Where to fight?

The spatial dynamics of violence in areas of limited statehood

Sven Chojnacki
Free University of Berlin
Department of Political and Social Sciences
SFB700: Governance in Areas of Limited Statehood
svencho@zedat.fu-berlin.de

Nils Metternich
University of Essex
Department of Government
and
Free University of Berlin
SFB700: Governance in Areas of Limited Statehood
nmette@essex.ac.uk

with Max Grömping and Michael Spies
SFB700: Governance in Areas of Limited Statehood

Paper prepared for the 49th Annual ISA Convention San Francisco, 26-30 March 2008

Preliminary Version. Please do not cite.

Abstract

Fighting in internal armed conflicts does not occur arbitrarily across a countries territory. Therefore, this paper addresses the question where fighting takes place in sub-state wars with at least two non-state actors and how we can explain spatial patterns of armed conflict in areas of limited statehood. In order to predict conflict behavior in space, this analysis, first, builds upon the theoretical argument that how actors finance their fighting explains patterns of violence in sub-state wars. Second, the paper uses a new database on violent events in Somalia from 1990-2006 to test the implications of our spatial theory. The findings show that strategic and financially important grids experience the most violent events.

Introduction[1]

Much attention has recently been directed towards the spatial dynamics of violence. As a consequence, spatial analyses of civil wars have dramatically increased during the recent years (Buhaug and Gates 2002; Buhaug 2007; Raleigh and Hegre 2005). The current attraction of geographic analyses of violent conflicts has resulted from the lack of existing datasets and research programs to account for the correlates and dynamics of armed conflict on the local- or sub-state level. Even though we know that violent events often take place in very distinct areas of a country the available country-level data could not provide any insights to the local determinants of conflict and security (Buhaug and Rød 2006). Moreover the existing yearly based country-level datasets presented by the Correlates of War Project (COW) (Sarkees et al. 2003) or the Uppsala Conflict Data Program (UCDP) (Gleditsch et al. 2002) also make it difficult to analyze escalation and time-dependent variations of violence (Restrepo et al. 2006). A new generation of datasets has therefore emerged which try to account for the spatial and temporal dimensions of conflict (Raleigh and Hegre 2005).

[1] The project is part of the Research Center (SFB) 700 “Governance in Areas of Limited Statehood. New Modes of Governance?”, funded by the German Research Foundation (DFG). We gratefully acknowledge the following people who have been involved in the data gathering process and, therefore, contributed to the success of our project: Johanna Bross, Sebastian Diezel, Robert Faußner, Alexandra Jarotschkin, Olga Krapp, Sahand Haghi, Robert Heber, Steffen Höhn, Jan Hussels, Tim Rauschan, Gregor Reisch, Eva Gil Schäfer, Judith Schneider, Edwin Schotland, Anika Terton, Fenia Vazaka, Joel Winckler, Holle Wlokas, Birgitta Wodke, and Sara-Sumie Yang.

Paying empirical attention to the relationship between geography and war is not only a necessary condition to advance the scientific study of war in general, but also to better understand regional or local variations of conflict and security. When a country is affected by warfare this does not imply that fighting takes place all across its territory. Quite to the contrary, some parts in countries experiencing armed combat are almost secure and the population can invest in more productive activities. In the Democratic Republic of Congo, for example, the majority of fighting takes place in the eastern provinces of North and South Kivu. Using a micro-level approach, Kalyvas (2006) concludes that even neighboring valleys in the Greek civil war (1946-49) were differently affected by violence depending on the level of control. Explaining these regional differences should be important to understand both the dynamics of violence in ongoing armed conflicts and regional variances in the conditions of security. The research question of this paper is therefore: Where does fighting take place in countries experiencing war and how can we explain these spatial patterns?

What is still missing in the debate on the spatial and temporal dimensions are competing theoretical frameworks to predict the spatial behavior of conflicting armed groups. An additional challenge is to explain the relationship between geography and war in different settings of warfare, i.e. across different types of war. While recent studies exclusively focus on spatial dimensions in “classical” civil wars *within states* between regular armed troops of a government and one or more non-state parties within the boundaries of an internationally recognised state (Buhaug and Rød 2006; Raleigh and Hegre 2005), conflict research pays only little attention on the often overlooked activities of non-state actors in regions where state authority had collapsed. As a solution, we resort to the concept of sub-state wars which has been suggested by Chojnacki (2006). These are wars where fighting between non-state armed actors predominates the patterns of conflict. In terms of typology, the proposed focus on a sub-state war category draws our attention to similarities and dissimilarities across different classes of war and suggests an improved perspective for the analysis of their correlates and etiologies. In this paper we therefore want to present not only empirical patterns of conflict behavior from a geographic perspective, but also a theoretical argument how the way actors finance their fighting efforts in sub-state wars accounts for patterns of violent events in these conflicts.

