[1] I wish to acknowledge, with gratitude, valuable contribution from my supervisor, Prof. Stephan Klasen.

1. Introduction

> 'Civil wars should be considered an international problem, since they almost always affect and involves neighboring states, thereby undermining regional stability'. Brown (1996, 3)

A considerable volume of literature has attributed part of the economic failure of the developing countries to the prevalence of conflicts in these regions (Collier,1998; Collier and Hoeffler, 1998 Elbadawi, 1999 etc). Africa for example has 51% of minor conflicts, 38% of intermediate conflict and 53% of war out of all global conflicts and wars during the period 1989 to 2000 (see 'states in armed conflict 2000' Sollenberg 2001:21). Also, according to Elbadawi and Sambanis (2000), over the last 40 years nearly 20 African countries[2] have experienced at least one period of civil war. This is enough to make one believe that the prevalence of conflict could explain a greater part of its current economic situation since meaningful economic development cannot take place without peace (Mkandawire and Soludo, 2001).

By now, there is a considerable amount of literature on the effects of conflict on host countries. There is also a growing body of literature that has started to look at the spill over effects of conflict in one country onto its neighbours. However, this has largely been limited to the effects of conflict on GDP per capita growth: the transition to steady state. Little, or nothing, has been written on the effect of conflict in one country on other economic development enhancing variables, especially key variables of the neoclassical growth model, a framework, which has been widely used in the conflict and development study literature. This study adds to this pool of knowledge by extending the model to include the effects of neighbours' conflict on other economic development determinant variables.

The effects of civil wars are not only felt in the countries were they are fought but also in neighbouring countries and beyond. In a world of increasing demand for globalization, states no longer exist in isolation, but are influenced by their interaction and exposure to the activities of other states (Gleditsch 2003). A recent report by the World Bank (2003), which indicates the increasing awareness of conflict among development actors, also noted that civil war has spill over effects for both neighbouring countries and the entire international community. This paper looks at the spill over effects of conflict on neighbouring countries in Africa, Asia and Latin America. Since the end of the 1980s, there has been a substantial increase in conflicts within

states rather than between them. Yet, a considerable amount of the burden falls on neighbouring countries.

The economic studies of civil war have successfully identified an empirically robust relationship between poverty, slow growth, and an increased likelihood of civil war onset and prevalence. These relationships are discussed at length in a collection of papers in the February 2002 special issue of the *Journal of Conflict Resolution* (Collier and Sambanis 2002). Collier and Hoeffler (2000) and Fearon and Laitin (2001) both find evidence that high poverty levels and slow economic growth are the two most salient determinants of insurgency. However, this current study posits that most of the previous works have been focused on the effects of conflict on the countries in conflict[3] themselves, whereas the externality of such conflicts has not received much attention.

As the pioneering studies of Murdoch and Sandler (2002a, 2002b) on the spill over effects of conflict also observed, a better understanding of the consequences of civil wars, not only on a host country's economic growth but also on its neighbour's growth, is essential to improve the effectiveness of foreign assistance to developing countries. The focus of previous studies is on own-country effects of conflict, and now, I want to scrutinise the spill over effects from conflict in neighbouring countries. Hence, this study is similar in many ways[4] to its predecessors, Murdoch and Sandler (2002a, 2002b), but it has employed different measures of neighbouring countries conflict to see if similar results of neighbourhood effects of conflict will be obtained. Specifically, I want to ascertain whether conflict in one country is a potential shift parameter in the growth equation in another country, but also if this shifts other growth enhancing parameters. Therefore, my interest in this paper goes beyond estimating the empirical relationship between standard determinants of growth. Also, I observe the effect of a neighbour's conflict when the country itself is in conflict, an aspect which previous studies did not take into consideration.

This paper further argues that because the effects of conflict are felt beyond the borders of the conflicting countries, reconstruction of war tone societies should take this very seriously into account if success is the goal. The paper show that there is a need for new, inclusive, approaches to post-conflict situations. Involvement by the local population, displaced persons and returning

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[2]That is about 40% of countries in Africa south of the Sahara

[3] As evident in the issue 01 volume 46 of the *Journal of Conflict Resolution* and several other studies.

refugees is a key factor for successful reconstruction. Above all, neighbouring states can also play a great role especially those who have been harbouring refugees of the country under reconstruction and these aspects should be incorporated in peace talks if lasting peace is to be achieved.

The rest of the paper is arranged as follows: sub-section 2 discusses the possible spill over effects of conflict drawing on economic theory and previous theoretical and quantitative studies. A section that describes the approach of the study follows. The methodology employed is then explained in sub section 4. Sub section 5 shows the results and discussion of the estimation while 6 relates results of the study to previous findings and 7 concludes the paper.

2. Spill Over Effects of Conflict: Existing Research and Theoretical Debates

As a base for my empirical analysis, I use economic theory backed by brief literature reviews to discuss the spill over effects of conflict. Studies that have used economic theory to explain the incidence of conflict are abundant[5]. These studies have divided economic theories of conflict in two generations. First generation theories emphasized the impact of economic modernization (rapid growth rates and structural changes to the economy) on the mobilization of social groups for conflict. Rapid socio-economic change could accelerate and intensify group competition for scarce resources. Further, the process of modernization explains not only the origins of ethnic conflict but also the form of that conflict, and the success or failure of specific ethnic political movements (Newman 1991).

The second generation of economic theories, however, is more easily generalizable and is based on rational choice theory and economic theories of criminal behaviour. Classic references include Grossman (1995) and Hirschleifer (1995), who focus on the economic tradeoffs that allow the outbreak of conflict and, they also zoom in on the consequences of conflict on economic growth. The influential works of Collier and Hoeffler (1998, 2000, and 2002) on conflict and economic growth fall comfortably within this framework.

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[4] Using the same theoretical model (the neoclassical framework of Solow (1957) and regressing on growth rate for example

[5] For a comprehensive report on this, see Sambanis (2002); for a very recent review of literature on conflict and economic growth. Also see 'economic motives and economic effects of civil war' in appendix 2 of World Bank (2003) on 'A Selected bibliography of Studies of Civil War and Rebellion'.

However, it is unlikely that the economic consequences of civil wars will be confined solely to a nation in turmoil. Negative spill over to neighbouring nations are likely to occur from disruptions to trade, heightened risk perceptions by would-be investors, severance of input supply lines, collateral damage from nearby battles, and resources spent to assist refugees (Murdoch and Sandler 2002a). In addition to the negative externality of neighbourhood conflicts effect, which has received wide consensus in the limited literature, this paper also discusses the possible positive spill over effects of conflict to neighbouring countries[6]. First, however, let me provide some theoretical discussion of how conflict in host countries might affect growth in neighbouring countries in the context of a neoclassical growth model.

A violent civil conflict constitutes a negative externality because it not only disrupts economic interactions in the own, but also in the neighbouring, country (Eberle *et al* 2003). The most commonly cited manner in which a conflict in one country affects another is through the possibility of conflict initiation across the border. In some situations war in one country directly increases the risk of war in neighbouring countries (Gleditsch 2002, 2003; World Bank 2003[7]). In a sensitivity analysis, Hegre and Sambanis (2002) find that the positive impact of neighbouring conflict on the risk of civil war remains robust under many possible measures and model specifications[8]. As Eberle *et al* (2003) also noted a large body of research[9] has shown that geographical contiguity increases the likelihood of conflictual interactions between states[10]. Again, Collier and Hoeffler (2001) find evidence that rebellions are contagious, in other words, a rebellion significantly increases the risk of internal upheaval in a neighbouring country. Additionally, they showed that the level of military expenditure in one country is strongly influenced by the expenditure of its neighbours (Collier and Hoeffler 2002). This may be partly

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[6] A conflict is said to generate negative effects if it directly reduces economic growth and or indirectly reduces the growth of economic growth enhancing variables. It is positive if neighbouring countries gain in some ways as a result of the conflict. An example of the latter can be when resources exploited in the warring country (especially by rebel groups) are sold in the neighbouring country.

[7] See Paper 3 of World Bank (2003) report

[8] As cited in Gleditsch K.S (2003).

[9] See Siverson and Starr 1999; Tir and Diehl 2002. cited in Eberle *et al* (2003).