Our paper consists of two parts: the first serves to develop a framework to predict spatial patterns of violence in sub-state conflicts, to guide our understanding of what to consider when analyzing sub-state war and to formulate testable hypotheses on the spatial logics of violence. The theoretical argument is that how and in what environments actors finance their wars explains patterns of violence in these conflicts. Taking contest theories as a starting point, this paper tries to show its usefulness for analyzing spatial contests in sub-state war by first incorporating the idea of *grids cells*. The very simple spatial theory of where we should expect most violent events is based on the idea that strategically and financially important *grids* should be the most contested and therefore fought for. We also suggest that decisions in sub-state wars as to when and where to fight and when to withdraw are more similar to classic understandings of warfare (see, for example, Biddle 2004) as it has been discussed so far.

In the second part we present a new dataset and empirically test the hypotheses. The disaggregated event data were collected by the *Event Data Project on Conflict and Security* (EDACS) which is part of the Research Center "Governance in Areas of Limited Statehood. New Modes of Governance?" (SFB 700) at the Free University of Berlin. While the Research Center in general focuses on "new" or hybrid modes of governance in areas of limited statehood[2], EDACS collects and analyzes event data in order to explain the temporal and spatial escalation patterns of organized violence, i.e. the evolution and demise of armed conflict and security in the zones of turmoil of failing and failed states. The availability of disaggregated data makes it possible to test hypotheses of more dynamic theoretical models.

Wars is areas of limited statehood

Taking areas of limited statehood seriously necessarily implies to conceptualize violent conflict within such areas and focus on the spatial dynamics of violence. Even though violence in areas of limited statehood oftentimes seems to be unexplainable and is being labeled as barbaric, irrational or non-strategic (Kaplan 1993; Münkler 2002), many authors argue that these processes should be understood in terms of a logic of strategic action

[2] For further details see Risse and Lehmkuhl (2006) and http://www.sfb-governance.de/en/index.html

against both civilian and military targets (Azam and Hoeffler 2002; Humphreys and Weinstein 2006; Eck and Hultman 2007). Taking up this notion of armed groups' strategic action we should therefore expect that violence does not occur arbitrarily across a country. In contrast, we should see spatial patterns of violence and insecurity. Existing work has already provided some insights to these patterns (Hegre and Raleigh 2005).

As pointed out, this paper focuses on the spatial dynamics in sub-state wars. This type of war represents the missing actor configuration in the leading typologies of war. For decades, the major data gathering projects such as COW and UCDP have focused their operational coding rules exclusively towards the fundaments of sovereign statehood as the definitional criterion for the compilation of war events. The assumption that war occurs only where states act violent in the absence of a centralised global authority has produced two core types of armed conflicts in the international system: first, wars between two or more members of the state system and, second, intra-state wars in which regular forces combat internal non-state challengers. COW, as other research projects, has deduced a third type of war from the processes of colonisation and de-colonisation: the historical specific type of conflict between a member of the international system and a unit which is not recognised as a sovereign state. These colonial or imperial wars are defined as 'extra-systemic wars'. This actor-based classification is straightforward, but excludes by definition conflicts whose parties are not recognised as legitimate members of the international system, so that such conflicts are either omitted from the data collection or classified as ordinary intra-state wars. Moreover, the focus on state-based violence underestimates the qualitative transformation of warfare in a globalized era. Mary Kaldor (1999) sought to grasp the complex changes of organized violence by the simple distinction into 'old' and 'new' wars. Others scholars have developed conceptualisations such as 'wars of the third kind' (Holsti 1996) or 'network wars' (Duffield 2001). Irrespective of the vagueness of terms such as 'new wars' or 'network wars', there is a widespread and empirically supported consensus among scholars that the character of war is changing and, especially, that violence within weak or failed states has become an analytically important form of conflict throughout the post-Second World War period (Sarkess et al. 2003; Harbom and Wallensteen 2007).

To overcome these shortcomings, several authors inside and outside the Correlates of War community have suggested new categories such as ‘intra-communal wars’ (Sarkees et al. 2003) or developed a ‘non-state actor’ dataset (Kreutz and Eck 2005). Following the underlying rule that a classification of war is best arranged according to the political status of the protagonists and by adding only a missing part to the possible combinations of state and non-state actors, Chojnacki (2006) has integrated a ‘sub-state war’ category between mostly non-state actors within or across borders. This approach pays tribute to changing patterns of warfare in areas of limited statehood, where governmental actors gradually lose or even lack the monopoly over the means of violence (Reno 1998; Jackson 2003). Even though sub-state wars are not a dominant type of war on the global level, their relative importance has grown over the last two decades. Violent conflicts in Somalia, Liberia, or the Democratic Republic of Congo are wars mostly fought between armed non-state actor groups referring to the emergence of multiple zones of military and political control. Where the monopoly of violence has at least temporarily collapsed (Somalia), non-state actors (warlords, local or ethnic militia) are able to establish alternative, territorially restricted forms of centralised violence. The proposed integration of a sub-state war category, thus, draws our attention to a neglected side of war and to similarities and dissimilarities across different classes of war. For future research, this will allow us to assess how the different types of wars have evolved over time and whether we can identify similar or different spatial and temporal logics of violence.

Theorizing about spatial contests in areas of limited statehood

In the following the idea is pursued that one can think about sub-state wars in terms of spatial contests. Even though we do not provide a formal contest model in this paper much of our theoretical framework draws from this line of research. Contest theory is so compelling in the context of sub-state wars, because it allows us to think about conflict situations without immediate reference to concepts of the state. Skarperdas (2002) has shown this in modeling situations of warlord competition taking place through the use of force for turf. Warlord competition or non-state actor wars in general can usually be observed when the state has broken down or collapsed. Sub-state wars can, therefore, be thought of as contest in a context where property rights and credible commitments are harder to achieve.

Contest theory has been developed to account for the fact that individuals and groups not only invest in productive measures, but also steal, rob, and in the worst case kill for achieving their goals. Actors in internal war similarly pursue their self-perceived interest by making choices between production and appropriation (Skaperdas 2007). In recent years different contest models have been developed to explain the occurrence and duration of civil wars. Gershenson and Grossman (2000), for example, adapted a basic model of contests with asymmetries to the type of war that can occur, whereas Azam (2002) considered the role of looting in joining rebel groups. Collier and Hoeffler (2001) put particular emphasis on the role of natural resource endowments as a source of rents for adversaries.[3]

The main assumption guiding our theoretical consideration is that sub-state wars actors act rational and try to maximize their utility. The first question we then have to ask is what sub-state war actors want to maximize. In a "classical" civil war this seems to be pretty straightforward to define. The government would like to stay in power and the insurgent wants to remove it and gain control over the state. So both actors would like to have as much of the political cake as possible. Many have then showed how incomplete information or commitment problems lead to the onset or duration of internal war (Garfinkel and Skaperdas 2007: 677-689; Walter 2006, Fearon 2004, more general Powell, 2006 and Fearon 1995). In sub-state wars the main assumption that actors compete for political central control of the state may be less sensible. Skarperdas (2002: 436) for example argues that warlords compete over rents (e.g. oil, diamonds, drugs, foreign aid) and the taxation of their subjects. This idea implies that actors are in control of some territory they want to expand, protect, and tax. Lemke's (2007) "autonomous political entities" are very similar to this kind of understanding. And from a governance oriented perspective Chojnacki and Branovic (2008) take a closer look at varying provisions of coercive security for defined territories and ethnic groups. Empirical examples of these sub-

3 For a review of the contest theory literature in general see Konrad (2007), for a more specific introduction in regards to violent conflict see Garfinkel and Skaperdas (2007)

state actors effectively controlling territories, can today be found in Afghanistan, the Democratic Republic of Congo or Columbia.

An important aspect of this line of thought is that actors in sub-state wars are in it for the long run. One reason for this can be found in context these conflicts take place. As in most sub-state wars the state is very weak and not many institutions exist that could for example solve commitment problems. Additionally, sub-state wars are oftentimes low-intensity conflicts taking place in less developed countries or totally collapsed states and, therefore, the immediate costs of war are relatively low for the rebel groups or warlords. Given these characteristics of sub-state wars, actors should be very concerned about how to defend their territory and how to finance this task. In these situations the main challenge to any non-state actor is how to fight military challengers, but at the same time being able to provide enough security to those who produce taxable goods or to areas where rents can be attained.

In the following the theoretical approach taken will focus on the question how patterns of violence should theoretical look like, given that actors are mostly concerned about 1) fighting military rivals and 2) financing their operations. These two challenges should account for a strategic selection process of deciding where to fight. If this is true, we should be able to formulate hypotheses about where fighting is more likely to occur, instead of seeing a random process of violent events.

Theoretically there should be two ways how to fight adversaries in a sub-state war: either fighting takes place over strategic important grids or over financially important grids. Fighting for strategic important grids implies that actors try to defeat each other in a very direct short-term oriented fashion. Fighting for financially important grids means that actors try to destroy or take over the financing sources of the opponent. This implies a more long-term oriented strategy. Both types of fighting should each have distinct characteristics of where fighting occurs. We will shortly elaborate on what we mean with strategic important grids, but the remainder of the paper will especially focus on patterns of violence connected with financially important grid cells.

Strategic important grids and violence

Strategic importance in a very narrow sense can be defined to which degree the control of a certain territory increases the probability of winning the armed contest on the battle field. The more the control of a certain territory increases the probability of winning the more strategic important appears that territory for the parties in conflict. Three characteristics make a certain territory especially strategic important: firstly, cities holding head-quarters of one of the fighting parties (most of the capitals fall into this category, but also rebel groups have their capitals like Huambo for the UNITA in Angola); secondly, territory around major transport routes and especially major road junctions, as they are important for the fast deployment of troops and retaining supply lines. Moreover, control over certain passes, valleys, or mountains is oftentimes an advantage to having access to additional territory. These kinds of situations have been formally modeled by so called *Colonel Blotto games* were two or more actors have to decide how to attribute their military resources (Konrad 2007). For example, Roberson (2006) has modeled a situations where the gain of one critical point will lead to greater chances of winning in the future. Fighting should especially take place around points where small advantages can decide the battle. Finally, air- and sea-ports that are important for supplying troops and carrying out military campaigns should experience more violence. These important sights should be hardly competed over and grids containing strategic important grid cells should, therefore, experience more violence.