[10]The civil wars in the African Great Lakes region are examples of this, as recurrent wars in Burundi and Rwanda spilled over their borders in both directions and into the Democratic Republic of Congo. The latter war also provoked interventions by Uganda and Zimbabwe. In all these wars Hutu-Tutsi antagonism was predominant (Ngaruko and Nkurunziza 2002; Prunier 1995). This recurrent ethnic conflict crossed borders and lasted over time, being at the core of approximately seven episodes of civil war in the two countries. Additionally, the conflict in Sierra Leone is said to have been a spill over from the Liberia conflict and in the late 90s, both conflicts were also said to have spilled over to neighbouring Guinea.

due to a perceived threat, and in part because of norm setting and the emulation and rivalries of military leaderships.

Although the basic assertion that conflict in a one state increases the risk of conflict in another is not controversial, there are a number of ambiguities associated with the existing empirical evidence. A consensus on how conflict is directly spread to neighbouring countries does not seem evident in the literature (Gleditsch, 2003; Sambanis, 2003). The increase in risk may stem from direct contagion, or what is referred to as non-actor specific spill over effects. For example, an ongoing conflict in neighbouring countries may decrease the price of arms and increase their availability, thereby making it relatively less expensive for aggrieved groups to mobilize insurgencies (Collier and Hoeffler 2002). So, then, the question remains whether rebel groups in one country directly invade neighbouring countries, or whether rebel groups in countries close to those that are in conflict emerge as a result of neighbour's conflict. I will argue that most often we observe a combination of the two factors.

Apart from increasing the probability of conflict, the most immediate effect of civil war on neighbouring countries is the arrival of thousands of refugees in the neighbouring countries and the consequences of this move for the population thereafter. Further, since refugees stay in asylum countries long after the civil war ends, the social effects of civil war on neighbouring countries also continue well into peace time (World Bank 2003). Indeed, nearby civil wars can increase refugee flows, a factor which raises labour growth and reduces per capita income through migration (Murdoch and Sandler (2002a).

Among all the long-term, indirect effects of civil war, it causes the most deaths in neighbouring populations through infectious diseases, especially malaria. Many people have been known to die from malaria in Africa, especially. It is now established that civil war has been a basic reason behind the observed increase in the frequency of malaria (World Bank 2003). Montalvo and Reynal-Querol's (2002) study discovered that conflict in one country affects the occurrence of malaria in a neighbouring country directly as non-immune refugees come into contact with infected individuals when, in instances where the former flee through rural and rainforest areas to reach a foreign country. Even more alarming is Ghobarah, Huth and Russett's (2003) discovery that the most important effect of civil war on neighbouring countries is caused

by HIV/AIDS[11], a dreadful disease known to have claimed thousands of lives especially in Africa.

Again, the effect of conflict in one country on the trade link of another can be enormous. War seems to frighten investors away rather than attract them to a particular region[12]. It is not only investors who are scared away from these regions, even inter state trade reduces during conflicts. This is exacerbated by the dependence of some African countries, for example, on others for a major part of their trade (imports and exports), a case which applies especially to countries that do not have access to the sea (land locked countries). A country whose import and export is carried out by another country in conflict is at a greater risk especially if there are either no other options, or such other options are more expensive. The war in Mozambique doubled Malawi's international transport costs and triggered an economic decline. Similarly, the war in the Democratic Republic of Congo closed the river route to the sea for the landlocked Central African Republic (World Bank 2003).

Sometimes, the spill over effects of conflict can be physical; bombs have been known to cause destructions beyond the borders in which they are used. These might destroy valuable physical capitals, schools, and so forth in neighbouring countries. A nearby civil war may lead to collateral damage from battles close to the border which destroy infrastructure and capital (Murdoch and Sandler 2002a). Further, the displacement of people within border regions is also not uncommon in countries that share borders with conflict-ridden countries. This might exert pressure on urban population as the attraction is normally towards the bigger cities.

Another important externality, which results from conflict in contiguous countries, is the reallocation of resources to less productive activities. This has already been deliberated in the literature on the effects of conflict on the host country; it is also very relevant in the spill over effect debate. Being contiguous to a warring country might require the taking of military measures to ensure the protection of borders. This action, because of its high expense, in most cases constitutes a diversion of resources away from possibly development-oriented initiatives, and therefore leads to loss. This loss is twofold: the direct cost of diversion but also the side effects produced by this border security. Border patrols, or shooting to scare neighbouring

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[11] HIV/AIDS is a wide spread disease in times of conflict because the incidence of rape increase during these situations. Some time the transmission of Aids is intentional on the parts of rebels, as shown in the case of Rwanda.

[12] A special exception in this case relates, however, to investors involved with the trade in arms, who are, in fact, attracted.

countries' troops, create panic while sending signals of potential conflict spill over. The defence cost of countries with neighbours in conflict is expected to increase as border defence is strengthened.

On the part of positive spill over, gains from disruption in one country's economic activities as a result of conflict may accrue to neighbouring countries. Because war disrupts trade and other economic activities in neighbouring countries, it is expected that the opportunity costs for resorting to war should decrease. However, some countries have even been known to interfere in their neighbours' conflict situations. Countries embroiled in civil war also often provide a safe haven for rebel groups of other countries. The wars in Liberia and Sierra Leone alternately served these purposes for each other's rebel groups (Davies and Fofana 2002). This suggests that there may be gains accruing to some countries, hence their willing involvement in other's conflicts. This clearly excludes those countries that send in support usually in the form of military personnel in peace missions[13].

Again, spoils of war from one country, especially when these are primary products, could be sold in neighbouring countries with their benefits accruing there. An example is the sale of Sierra Leonean 'conflict diamonds' (especially when such sales were internationally banned) in neighbouring Liberia and the procurement of arms and munitions by the rebel organization from that same country. Also, Guinea would have gained much through trade when there were sanctions in Sierra Leone towards the end of the 90s because goods were smuggled across the border. The proportion of young and uneducated men in neighbouring countries could also serve as a pool of potential rebels for countries in conflict. The opportunity to gain new recruits should be especially large in poor societies. With low levels of human capital and slow growth, the 'alternative income' to be gained from participating in a rebellion is high (Eberle *et al* 2003). These arguments suggest that there may be positive gains from conflict in one country: idle labour could be absorbed into this process at the same time that direct financial benefits are accessed. So there is a reciprocal relationship between peaceful countries and conflict-ridden countries.

[13] For example, the Nigerian and Guinean troops that dominated the ECOMOG peace mission to Sierra Leone in the 90s clearly did not bring direct gains to these countries, although undocumented sources have it that soldiers were involved in looting and extortions. These cannot be quantified.

The long-standing debate with empirical evidence[14] on the capital flight effect of conflict could suggest positive effects of conflict on neighbouring countries. There is no study, to my knowledge, on where capital typically flies[15]. However, if this were to flow into the neighbouring countries, then one would expect positive spill over effects of conflict into neighbouring countries. In as much as this is difficult to quantify, it cannot be completely ruled out. Measuring capital flight and its specific direction is difficult because financial capital is normally illegally taken out of a country. It is often difficult, if not impossible, to move physical capital across borders unlike the mass movement of human capital across borders in times of conflict can be directly observed. Although this is usually seen as negative for host countries, it could be translated into positive effects. In fact, where the human capital of refugees is high, benefits to the host country could be substantial. Experience shows that Gambians saw an influx of teachers from Sierra Leone with the onset of war in the latter country in the 90s. Although this was a common trend prior to the conflict, the magnitude increased significantly because of the conflict.

The spill over cost of conflict is not only confined to two countries (with one country affecting another country), they can also be regional. Regardless of whether conflicts in developing countries are motivated by grievance and greed by some members of the host country population or fuelled by greed and grievance from other members of the neighbouring country, they have had profound consequences on economic growth, not only at home, but also in neighbours (irrespective of whether they participate[16] in the conflict). Factors such as the diversion of foreign direct investment out of the entire region with conflict harm all countries within that region. The loss spreads to neighbouring countries because experience shows that conflicts in one country can spread into a neighbouring country; with this in mind, investors will be hesitant to engage in business within the entire region.