Financially important grids and violence

How to understand and conceptualize financially important grids? From our perspective, these are grids that are important to the war economy of an armed group (either being a government or a rebel organization). Every war needs its war economy, meaning a way to finance and continue warfare. Western, democratic states for example use the tax money of their citizens to buy weapons, pay soldiers, and sustain military infrastructure. But this kind of sophisticated war economy only works in countries where the taxation system is very advanced and can be effectively enforced. In sub-state wars where the government has lost its ability to tax[4] also non-state armed actors lack the capability to sufficiently enforce modes of effective taxation. This leads to the well observed phenomenon that rebels or warlords (as well as governments) look for alternative ways of financing their military campaigns (Le Billon 2001). Two developments account for the present diversification of the methods of financing warfare. First, the end of the Cold War has drastically decreased the amount of military aid, which gave rise to globalized economic networks and changing practices of financing (Le Billon 2001). Second, areas where state authorities have collapsed are accompanied by the emergence of multiple and alternativ patterns of economic driven orders of violence and material reproduction (Reno 1998; Duffield 2001). In the literature war economies based on natural resources are most discussed (Ross 2004), and mostly due to the very prominent wars in Sierra Leone, Liberia, Angola, and the Democratic Republic of Congo diamonds are a prime example of a natural resource used to sustain warfare. Other war economies in turn rest upon the looting of civilan populations to strategies based on human resources such as the logic of kidnapping (see, for example, the practices in Colombia or Iraq).

To sum up shortly, even where the state has failed to control people and revenue a variety of mostly non-state armed actors deliberately seek to control markets, resources and trade connections referring to different types of war economies and followed by different logics of military action. In order to specify our theoretical argument more precisely, below we will distinguish between war economies that rely on the taxation and extraction of stationary resources and those of non-stationary ones.

Stationary war economies of taxation and extraction

In case actors want to be capable of sustaining their military action for a longer period of time, they have to protect their financial basis effectively. This assumption points to recent studies that have underscored the relationship between the type of resource and the duration of warfare (Ross 2004). For an actor who relies on the taxation of goods this implies that the main goal should be the protection of areas where the most precious goods are

[4] Two reasons drive the prevention of effective taxation systems in failed states. First, in case an effective taxation has never existed it is very hard to establish one in times of war. Second, even if a decent taxation system has been enforced it is most likely to collapse in times of a civil war. This is different to international wars as the internal control is not necessarily diminished during these conflicts.

produced. At the same time every actor knows that the occupation of taxable productive areas would increase the probability of winning the war. This creates a situation of strategic interaction as every actor should protect the resources it can tax, while at the same time strike at the taxable goods of others to diminish their financial basis. Actors who do rely on the taxation of productive good should therefore try to protect these areas from any kind of fighting. In case these areas do get attacked, actors should try to stop the challenger before it reaches the most productive areas. But once a challenger is able to take over the productive area, this should put an end to the incumbent as this indicates an decisive victory in war.

A similar pattern should apply when actors hold territory containing revenues, like gold or diamonds. Even though areas of natural resources should be much smaller than taxable productive areas, we should also see little violence at the exact position of natural resources. One would expect that the most violence takes place in the area surrounding the natural resources. Once the resources are taken over by one party this should normally end the military effort. To put it in a nutshell, war economies relying on the taxation stationary resources or taxable productive areas that can not be moved should experience lower levels of violence at the center of the resource or the productive area, but rather a higher amount of violent events in contiguous areas.

Non-stationary taxable goods

We have now defined how violent behavior should look like in regard to economies of war that rely on resources or productive areas that can not be moved. But what happens if a taxable good is not fixed but moves across territory? In many conflicts non-state parties such as local militias, rebel groups or warlords rely on the taxation of transport routes by setting up road blocks or providing security services for transports through conflict zones. In case the transport routes only cover a small territory, we should see behavior that is similar to fixed productive areas. This should be the case because a small territory is relatively easy to control and fighting should take place around this area and as soon as one party has control over the area fighting should stop or resume around the territory.

As the territory size increases it becomes much harder to control the whole area holding the actor size constant. That means when very long transport routes exist it will become impossible to have total control the whole road. Therefore when actors rely on taxable goods transported over long roads they should have different strategies than actors that try to secure a well defined productive area or a fixed natural resource. Two strategies should be most common. The first is to protect transports from challengers and collecting a 'protection fee'. This pattern can be observed when non-state actors guarantee International Organizations or NGOs safety in conflict zones by providing security services. This strategy has the disadvantage that one can only protect a limited number of vehicles, due to constraints in the number of troops. The second strategy involves fighting other parties as soon as they try tax the roads themselves or plunder the precious goods. This strategy leads to initial loses of tax revenue as it will take some time until the incumbent is informed about a challenger collecting taxes. On the other side, this strategy comes with the advantage that if a challenger starts collecting taxes it reveals important information about its position to the incumbent. The incumbent can directly send troops to the exact position where the challenger raises taxes and fight him. Therefore, we should see fighting along the roads and not around them. Theoretically this strategy should be less constrained by troop size than the pure protection strategy.

Hypothesizing the spatial logic of fighting in Somalia

Somalia is not a very natural resource rich country. None of the armed actors is thus running a war economy that relies exclusively on natural resources. We will therefore focus on hypotheses in regard to the taxation of productive areas. The dominant productive sector of Somalia's economy is agriculture, with livestock being the most important export commodity.[5] The cash crop production includes bananas, sugar, cotton, rice and fruits. Huge parts of the irrigation system are in disrepair and production is heavily dependent on rainfall and natural irrigation. In addition to these crops, charcoal became an important export as well, as it is shipped in bulk to the neighboring Gulf states. But especially agricultural areas in Somalia are those productive areas where we should find violent behavior as pointed out above.

5 80 percent of foreign revenue is generated by cattle exports (Food Security Analysis Unit Somalia, http://www.fsausomali.org/index.php@id=39.html)

First we turn to non-agricultural areas. In these areas one should observe no violence, because there is no production and therefore nothing to tax and nothing to protect. For no actor it should be profitable to protect or fight for areas that have no financial returns. Turning to the other side of the spectrum we should also see no violence in areas which have very intense agriculture. Actors will do anything to protect these areas against external threats as these areas have high financial returns to protection. Once a challenger is able to capture the area the fighting stops or resumes again around the high agricultural areas. This should be the case because the challenger is now the one who has high returns from protection. Therefore we predict more fighting in areas around the highly productive agricultural areas, meaning areas with medium agricultural activity. Putting this together it implies that we should see an inversed u-shaped relationship between agricultaral activity and the risk of an event taking place.

> *H1: The centre of intensely used agricultural areas (grids) and non- or little used agricultural areas (grids) should experience low levels of violence. Areas (grids) proximate to highly productive agricultural areas experience the most occurrences of violent events.*

In Somalia most goods are transported along the major routes to larger trading centres or points of export. According to our theory we should see fighting along major roads as the taxation of these roads are vital to the war economies of several actors in Somalia. As noted above major roads should not only fought for taxation purposes but also for simple strategic purposes. Due to the limited data sources we are not able to completely separate violence due to strategic reasons and violence stronger related to war economies. But following our theory we should see more violence around roads where more goods are transported and actors can retain higher taxes. There are no measures of traffic density in Somalia, but one could assume that on roads in agricultural regions more goods are transported than in areas where only little or no agricultural goods are grown. Especially, since Somalia does not have big industrial areas major roads should be mostly used to transport agricultural goods. Summing up, this means that we should see more violence along roads in regions that have high levels of agricultural activity, especially in the areas of Mogadishu, Marka, Kismayo and Boosasso. Additionally, we assume that junctions should be especially profitable to tax as two or more transport routes join and the value of these should accumulate. Again we should see that junctions in agricultural regions should experience violent events more often than junctions in non-agricultural areas.

> *H2a: Roads in areas with high agricultural productivity experience more violent events than roads in areas) with low agricultural output.*
> *H2b: Junctions in areas with high agricultural productivity experience more violent events than junctions in areas with low agricultural output.*

As pointed out in the theoretical section a major assumption of our theory is that actors are effectively in control of some territory similar to the concepts of "autonomous political entities" (Lemke 2006) or "coercive governance" (Chojnacki/Branovic 2008). This also means that additionally to the hypotheses of protecting productive areas of its territory one would expect to see more violence where these territories border to each other. This argumentation is similar to border disputes and the meaning of continguity in international relations theory. In Somalia grids including clanborders should therefore have a higher risk of violence.

> *H3: Grids with clanborders have a higher risk of event occurrence than grids without clanborders.*

Data Collection and Variables

The data used in the analyses are taken from a new database developed at the Research Center “Governance in Areas of Limited Statehood” funded by the “German Research Foundation”. Within the Research Center the *Event Data Project on Conflict and Security* (EDACS) collects, integrates, and analyzes spatial data on violent events. The basic unit of observation in the EDACS dataset is a single event which is defined as a violent incidence with at least one casualty resulting from the direct use of armed force. Therefore, the event dataset includes all violent events resulting in casualties in the course of armed hostilities. For every event a number of fatalities is given and whenever possible the dataset provides a differentiation between civilian and military casualties. This approach leaves behind the problem of defining thresholds (Collier and Hoeffler 2001; Sambanis 2004) as we operate with continuous numbers of deaths. Following the logic of disaggregation the dataset contains detailed information on the latitude and longitude of various regions, cities and roads which are identified locations of violent events (for a similar approach see Raleigh and Hegre 2005). For the puposes of data collection, the information is drawn from the information management system of LexisNexis including all the articles published in major newspapers (New York Times, The Guardian, Washington Post) and comprehensive news services (BBC Monitoring).