By now, there is a growing body of research that highlights the association between economic conditions and neighbouring civil conflict. Sambanis (2002) has already provided a detailed review of the cross-country empirical literature on civil war, so I do not attempt to be comprehensive in this section. Instead, I will summarize main findings of recent studies. A

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[14] See Colleir (1998) for example

[15] This is so even though capital, especially financial capital, from developing countries is likely to be saved in banks in Western countries where political stability guarantees interest on savings.

[16] Participation in conflict of a neighbouring country could take the form of help either to the government or the rebels. The latter is normally considered illegal and it is internationally frowned upon.

frequently cited study that attempts to theorize regional influences in civil war is Lake and Rothschild (1998). To the best of my knowledge, the first empirical evidence of diffusion or contagion effects in civil war is presented in Murdoch and Sandler (2002a and 2002b) who have attempted to estimate the overall effect of a neighbouring conflict on growth. Having a neighbour at war reduces the annual growth rate by around 0.5 percentage points (Murdoch and Sandler 2002a). This study shows that civil war reduces not only the country's own growth rate, but also growth across an entire region. Since most countries have several neighbours, this is a major multiplier effect of the economic cost of conflict. Recalling that the growth cost for the country itself is around 2.2 percent, a country with four neighbours is likely to inflict about as much economic damage on its neighbours during conflict as it does on itself (World Bank 2003). Although the results of the first wave of studies on civil war spill over is impressive, a considerable gap exists between the theory and empirics (Eberle et al 2003). Sambanis (2002, 19) rightly pointed out, in a recent survey article, that "we do not yet know how civil violence is transmitted across borders". This is why the current study probes the effects of conflict in one country not only on the per capita GDP growth but also on some development enhancing variables to get a broader view on the several economic development determinants that a neighbours' conflict might affect. Three main questions are empirically tested here. How does a neighbouring country's conflict directly affect a country's economic growth? How does neighbour's conflict indirectly affect economic growth of other countries? Does the number of borders in conflict increase the direct and indirect spill over costs? These questions are answered with the use of panel data analyses in this paper.

3. Data Approach

The representative domain for this study is developing countries chosen per geographic region as prescribed by the categorization 'developing' and 'developed countries'. Initially, the study intended to have only African countries for the econometric analyses. Since the issue under investigation is a phenomenon common in the developing world, rather than just Africa, the observational focus of the study shifted to including countries in the developing world rather than a regional focus on Africa. This provides the opportunity for regional comparison. Data is

collected for 72 countries in these regions which have experienced conflict in the last decade (1990-2000).

To account for conflict, I rely on a new dataset compiled at the International Peace Research Institute Oslo (PRIO), in collaboration with the University of Uppsala. In contrast to the most widely used 'Correlates of War' data set requirement of 1,000 battle related deaths for a civil war, this new database sets a threshold of 25 battle casualties[17]. Eberle *et al* (2003), Miguel (2003), and few others have also used the same dataset in their studies. Most contributors to the existing literature on civil conflict have worked with, or built on, the Correlates of War (COW) database, indicating that it is by far the most frequently used data on civil war.

However, the lack of transparency and the many inconsistencies of the COW database are well known, and have been the subject of a detailed evaluation by Sambanis (2002).[18] Furthermore, the arbitrary 1000 death threshold the COW database and several other databases use to identify a civil war has the danger of excluding conflicts that may be major for smaller countries, including many African countries (Miguel 2003). What is more, the COW dataset is criticized on the basis that the dates for conflicts can become somewhat arbitrary, as wars with lower intensity may drop in and out of the sample depending on whether they claim one thousand casualties in any given year (Gleditsch 2002)

The database used in the current study is believed to be more transparent in its construction than COW, and also, it uniquely, records all conflicts with a threshold of 25 battle deaths per year, in addition to classifying conflicts by the standard 1000 death threshold, thus including more small conflicts in the analysis (Miguel 2003). This is one of the extensions of the current study. However, the data set used here also has limitations: it neither includes conflict information by month within each year, nor does it provide the exact number of conflict deaths, and this necessity limits certain aspects of the empirical analysis.

I probe two main channels through which neighbouring countries' conflict can be harmful. One is the *existence* of conflict, and the other is the *duration* of a neighbour's conflict (measured

[17] In this report, armed conflict is divided into three subsets, minor and intermediate conflicts and war. These are defined by the magnitude of battle related deaths produced by each type of conflict with intermediate conflict and war regarded as major armed conflict.

[18] For instance, it is unclear if the Correlates of War database uses 1000 cumulative deaths, or 1000 per year, when identifying a civil war (Miguel 2003).

in years)[19]. The existence of conflict variable includes three dummy variables for minor, intermediate conflict and war. The dummy variable assigns a value 1 if a country's neighbour/s experience minor, intermediate conflict and war and 0 otherwise. A country's neighbour's conflict is the share of borders in conflict in relation to the country's total number of borders for every year. This is calculated as:

$$\text{Share of borders in conflict} = \frac{\text{Number of borders in conflict}_t}{\text{Total number of borders}}$$

Note that the total number of borders does not have a time subscript because this does not change over time, even if it changes over observations. The final variable used is the average share of borders in conflict between 1990 and 1995 for the first period, and 1996 to 2000 for the second period. This coding necessitated the use of the duration of conflict variable, which considers the cumulative effect of neighbours being in conflict. Countries' share of borders in conflict averaged in two time periods does not indicate the length of time neighbours are in conflict. Certainly, if a country were affected by its neighbours' conflict an accumulated effect would be expected over the years. Hence, the duration variable looks at the total years a country's neighbour(s) is/are in conflict for the 5 years for each of the borders it has and aggregates this for the country as the total number of years of neighbours' conflict. Conflict in adjacent countries is measured in absolute terms as the number of adjacent countries at war. For example, this variable ranges from 0 to 6 for a country with one border, which experienced conflict for all the years between 1989 and 1994.

4. Method

The theoretical representation in this paper is the neoclassical growth model following the works of Mankiw, Romer and Weil (1992) and Murdoch and Sandler (2002a, 2002b). However, this paper slightly modifies the Solow model to include neighbouring conflict effects. The neighbouring effect of conflict is investigated on the neoclassical transition model and not on the steady state like Murdoch and Sandler because I equally want to see what the effects of conflict on neighbours are while the other traditional determinants of economic growth vary. A two-wave

[19] Another interesting variable to include could be the intensity of conflict proxied by the number of deaths as done by Murdoch and Sandier (2002), something which is not available in the chosen dataset.

panel is set up to observe the short-term effects of conflict in the vicinity on economic growth. The division of the entire period into five-year intervals limits the longevity of the conflict in the sample period but it is also very useful to observe the effects of short-lived conflicts. The single cross section method is, hence, not appropriate for analysis in this paper since the decade or more averaging of the conflict in neighbours might under-estimate the effect especially if the occurrence of conflict is clustered around the beginning or the end of the decade period. This makes panel data analysis more desirable for the analysis in this paper. In addition, there may be country specific unobserved factors, which can be taken into account by the fixed effects model. Another advantage here of using the fixed effect model of Panel data in addition to increasing the number of observation relates to the expectation that including country specific unobserved factors often associated with conflict will produce better results. For example, countries which are mountainous or have more natural resources can attract conflict which could neither be modelled with the use of single cross section nor with pooled cross section. In addition, the spill over effects of conflict is more likely to be immediate (hence the choice on shorter periods) even though such effects might persist in the long run.

Most quantitative studies of civil war utilize panel data. However, much of the potentially useful explanatory power of panel estimators is lost due to the fact that many important explanatory variables are time-invariant (Sambanis 2002). This concern is shared in this study, and offers the motivation for why this study, in using the panel data analysis also estimates some specifications only with the random effect model. This allows for the inclusion of some pertinent independent variables especially regional dummies, which cannot be analyzed in the fixed effect model framework. These two estimation techniques complement each other.