In order to account for different patterns of violent incidences EDACS collects data on two types of violence: *fighting* and *one-sided attacks*. Fighting is defined as armed interaction between two or more organized groups. With the help of this definition the project underlines the imperative to leave behind the state-centric definitions of war (Sarkees et al. 2003) and armed conflict (Gleditsch et al. 2002) found in the leading datasets in the field of conflict studies. In addition to information on the *fighting* of armed groups we also collect data on *one-sided attacks*. We define one-sided attacks as direct unilateral violence by organized groups aimed at civilian or military targets.[6] This definition is dissimilar to UCDPs concept of “one-sided violence” (Eck and Hultman 2007). UCDP defines one-sided violence as “the use of armed force by the government of a state or by a formally organized group against civilians which results in at least 25 deaths

[6] Road side bombings, suicide bombers, or massacres would therefore be one-sided attacks independently from who is targeted.

per year" (Eck et al. 2004: 136). The main difference is that one-sided attacks in our dataset can also be directed at military targets. The idea behind this concept is to keep the type of target and the type of violence separated from each other.

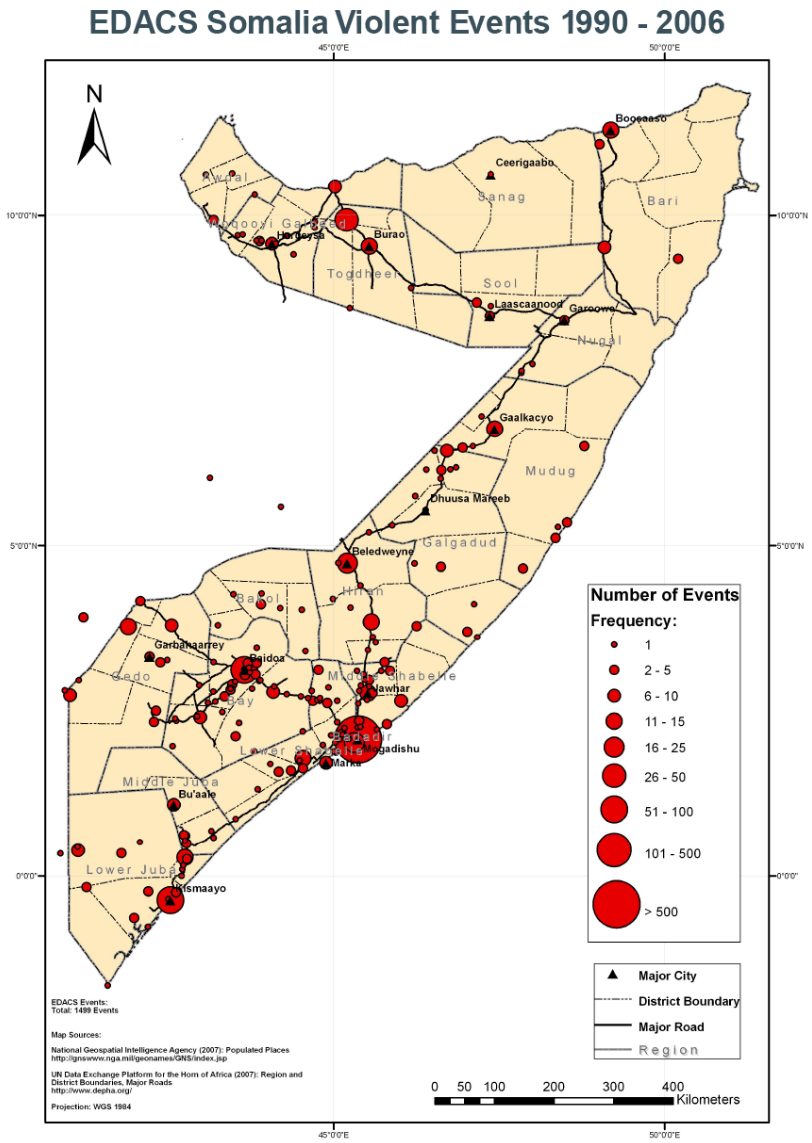
Empirically, the EDACS project has decided to start the data collection with Somalia, because it is a striking example for armed conflict between mostly non-state armed groups and the collapse of state authority. With ongoing fighting since 1988 and the lack of functioning state institutions since 1991, Somalia is considered as an archetypical example of a sub-state war and a failed state. While some authors try to explain the origins of the overlapping internal conflicts with the fractionalized societal structures and inherent violent dynamics in clan relations (Schlee 2001), others have stressed the importance of political entrepreneurs and their manipulation of clan loyalties (Compagnon 1999). In any case, the Barre regime and its system of clan-based patronage and strategy of capturing the state and its resources certainly exacerbated existing tensions between clans. As a consequence, economic decline as well as the collapse of the education and health systems caused grievances among the most disadvantaged groups, while the regime attempted to hold on to power by the repressive use of state organs, especially by the creation of armed militias which in turn led to a huge proliferation of small arms and the decline of state monopoly on the use of force. In terms of typology, the war started as an anti-regime conflict between a few armed opposition groups like the Somali National Movement (SNM), the Somali Salvation Democratic Front (SSDF) or the United Somali Congress (USC), and the state's armed forces. After Barre's defeat in January 1991, however, and the formal declaration of independence of Somaliland on May 18, 1991, the conflict endured, as the USC disintegrated into rival factions. This trend of fragmentation continued throughout the following years even until today.

The EDACS event dataset on Somalia contains a sum total of 1464 violent events and a minimum of 20,357 fatalities (FAT_MIN)[7] in a vector (point) format for the observation period January 1990 - December 2006. In Figure 1 you can see a representation of all violent events in the dataset in the vector format.

---

[7] EDACS collects both "minimum" and "maximum" values for fatalities. For the purpose of this analysis we have decided to use the "minimum" of fatalities. In the future we will offer a best estimate measure.

FIGURE 1: Frequency of Violent Events in Somalia from 1990-2006



In order to utilize the dataset in a regression analysis, we have transformed the point data into a raster grid, with both events and fatalities aggregated on a monthly basis. This is done within an open source GIS environment, using GRASS GIS version 6.2. The raster uses a WGS 84 projection and the following geographic boundaries: 13.125°N, 38.125°E and 4.125°S, 52.125°E, which contain all of Somalia, Djibouti and parts of the adjacent countries. With a resolution of 0.25° this makes for 56 columns and 69 rows to a total of 3864 grid cells. Events and fatalities are aggregated by month and grid cell for each of the

204 months of the observation period, with the cell value being the sum of events or fatalities respectively for that month. Each month is exported separately as an ascii-file. By then joining 198 of the monthly ascii-files[8] into one column of a single file, we get a total of 765,072 cases (198 months * 3864 grid cells). In addition to the events and fatalities we also calculate variables to check for neighbourhood and time lag effects for both events and fatalities. These are the mean value of 3 x 3 neighbouring cells for the same month (_3nn), the previous month (_3nn1m), the previous three months (_3nn3m) and the previous six months (_3nn6m). A similar procedure is used with the independent variables. For time-consistent variables (e.g. roads or population density), all 198 monthly raster grids are the same and are merely joined together, whereas rainfall as a time-variant variable has 198 different raster grids. At each time point the dataset includes 950 grids of 25 x 25 km. This means we end up with 188,100 observations.

Dependent Variable

In the original dataset every event is coded along with a minimum and maximum fatality estimate. In this study, however, only the event variable will be used, because at this stage of research we first wanted to look at occurrence and distribution of events and less on intensity levels. In a first step we aggregated all events on a monthly grid basis. The size of the grids is about 25 square km. In a second step we simply created an indicator variable, whether an event has taken place in a particular grid at time *t*.

Independent Variables

The independent variables used in this analysis are compiled from several sources, the main source being the *UN Data Exchange Platform for the Horn of Africa* (DEPHA).[9] Assuming that violence is closely interlinked with the economic resources and trade connections we focus on factors concerning the economic performance measured by the intensity of the Somali agriculture (*crops*) and the strategic importance of transportation (*roads* and *junctions*). For analytical purposes we have chosen to control also for the territorial and

8 The months January - June 1990 cannot be used for the creation of time-lag-data for the previous 6 months and are thus dropped from the regression.

9 http://www.depha.org/maps/somalia/default.asp

ethno-political dimensions of armed conflict (*regions* and *clan borders*), demographic conditions (*population density*) and environmental developments (*rainfall*).

Lagged neighborhood events

As the grid cell size is relatively small one would expect to see spillover effects from one grid to the other. This kind of horizontal escalation can be due to military non-state actor activity in a particular area or groups being pushed back by another actor. There could also be local factors that are similar in a group of neighboring cells. To control for this kind of spatial autocorrelation we created a binary variable that indicates whether any event has taken place in the surrounding eight 25 x 25 km grid cells at t-1.

Crops

Economic performance in Somalia is best measured by the intensity of the Somali agriculture. Here the percentage of area covered with herbaceous crops (0%, 15%, 30%, 40%, 60% or 100%) is used as an indicator for the intensity of agriculture and is coded as the variable "*crops*". The values are extracted from polygon shapefiles in the Somalia Multipurpose Landcover database (Africover) of the FAO.[10] Land cover classes in that database were produced from visual interpretation of digitally enhanced LANDSAT TM images (Bands 4,3,2) acquired mainly in the years 1995 - 1998. The land cover classes have been developed using the FAO/UNEP international standard LCCS classification system. The variable indicates the percentage of area covered with herbaceous crops ranging from 0 to 100 percent.

Road, Roads minus Junction, and Junction

To test for the risk of violent events around roads we make use of three different variables. Roads indicates whether there are any major transportation routes in a particular grid. The DEPHA data used for the variable *roads* were digitized from topographic maps of Somalia at a scale of 1:100,000. These maps were produced by stereo aerial photography and printed in 1976 by the Bureau of Cartography, Ministry of Defence of Somalia. They thus represent a rather outdated state of Somalia's road infrastructure but are the most detailed

---

10 http://www.africover.org/system/area.php?place=5

maps digitally available. Only the major roads from the DEPHA dataset are coded. The major road from Kismayu to Baidoa is independently digitized from ESRI World Basemap shapefile "Streets and Railroads 1"[11] and added to the DEPHA roads, because it was recognized as a major road in several UN documents and by other relief agencies.