Econometric Model

In this paper, the benchmark empirical specification is:

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$ ..... (1)

Where:

Y= GDP per capital growth 1990-1995, 1996-2000

X_1= LogGDP per capital: the natural log of initial GDP per capita

X_2 = popgr (population growth rate between 1990-95; 1996-2000)

X_3 = Investment (physical capital accumulation)

X_4 = Illiteracy (measure of human capital)

X_5 = Nmincon (neighbouring countries in minor conflict)

X_6 = Nintcon (neighbouring countries in intermediate conflict)

X_7 = Nwar (neighbouring countries in war)

ε = error term

α , βi = parameters to be estimated

Model (1) facilitates an assessment of the transition to a steady state. It is a panel data analysis unlike Murdoch and Sandler (2002a, 2002b) who used a cross sectional regression. The dependent variable is the growth in income per capita from two initial periods 1990 and 1996 until the steady state 1995 and 2000. A negative coefficient on the conflict in this model suggests that the growth rate to steady state is reduced as a result of conflict in a neighbouring country.

5. Empirical Results

There are two parts of the empirical results. Bivariate regressions have been estimated to look at the indirect effect of neighbours' conflict on economic growth. Further, results on the short term direct effects of neighbour's conflict on developing countries transition growth rates are shown.

5.1 Empirical Testing of the Indirect Effects of Conflict on Neighbouring Countries

Neighbouring countries in developing regions must usually accommodate large numbers of refugees, because the victims of war do not usually have the means to travel to countries further away from their home country, and, in any case, they most often arrive on foot. This direct burden, though the most widely cited, is probably not the most important regional economic spill over of conflict. Results of simple regression indicate that several indirect channels exist through which neighbouring conflict affects economic growth.

There is a general consensus among economists that economic growth is not necessarily development. So investigating the effect of conflict and refugees through an exclusive focus on economic growth does not answer the intriguing question about the effect of this variable on neighbouring country/ies' economy. Therefore, the results presented in this section are estimated

using the two wave panel data in a simple regression model. This is done to capture the relationship between having neighbours in conflict and such effects on economic growth enhancing variables. The results in tables 1.1 and 1.2 show the effects of the *existence* and the *duration* of minor conflict and war[20] in the neighbourhood on eight economic determinant variables. Each of the economic determinant variables is used at a time as dependent variables.

Table 1.1 Effects of the existence of neighbours conflict
(Dependent Variables: Various economic development indicators)

Dependent Variable	Existence of Minor Conflict				Existence of War			
	β	Constant	R^2	No. of obs.	β	Constant	R^2	No. of obs.
gdpgr	-3.08***	0.99***	0.07	144	0.68	0.22	0.00	144
	(-3.12)	(3.69)			(0.72)	(0.74)		
gdpav	-2426***	22230***	0.08	144	-1797***	2112***	0.04	144
	(-4.11)	(8.40)			(-3.04)	(7.99)		
popgr	0.77***	1.92***	0.06	144	0.35*	2.01***	0.01	144
	(2.63)	(27.00)			(1.70)	(25.82)		
openess	-17.87	68.82***	0.02	143	-0.93	65.31***	0.00	143
	(-1.42)	(189.02)			(-0.06)	(18.55)		
Loglixp	-0.20***	4.05***	0.06	143	0.06	3.99***	0.01	143
	(-3.00)	(191.25)			(1.01)	(183.04)		
illitav	38.80***	29.63***	0.18	136	1.22	37.10***	0.00	136
	(6.11)	(13.73)			(0.17)	(14.13)		
grcapfom	-4.31	21.44***	0.02	141	2.51	20.02***	0.01	141
	(-1.94)	(24.88)			(0.65)	(22.68)		
fdi	-2.8***	2.61***	0.05	141	-0.25	2.07***	0.00	141
	(-3.24)	(7.02)			(-0.22)	(5.83)		

Notes: Corrected for standard errors and values of robust t statistics are shown in parenthesis below the coefficients indicating significance level as: * 10%, **5% and ***1%.
gdpgr the growth rate of real GDP per capita
gdpav-the average of GDP per capita for each period.
popgr-population growth rate
openness-average trade as a percentage of GDP
Loglixp-the log of life expectancy at the end of each period[21].
illitav- the average of the percentage of illiteracy
grcapfom- the average of gross capital formation
fdi- the average of foreign direct investment

[20] Results are only shown for two types of conflict. This is both because results of intermediate conflict do not differ much from those of minor conflict and also because the two conflict variables reported measure lower and higher thresholds of battle related deaths.

[21] Data on life expectancy for the second period is 1999. 2000 would have been preferable but this is not available on the WDI 2002. Consequently, 1999 is used as the end period in this case.

Results in table 1.1 indicate that conflict in one country significantly affects the economic development enhancing variables of its neighbours. Specifically, having a neighbour in minor conflict significantly reduces GDP per capita growth, GDP per capita, life expectancy, domestic and foreign investment and significantly increases the illiteracy rate of nearby countries. The effect of having a neighbour in minor conflict and war also shows a positive and significant relationship on the population growth rate. This substantiates the fact that conflict spill over in the form of refugee flow could possibly have a positive effect on population.

Contrary to expectation the minor conflict variable performs better than the war variable. Except in the specific case of the effect on the level of per capita GDP in neighbouring countries, the results show that war does not affect most of the non-income data in neighbouring countries. Finally, though the goodness of fit of the results is very low due to fewer numbers of variables the interesting findings suggest that conflict spreads its evil arms across borders and that the effect is not only on the growth rate to steady state income (as the next section will show) but also that growth rate's enhancing variables.

In table 1.2, I examine the effects of the duration of a country's neighbour's conflict on economic development stimulants. This is the sum of years a country's neighbour(s) is/are in conflict[22]. The results show that the longer a country's neighbour/s is/are in a minor conflict, the lower the own GDP growth rate, GDP per capita level, trade, life expectancy, domestic and foreign direct investment. Conversely, the sharing of borders with countries whose minor conflicts last longer increases the own population growth rate and illiteracy rate. All variables are statistically significant, with most of them (6 out of 8) at the 1% level. Contrary to findings in table 1.1, the variable on war shows theory consistent result. Having neighbours with longer years of war significantly reduces a country's GDP per capita growth and its level, trade and investment, both domestic and foreign investment. Longer periods of war also increase population growth and, although not significant, this variable shows the expected direction of effect on illiteracy rate. Although the goodness of fit is generally low, longer periods of minor conflict seem to explain significant parts of the variation of human capital variables (life expectancy) in other countries.

[22] Looking at the summary statistics on table 7.1, there are on average, conflicts in neighbouring countries last up to 2, 3 and 2 for minor and intermediate conflicts and war with a maximum of 12, 10 and 16 years each.

Table 1.2 Indirect Effects of the duration of conflict in a neighbouring country

Dependent Variable	Duration of Minor Conflict (1)				Duration of War (2)			
	β	Constant	R^2	No.	β	Constant	R^2	No.
gdpgr	-0.18*	0.69***	0.03	144	-0.12	0.70***	0.03	144
	(-1.95)	(2.50)			(-1.82)	(2.37)		
gdpav	-253***	2197***	0.09	144	-117***	2052***	0.04	144
	(-5.16)	(9.02)			(-3.42)	(8.38)		
popgr	0.08***	1.9***	0.07	144	0.04***	1.97***	0.04	144
	(3.76)	(30.30)			(2.80)	(26.39)		
openess	-3.01***	70.71***	0.07	143	-1.04*	67.99***	0.02	143
	(-3.43)	(22.51)			(-1.54)	(23.73)		
loglixp	-0.02***	4.05***	0.06	143	-0.004	4.02***	0.01	143
	(-3.35)	(198.57)			(-0.97)	(196.12)		
illitav	4.29***	29.50***	0.22	136	0.44	36.13***	0.01	136
	(6.76)	(14.03)			(1.02)	(14.79)		
grcapfom	-0.41	21.30***	0.02	141	-0.31***	21.39***	0.02	141
	(-1.76)	26.40)			(-2.11)	(26.42)		
fdi	-0.30***	2.57***	0.06	141	-0.12*	2.34***	0.02	141
	(-3.89)	(7.32)			(-1.97)	(7.28)		

Notes: Corrected for standard errors and values of robust t statistics are shown in parenthesis below the coefficients indicating significance level as: * 10%, **5% and ***1%.
Please see notes under table 1.1 for the definition of variables.

Finally, table 1.3 presents results on the general prevalence of conflict (any type of conflict) in neighbouring countries and its spill over effects. This table simply ignores the classification of conflict and treats minor, intermediate conflict and war as the same. So any border in conflict (dummy variable) and total borders (continuous variable) in conflict refer to any type of conflict. The results are unsurprising. The total number of borders[23] in conflict matter more for economic development in a neighbouring country than having just one neighbouring country in conflict. For all the economic growth enhancing indicators in table 1.3, the total number of borders in conflict shows higher t-values than the 'any border in conflict' variable. The results confirm the hypothesis that the more borders in conflict the greater the impact felt by the country, one of the main questions this paper seeks to answer.

[23] I use the sum of total number of borders in conflict and not the share of total borders in conflict because countries with fewer borders, (say 2) which are all in conflict, will show a higher share of borders in conflict where as a country with 5 borders with 4 of those in conflict, will show a lower share of borders in conflict. I, therefore, decided to use the sum total number of borders a country has in conflict.

Table 1.3: Indirect effects of general conflict in neighbouring countries

Dependent Variable	Any border in Conflict				Total Borders in Conflict			
	β	Constant	R^2	No.	β	Constant	R^2	No.
Gdpgr	-0.37	0.64*	0.00	144	-0.29*	0.82**	0.02	144
	(-0.79)	(1.70)			(-1.56)	(2.34)		
Gdpav	-1271**	2674***	0.07	144	-439***	2424***	0.08	144
	(-2.52)	(5.62)			(-3.41)	(7.36)		
Popgr	0.17	1.95***	0.01	144	0.09***	1.96***	0.02	144
	(1.27)	(16.99)			(2.02)	(22.60)		
openness	-16.00***	76.97	0.06	143	-6.65***	75.62***	0.09	140
	(-2.80)	(15.40)			(-4.31)	(20.35)		
Loglixp	0.001	4.01***	0.00	143	-0.01	4.03***	0.00	143
	(0.03)	(127.12)			(-0.83)	(159.35)		
Illitav	11.71***	28.66***	0.05	136	3.9***	31.21***	0.05	136
	(2.99)	(8.95)			(3.08)	(12.03)		
Grcapfom	-0.31	20.78***	0.00	141	-0.70	21.64***	0.04	140
	(-0.21)	(15.97)			(-1.47)	(20.94)		
Fdi	-1.23*	2.93***	0.03	141	-0.48***	2.78***	0.05	140
	(-1.69)	(4.23)			(-2.82)	(5.99)		

Notes: Corrected for standard errors and values of robust t statistics are shown in parenthesis below the coefficients indicating significance level as: * 10%, **5% and ***1%.
See notes under table 1.1 for variable description

The effect of neighbours' conflict on the determinants of economic development in other countries is striking. Having even one neighbour in conflict (indirectly) negatively affects economic growth. The existence of one neighbouring country in conflict reduces per capita GDP, trade and foreign direct investment. On the total number of borders in conflict, GDP growth rate, per capita GDP, trade, domestic and foreign investment are decreasing indicating a higher indirect effect of neighbour's conflict on economic growth.

5.2 Empirical Testing of the Short Term Direct Effects of Neighbours' Conflict

In table 1.4 estimates from different specifications of the panel version of model (1) are presented. Here growth is considered over two shorter time periods and then pooled with a panel estimator of RE and FE. In this case, results of fixed effects are discussed since the Hausman's test indicates that FE is to be preferred. The dependent variable is GDP per capita growth rate and the benchmark model shown in column 1 of table 1.4 includes the natural logarithm of per capita

GDP, population growth, investment (gross capital formation) and human capital variable- illiteracy (initial values)[24]. I add to the specification variables of interest in a stepwise fashion, starting with the impact of each type of conflict a neighbouring country has (for the existence specifications- columns 2 to 4), and a specification with the joint effect of all types of conflict (column 5) and a full model including the own and neighbouring country conflict situation (column 6) with column 7 estimating a specification on neighbouring conflict effects regardless of the type of conflict. Finally, column 8 probes regional effects. This same procedure is followed for estimates in table 1.5 where the duration of conflict variables is used in lieu of the existence of conflict variable.

In column one, the benchmark model for the panel data framework used in this paper is estimated. The results correspond closely with the Solow growth model used as a framework in this study. The initial level of income per capita creates a negative influence on income growth, known as convergence, owing to diminishing return of capital accumulation. What is more, physical capital increases growth whereas high illiteracy levels reduce growth even though population growth is contrary to the speculations of this model probably because of the short time period used in this study. Reverse causality between population and economic growth (common in panel data results because of shorter time periods) might be influencing the outcome of these results. Reverse causality is observed when high growth attracts higher net immigration and lowers mortality, both of which increases the population growth rate; these are elements that will positively relate to economic growth. The significant levels of the initial per capita income with its right sign (confirming the convergence hypothesis) should, nonetheless, be interpreted with caution since business cycle effects might be influencing these results.

In the second column, the sole effect of having neighbours in minor conflict is observed. The results show that a country's neighbour in minor conflict reduces growth by a 2.2 percentage point while taking country specific unobserved variables into account. In column 3, the results show that intermediate conflict neighbourhood effects are marginally larger than minor conflict and significant. A country loses about 2.3 percentage point in per capita GDP growth if there is intermediate conflict in its neighbouring countries. The results on the neighbouring countries war variable are counter intuitive. This is even so when all the three variables of neighbours conflict

[24] Life expectancy and total years of schooling are used alternatively. However, the illiteracy rate variable produced better results.

are simultaneously used in the specification in column 5. Since the variable is insignificant, no explanation can be given for such results. Intermediate conflict in a neighbouring country again, as expected, exerts slightly more pressure on economic growth than minor conflict -- both variables being significant at the 5% level (column 5).

In column 6, the combined effect of a country and its neighbours all being in conflict is shown. The results indicate that a country's war harms its growth more than all other types of conflict, but also that its neighbour's minor conflict is more harmful, followed by intermediate conflict. Column 7 estimates a specification with a country that has any of its borders in conflict but the variable is not significant.

In column 8, specifications with regional and period dummies have been estimated with only the Random effect model since the Fixed effect model could not be used at this point. The specification in column 8 indicates that African countries' growth rate significantly reduces when we control for conflict neighbourhood effects. These results are consistent even in a specification where Africa and Asia are used while dropping Latin America.

Table 1.5 produces similar results as those in table 1.4. Specifications in columns 2 to 8 in this table are the same as those in the later table, the only notable difference relates to the fact that the neighbourhood conflict effects are measured in years (duration), instead of existence. The general results in this table are similar to what is found in table 1.4, meaning that the duration of conflict does not seem to harm economic growth (in the short run) in other countries more than the existence of conflict. This is probably because of the short time period. Five years might also be too short to observe the cumulative effects of neighbour's conflict. Looking at the cumulative effects of neighbours conflict (not in terms of time but total number of borders in conflict) in column 7, the results show that the more borders in conflict a country has, the lower its growth rate. A country looses 0.6 percentage points in growth rate as a result of having more than one border in conflict. In the duration effect, the dummy variable for Africa also shows the significant negative effects of neighbours' duration of conflict effects (column 8).

Generally, the existence and duration of conflict in neighbouring countries explain about 73 to 79% of growth differences in developing countries in this study. This is particularly so for specifications using the fixed effects model which shows that country specific unobserved effects, are important in determining the neighbourhood effects of conflict in neighbouring countries.

6. Making Sense of Estimated Results

In the section that follows, the economic and practical relevance of the variables estimated will be discussed while making reference to results of related studies[25]. Arguments will point to whether results confirmed the theoretical discussions of the spill over effects of conflict in sub-section 2.

From the results (table 1.1), it is observed that the existence of minor conflicts in the neighbourhood is more harmful than war, some thing quite contrary to common sense and theory. However, the existence of neighbour's war significantly reduces average per capita GDP and increases population growth. This leaves me with the suspicion that the diversion of resources as a result of sharing borders with countries in conflict is reflected in the results. Also, the increase in population through refugee flows is further confirmed. The better, though unexpected results with the existence of minor conflict, unlike war could be attributed to the fact that minor conflict signals a slow progression into war. Hence, the mere presence of conflict is enough to generate neighbourhood externalities.

However, contrary to results on table 1.1, those on table 1.2 seem to suggest that it is the duration of war rather than its mere existence that poses more problems for neighbouring countries. Though the results on the duration of minor conflict still show strong impact on neighbours' economic determinant variables**.** Table 1.6 gives a summary of the statistics of the different types of conflict in each time period. There are significantly more minor conflicts in each period than war. This might be the reason why neighbours minor conflict indicate pronounced effects that war.

Results on table 1.3 indicate that countries with many borders in conflict must be suffering much economic depression[26]. In this study, Sub-Saharan Africa has more countries with the majority of borders in conflict-see table 1.7-. The case of Guinea could also be made at this point. Although it is not in conflict, 5 out of its 6 neighbours are in conflict during the time of study.

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[25]The economic or practical significance of a variable is related to the size (and sign) of the β coefficient.

[26]It does not, however, mean that all countries with many borders are necessarily in trouble, only those with many borders in conflict. For example there are only 3 countries in conflict out of Zambia's 8 borders. Congo D.R, Congo, Ethiopia, Rwanda and Uganda are expected to suffer most since these countries are in conflict themselves and have most of their neighbours in conflict as well.

Also on the story of more borders in conflict, results of the study point to the fact that more neighbours in conflict reduces foreign direct investment than just having one neighbour in conflict. This signals the diversion of foreign investment out of conflict-ridden regions.

Again, the magnitude of the coefficient on duration of conflict-table 1.2, 'any border in conflict' and 'total borders in conflict' (table 1.3) variables on the trade and illiteracy rate calls for concern from all interested in the economic growth of developing countries. The existence of minor conflict in neighbouring countries does not significantly reduce trade but the duration of both minor conflict and war reduces growth up to about –3.01 percentage points. There is even up to –6.65 percentage points reduction in trade the more borders you have in any type of conflict. The proposition that more outward-oriented economies tend to grow faster has been tested extensively in the literature and the majority of the evidence tends to support this proposition. Conflict is seen to greatly hinder trade in neighbouring countries. Theoretical growth models (especially the endogenous growth model) predict that trade openness could positively influence economic growth, because the flow of goods and investment across borders through international trade could be an effective means for diffusion of knowledge at the international level (Elbadawi, 2001). Since knowledge generates positive externalities in these models, the result of expanded trade should be to expand the productive capacity of the economy (Edwards, 1992). However, according to the authors, the real bone of contention does not seem to be the issue of openness per se, but the type of openness [27] that is most efficient for the transfer of knowledge and technology. Given that having a neighbouring country in conflict also reduces foreign direct investment, conflict is a serious problem hindering growth in developing countries, especially sub-Saharan Africa.

The extent of trade indicator used in this study is, in this sense, a good observable indicator of integration, and it has the advantage that data are relatively easy to obtain. However, an individual country may have a high degree of trade integration with countries elsewhere in the world, but it is its relationships with neighbouring states that is most relevant for this study. Hence, the extent of economic linkages with proximate states (South to South trade) seems a more appropriate indicator of the costs of conflict on trade. However, since this latter variable is

[27] For example, it is argued that only particular kinds of imports --mostly services such as foreign direct investment (FDI) and intellectual property – and not regular goods imports, are expected to have significant productivity-enhancing effects.

hard to come by, the trade with all other countries is used as a suitable proxy because trade links to the wider world could be affected if neighbours are in conflict. Evidently, countries are expected not to be just interested in their own peaceful state or fear of direct conflict spill over but also in the peaceful state of neighbours whether or not they have direct trade links.

Nevertheless, establishing the neighbourhood effects of conflict in developing countries could be problematic. A potential problem in estimating the neighbourhood effect of conflict is observing this effect while own country itself is in conflict. As Gleditsch (2003) noted, the presence of geographical contagion or neighbourhood effects create problems for statistical analysis. If the risk of conflict in one state depends on the presence of conflict in others, then the observations for different countries can no longer be considered independent of one another (see Gleditsch 2002a; Gleditsch and Ward 2000). The risk of conflict cannot increase for one state i without, at the same time, increasing the risk of conflict in neighbouring countries j. This spatial dependence between observations makes it difficult to get consistent estimates from a conventional statistical model, which assumes that observations are independent of one another.[28] Similar effects might militate against the results in column 6 of table 1.4. Although results of this study do not predict probability of conflict in neighbouring country, if own country conflict reduces growth, it will be difficult to see how neighbouring countries conflict also reduces growth.

Also, though this study does not include a regional comparison dimension, results on the regional dummies indicate that neighbourhood effects of conflicts are mostly felt in sub-Sahara Africa. This is probably because a major locus for civil wars in recent years has been Sub-Saharan Africa, where twenty-nine of forty-three countries suffered from civil conflict during the 1980s and 1990s (Miguel 2003). Sambanis (2002) also noted that the region most affected by civil violence is Sub-Saharan Africa, with Asia (especially South-east Asia) and the Middle East (including North Africa) following at some distance.

Interaction terms between regional dummies and neighbour's conflict were created and estimated to further test for which of the regions suffer most in terms of conflict neighbourhood effects[29]. The results contradict the findings of Murdoch and Sandler (2002b) who maintained

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[28]Consistent estimation methods for spatially clustered data that presume a continuous dependent variable, such as Anselin's (1988) spatial autoregressive lag and spatial error model, are not appropriate for categorical dependent variables such as conflict (Gleditsch, 2003).

[29] Results on this estimation are not shown because they are inconclusive on the other socio-economic variable.

that neighbourhood spill over are generally stronger in Asia than in Africa. The African interaction term in this specification is negative and significant (at the 1% level) whereas that for Latin America and Asia (using one at a time), they were simply insignificant. For each specification with a combination of two regions (while always having Africa in the specification), the constant term as the region left out shows an insignificant effect. These differences in the finding might be related to the different types of variables used by the current and previous studies. I have used the number of borders in conflict while Murdoch and Sandler used the distance to capture spatial effects.

Similarly, Gleditsch (2003) used a data set indicating the minimum distances between states to identify regional linkages. He coded two states as connected if they are within 950 km with one another. In his analysis, introducing a term for the number of neighbours did not notably change the results. In this study, the number of border variable is preferred to distance measures, firstly, because the distance measure might just capture the rate at which spill over effects are transmitted but the distance measure might loose importance for proximate states whose share of border length is less than 950 km[30]. Besides, the spatial variable used to capture spill over effects in previous studies does not exactly mention what two parts of a country's distance are being measured.

Finally, it is observed from these analyses that the data confirms most of the theoretical claims of the study. Also, the current study confirms and extends on previous studies and that conflict neighbourhood effects are indeed vivid in developing countries.

7. Some Concluding Remarks and Policy Recommendations

This paper demonstrates that countries in the proximity of conflicts may grow less through no fault of their own. The study finds results that are consistent with theory and previous findings on the effects of neighbours' conflict. In addition, evidence is further provided substantiating the fact that neighbours' conflict directly and indirectly affects economic growth. Specifically, the study finds out that

- It is the total number of borders in conflict rather than just having one border in conflict that hurts neighbours' economic growth most both directly and indirectly.

- It is the duration of war, rather than its existence that indirectly reduces growth-enhancing variables in neighbouring countries.
- Conflict in neighbouring countries scares investors to the entire region.
- Conflicts in neighbouring countries affect economic development and not only growth since variables that enhance wellbeing enhancing are also affected.
- Trade is significantly reduced in a country as a result of having neighbours in conflict.

The literature on the effects of conflict in one country, and on the probability of conflict on another, is well developed. Much of this research suggests that higher economic interdependence between states decreases the likelihood of interstate war (Gleditsch 2003). Actors in more integrated and complex economies face greater costs under conflict, and therefore, have greater interests in maintaining peaceful relations. This means that there is a dual relationship between trade and conflict across borders. Good trading partners increase the opportunity cost of war spill over and war spill over reduce trade. In this perspective, foreign economic liberalization should have positive international repercussions because the benefits of trade openness easily spill over to neighbouring countries.

However, the two main policy recommendations advanced in this paper is that because the effects of conflict are felt beyond the borders of the conflicting countries, reconstruction of war torn societies should take this very seriously into account if it plans to be successful. Also, that since neighbouring countries conflicts reduce trade, and trade between countries increases the interest in each other's security status, economic integration in developing countries should be encouraged.

Finally numerous extensions can help improve on the present analysis and clarify the transnational dimensions of conflict. Although the analysis here has restricted neighbourhood conflict to countries that share a border with countries in which conflict occurs, it does not identify the conflict location within a country and proximity of other states to this location. This is an obvious problem for large countries that experience conflict only in certain parts of their territories that might in fact be far away from neighbouring countries. However, many of the expectations are strongly borne out by the empirical results as the study confirms the existence of neighbourhood conflict effects in the short run.

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[30] Murdoch and Sandler (2002a, 2002b) also used lower thresholds.

APPENDIX: Data and Variables definition

Sample

The countries have been classified according to the World Bank definition. This is a very important background for this research since the income level of the countries, though not the sole determinant of its level of development, could suggest the gravity of conflict spill over effect. Sample includes the following countries:

LOW INCOME ECONOMIES:
Sub Saharan Africa: -Angola*λΩ, Benin, Burkina Faso, Burundi*λΩ, Cameroon*, Central African Rep., Chad*λΩ, Comoros*, Congo, Dem. Rep. *Ω, CongoΩ, Cote d'Ivoire, Ethiopia*Ω, , Gambia, Ghana, Guinea, Guinea-BissauλΩ, Kenya, Lesotho*, Madagascar, Malawi, Mali*, Mauritania*, MozambiqueΩ, Niger*, Nigeria*, Rwanda*λΩ, Senegal*λ, Sierra Leone*λΩ, Tanzania, Togo*, Uganda*λΩ, Zambia, Zimbabwe,
Asia and the Pacific: Bangladeshλ, CambodiaλΩ, India*λΩ, Indonesia*λΩ, Laosλ, Nepal*, Pakistan*λΩ, Papua New Guinea*, Uzbekistan*, Vietnam,
American and Caribbean: Haiti*, Nicaraguaλ,

LOWER MIDDLE INCOME ECONOMIES:
North Africa: Algeria*Ω, Egypt*, Moroccoλ, Tunisia,
Sub Saharan Africa Cape Verde, Namibia, South AfricaΩ, Swaziland,
Asia and the Pacific: Iranλ, Philippines*λΩ, Sri Lanka,λΩ, Thailand,
American and Caribbean: ColombiaλΩ, Ecuador*, El SalvadorλΩ, GuatemalaλΩ, Paraguay*, Peru*λΩ,

UPPER MIDDLE INCOME ECONOMIES:
Sub Saharan Africa: Botswana, Gabon and Mauritius,
American and Caribbean: Argentina, Costa Rica, Mexico*, Panama*, Trinidad and Tobago*, Venezuela*
NOTE: An asterisk indicates that the country experienced a minor conflict, a lambda sign shows that the country had an intermediate conflict and Omega sign, war.

VARIABLES

In table 1.8, I display the variables' names, coding, source of data and brief descriptions as shown in subsequent tables of the empirical results[31]. I will briefly describe some of the key variables below.

GDP per capita

The principal measure of current economic conditions in this study is the annual growth rate of per capita GDP. This is largely because of its near universal availability rather than due to overarching theoretical considerations. Many researchers find that a state's level of development alters the prospects for civil war (Collier et al. 2003; Collier and Hoeffler 1998). Consequently,

[31] Also see table 1.9 for a descriptive statistics on the variables.

the growth rate of GDP and the initial condition (testing the convergence hypothesis) are used in all specifications.

Population

The population of the countries is also included to capture two effects. Firstly, countries with larger population are more likely to contain some group willing to rebel, and, secondly, such countries are more likely to have conflict exceeding the casualty threshold. Therefore, controlling for this variable while observing the neighbours' conflict effect will minimise the variables captured in the error term.

Investment

Furthermore, investment in physical and human capital is known across empirical studies to increase per capita GDP growth. These two variables have been included in the bench mark model. Three variables -- illiteracy rate, life expectancy and total years of schooling -- for human capital measure have been used. The better educated the population of a country is, the less pronounced its conflict proneness. People with a high human capital have other options available to them than resorting to arms in times of economic crisis. Therefore, accounting for such effects includes controlling for the sample country's human capital level.

Table 1.4: Effects of the existence of conflict in a neighbouring country on economic growth (Dependent variable is growth of per capita GDP 1990-1995 and 1996 to 2000)

Variable	(1) FE	(1) RE	(2) FE	(2) RE	(3) FE	(3) RE	(4) FE	(4) RE	(5)		(6) FE	(6) RE	(7) FE	(7) RE	(8)
Constant	119.6 (12.10)	7.30 (1.44)	1120.92 (12.55)	7.38 (1.47)	121.85 (12.76)	8.82 (1.69)	118.10 (11.54)	6.31 (1.25)	122.94 (12.62)	7.40 (1.45)	126.96 (12.74)	6.66 (1.30)	121.86 (12.25)	7.46 (1.45)	10.57 (2.05)
LogGDP	-15.75 (-12.25)	-0.94 (-1.61)	-15.94 (-12.71)	-0.97 (-1.68)	-15.97 (-12.89)	-1.10 (-1.84)	-15.55 (-11.66)	-0.85 (-1.48)	-16.14 (-12.74)	0.99 (-1.69)	-16.61 (-12.88)	-0.93 (-1.60)	-16.04 (-12.40)	-0.97 (-1.65)	-1.25 (-2.06)
Popgro	0.55 (2.23)	0.63 (2.01)	0.61 (2.53)	0.69 (2.22)	0.61 (2.55)	0.66 (2.15)	0.53 (2.07)	0.49 (1.54)	0.67 (2.74)	0.57 (1.80)	0.69 (2.79)	0.58 (1.78)	0.58 (2.36)	0.62 (1.98)	0.50 (1.49)
Investment	0.09 (2.44)	0.04 (0.99)	0.09 (2.64)	0.04 (1.14)	0.09 (2.74)	0.04 (0.97)	0.09 (2.49)	0.04 (1.11)	0.10 (2.88)	0.05 (1.23)	0.09 (2.56)	0.05 (1.32)	0.08 (2.31)	0.04 (1.00)	0.06 (1.51)
Nmincon			-2.18 (-2.14)	-2.03 (-1.68)					-2.03 (-2.04)	-1.84 (-1.51)	-2.25 (-2.20)	-1.93 (-1.57)			-1.56 (-1.31)
Nintcon					-2.31 (-2.47)	-0.84 (-0.75)			-2.19 (-2.37)	-0.75 (-0.66)	-1.64 (-1.71)	-0.92 (-0.80)			-1.51 (-1.31)
Nwar							0.56 (0.61)	2.05 (2.00)	0.01 (0.02)	2.12 (2.06)	0.29 (0.32)	2.14 (2.06)			1.83 (1.76)
Illitini	-0.05 (-1.10)	-0.04 (-2.06)	-0.04 (-0.93)	-0.04 (-1.65)	-0.06 (-1.35)	-0.05 (-2.22)	-0.06 (-1.17)	-0.04 (-1.93)	-0.05 (-1.16)	-0.04 (-1.67)	-0.06 (-1.30)	-0.04 (-1.63)	-0.04 (-0.76)	-0.05 (-2.11)	-0.03 (-1.31)
Hmincon											0.46 (1.10)	0.20 (0.19)			

Variable	(1) FE	(1) RE	(2) FE	(2) RE	(3) FE	(3) RE	(4) FE	(4) RE	(5)		(6) FE	(6) RE	(7) FE	(7) RE	(8)
Hintcon											-0.56 (-0.87)	0.86 (1.20)			
Hwar											-0.88 (-1.61)	-0.11 (-0.15)			
Anbdcon													-0.84 (-1.38)	0.20 (0.31)	
Africa															-2.48 (-2.64)
Latin America															-0.74 (-0.63)
Perriod 1															0.34 (0.86)
No. of Obs.	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
F	42.69	8.24	37.00	11.13	38.15	9.69	33.88	12.48	28.84	16.38	21.19	17.07	35.03	8.56	25.06
R within	0.73	0.23	0.75	0.20	0.75	0.27	0.73	0.25	0.77	0.24	0.79	0.23	0.74	0.23	0.26
Hausman χ^2 Prop $>\chi^2$	167.09 0.000		183.95 0.000		195.68 0.000		157.95 0.000		189.87 0.000		199.43 0.000		167.69 0.00		

Nmincon, Nintcon and Nwarcon are dummy variables (existence) for neighbouring conflicts
Hmincon, Hintcon and Hwarcon are dummy variables for home conflicts
Anbdcon: a dummy variable for having any border in conflict

Table 1.5: Effects of the duration of conflict in a neighbouring country on economic growth (Dependent variable is growth of per capita GDP 1990-1995 and 1996-2000)

Variable	(2)		(3)		(4)		(5)		(6)		(7)		(8)
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE			
Constant	119.49 (11.97)	7.05 (1.41)	125.34 (12.09)	6.59 (1.25)	119.67 (12.03)	7.73 (1.53)	10.53 (2.02)	6.54 (1.28)	130.18 (12.24)	7.00 (1.34)	123.32 (12.74)	9.23 (1.76)	10.53 (2.02)
loggdp	-15.75 (-12.15)	-0.93 (-1.62)	-16.38 (-12.36)	-0.88 (-1.47)	-15.77 (-12.18)	-0.96 (-1.67)	-1.12 (-1.88)	-0.87 (-1.50)	-17.00 (-12.54)	-0.95 (-1.60)	-16.17 (-12.89)	-1.14 (-1.90)	-1.12 (-1.88)
popgro	0.56 (2.22)	0.66 (2.09)	0.66 (2.60)	0.61 (1.96)	0.52 (2.04)	0.69 (2.17)	0.51 (1.46)	0.71 (2.23)	0.60 (2.21)	0.77 (2.35)	0.63 (2.62)	0.69 (2.21)	0.51 (1.46)
Grcpfom	0.09 (2.43)	0.04 (1.10)	0.09 (2.47)	0.04 (1.03)	0.09 (2.46)	0.03 (0.88)	0.04 (1.13)	0.04 (1.01)	0.08 (2.12)	0.04 (1.04)	0.09 (2.46)	0.04 (0.96)	0.04 (1.13)
Nminnew	-0.02 (-0.18)	-0.15 (-1.23)					-0.17 (-1.42)	-0.14 (-1.18)	-0.15 (-1.23)	-0.15 (-1.16)			-0.17 (-1.42)
Nintnew			-0.19 (-1.64)	0.11 (0.97)			0.08 (0.67)	0.15 (1.24)	-0.20 (-1.55)	0.12 (1.03)			0.08 (0.67)
Nwarnew					0.04 (0.44)	-0.09 (-1.26)	-0.11 (-1.41)	-0.12 (-1.47)	0.05 (0.54)	-0.11 (-1.39)			-0.11 (-1.41)
Illitini	-0.05 (-0.98)	-0.04 (-1.63)	-0.07 (-1.51)	-0.04 (-1.92)	-0.05 (-1.11)	-0.04 (-2.12)	-0.03 (-1.47)	-0.03 (-1.55)	-0.06 (-1.18)	-0.04 (-1.72)	-0.04 (-0.94)	-0.05 (-2.11)	-0.03 (-1.47)

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Variable	(2) FE	(2) RE	(3) FE	(3) RE	(4) FE	(4) RE	(5) FE	(5) RE	(6) FE	(6) RE	(7)		(8)
Hminew									0.20 (0.96)	0.13 (0.59)			
Hintnew									-0.23 (-1.16)	0.18 (0.86)			
Hwarnew									-0.33 (-1.89)	0.001 (0.00)			
Totbdcon											-0.55 (-2.35)	-0.29 (-1.21)	
Africa							-1.89 (-1.99)						-1.89 (-1.99)
Latin America							-1.06 (-0.91)						-1.06 (-0.91)
Per1dum							-0.73 (-1.79)						-0.73 (-1.79)
No. of Obs	**135**	**135**	**135**	**135**	135	**135**	**135**	135	**135**	**135**	**135**	**135**	**135**
R within	**0.73**	**0.19**	**0.74**	**0.22**	**0.73**	**0.19**	**0.20**	**0.14**	**0.77**	**0.16**	**0.75**	**0.24**	**0.20**
Prop >χ^2	**154.52 0.000**		**166.97 0.000**		**168.19 0.000**		**146.40 0.000**		**171.48 0.000**		**177.64 0.00**		

Nminew, Nintnew and Nwarnew measure the total number of neighbour's conflict
Hminnew, Hintnew and Hwarnew are continuous varables (years in conflict) for home countries.
Totbdcon: total number of borders in conflict

Table 1.6: Type of conflict (existence dummy) and frequency of occurrence

Period	Minor Conflict	Intermediate Conflict	War
1990-1995	24	18	15
1996 to 2000	21	16	14

Table 1.7: Summary of countries and total number of borders in conflict

REGION	COUNTRIES	NUMBER OF BORDERS	TOTAL BORDERS IN CONFLICT
North Africa	Algeria	6	4
Sub-Sahara Africa	Burkina Faso	6	3
	Central Africa Rep.	5	5
	Chad	6	3
	Congo, Dem Rep.	6	6
	Congo Rep.	5	3
	Ethiopia	5	4
	Guinea	6	5
	Kenya	5	4
	Mali	7	3
	Mauritania	4	3
	Niger	4	3
	Nigeria	4	3
	Rwanda	4	3
	Tanzania	8	5
	Uganda	5	3
	Zambia	8	3
Asia	India	7	4
	Pakistan	5	3
	Thailand	3	3
Latin America	Colombia	4	4

Table 1.8: Variables, sources of data, coding and brief description

Variable	Code	Definition	Source
Conflict	Hmincon, Hintcon, Hwar	A dummy variable with the value 1 if a country has a minor, intermediate conflict or war and 0 otherwise	States in Armed Conflict report.
Conflict	Hminew Hintnew Hwarnew	The total number of years an 'observed country' has been in conflict	States in Armed Conflict report.
Conflict (Existence)	Nmincon, Nintcon, Nwar	A dummy variable with the value 1 if a country's neighbour has a minor, intermediate conflict or war and 0 otherwise which measures the existence of conflict in a country's neighbours. The share of borders in conflict is then calculated from this variable.	Author's own calculation using the number of borders variable from CIA
Conflict (Duration)	Nminnew Nintnew Nwarnew	The absolute number of years a country's neighbours have been in conflict and an aggregation of the total of borders in conflict for every country.	Author's own calculation
Number of borders	Nobord	The number of borders a country has	CIA

Table 1.9: Descriptive statistics of variables

Variable	Observation	Mean	Standard Dev.	Minimum	Maximum
Gdpgr	144	0.36	2.82	-9.1	7.8
Loggdpin	144	7.61	0.81	6.18	9.36
Gdpini	144	2806	2323	484	11588
popgro	144	2.08	0.74	-1.65	4.81
Grcpfom	143	19.67	8.19	4	53
Illitini	136	38.64	22.72	4	89
Investment	143	19.67	8.20	4	53
Religion	144	0.45	0.26	0	0.86
Language	144	0.51	0.32	0	0.92
Ethnic	144	0.55	0.25	0	0.93
Nminnew	144	1.85	2.52	0	12
Nintnew	144	1.82	2.47	0	10
Nwarnew	144	2.75	3.67	0	16
Hminew	144	0.71	1.35	0	6
Hintnew	144	0.68	1.40	0	6
Hwarnew	144	0.63	1.41	0	6
Nmincon	144	0.21	0.24	0	1
Nintcon	144	0.18	0.23	0	1
Nwar	144	0.21	0.25	0	1
Hmincon	144	0.31	0.47	0	1
Hintcon	144	0.24	0.42	0	1
Hwarcon	144	0.20	0.40	0	1

Nmincon, Nintcon and Nwarcon are dummy variables (existence) for neighbouring conflicts
Hmincon, Hintcon and Hwarcon are dummy variables for home conflicts
Nminew, Nintnew and Nwarnew measure the total number of neighbour's conflict
Hminnew, Hintnew and Hwarnew are continuous variables (years in conflict) for home countries

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