The roads shapefile is then used to generate point data of major road *junctions.* To attain information on whether a particular grid includes a junction, the information on roads was taken and we digitalized every point where two or more major roads meet. *Roads minus junction* is then simple all grids including a road minus those which include a junction. We created to this variable to avoid multicolinearity in the analysis below.

Population density

Population density is the main control variable in our model. There should be the risk that at least two of our explanatory variables are highly correlated with population density. Junctions of major roads are generally in populated areas and also agricultural areas should be more populated than non-agricultural areas. The population density variable therefore gives information on the population density in each grid cell. The values wher attained by taking the Population density (inhabitants/km²) and aggregated it to 0.25°x0.25° grid cells. The information on population density was taken from the raster file "Population Desity" of the UN Data Exchange Platform for the Horn of Africa (DEPHA)[12]. The data provided by DEPHA are deemed the best option as far as accuracy and reproducibility are concerned.

Clan Border

Identifying clanborders seems to be a daunting task especially because there is a high probability that they shift over time and are not as stable as state borders. One could argue that our time period of 17 years is relatively short, but one has to keep in mind that especially in times of war ethnic borders can shift rather quickly due to ethnic cleansing and refugees. Additionally, because of the many sub-clans existing in Somalia it is also

11 http://www.esri.com/data/download/basemap/index.html

12 DEPHA information is based on the LandScan Global Population Project, a worldwide population database at 30" X 30" resolution for estimating ambient populations at risk. Best available census counts are distributed to cells based on probability coefficients, which, in turn, are based on road proximity, slope, land cover and nighttime lights. Probability coefficients are assigned to each value of each input variable, and a composite probability coefficient is calculated for each LandScan cell.

difficult to select which clans should be mapped. Given all these difficulties we nonetheless tried to come up with a decent variable. For this paper we decided to map only the borders between main settlement areas of the major clan families: Daarood, Hawiye, Dir, Reewin, and Jareer. We digitilized information taken from Abikar (see Appendix), who provided the most sensible map we could find. Even though this indicator might have major flaws it is still a fresh approach towards operationalizing ethnic variables. It is less interested in the relative size of groups in the population or geographical spread, but focuses on the dynamics of 'border-disputes'.

Region

First-level administrative boundaries of Somalia (*regions*) are also provided by the DEPHA dataset, which contains the administrative boundaries at a 1:1,000,000 scale as polygons. The coverage is part of the "Famine Early Warning System (FEWS)/Associates in Rural Development (ARD)", African series. In addition to showing the regions of Somalia, we also use that shapefile to create a variable *somalia_mask* which enables us to select only cases that are actually located within Somali territory for the regression analysis.

Rainfall

Broadly speaking, Somalia's physical geography exhibits three main regions, the northern mountain ranges, the central plateau and the south-western area, which contains the country's only perennial rivers, Juba and Shabeelle. Somalia's climate, though being generally arid or semi-arid throughout the country, differs among those regions. Rainfall varies between 150mm/a in the central plateau and up to 500mm/a in the northern highlands and the southwest. The source for precipitation data is EC-JRC-AGRIFISH, a production by MeteoConsult (Nl) based on ECWMF (*European Centre for Medium Range Weather Forecasts*) model outputs.[13] That database provides rainfall in [mm] with a 0.5° spatial and a 10-daily temporal resolution. We first recode these data to fit our raster cell size of 0.25°. We then calculate the deviation of rainfall in each raster cell for a six-month period from the mean value of rainfall for the same six months during the observation

[13] http://agrifish.jrc.it/marsfood/ecmwf.htm

period 1990-2006 (*dev_rain6m*) or during the whole period for which rainfall data are available (1974-2006) (*dev_rain6m_full*).

Analysis and Results

In this paper our dependent variable is an indicator whether an event has taken place in a particular grid at time t. Theoretically we should observe time-dependency in our data as battles can go on for several days or even weeks. As expected we found time-dependency in a preliminary analysis and therefore correct for temporal dependence in the observations. In this paper methods are used that are appropriate to deal with time-series-cross-section data with a binary dependent variable (BTSCS). In International Relations the analysis of BTSCS data has been quite common and intensely discussed (Beck 2001). In our analysis we follow the logit solution proposed by Beck et al. (1998) using temporal cubic splines. In our analysis we first run a simple logit model and then a logit model correcting for time dependency to show how the coefficients change. This should also give us some indications as to how strong the temporal effect is. Comparing model 1 and 2 (table 1) we can observe that controlling for time-dependency leads to smaller coefficients. These results were expected for theoretical reasons and make it necessary to take a closer at escalation processes in the future, putting a stronger emphasis on interpreting time-dependent effect.

Model 2 will be taken as the base-line model in which the main explanatory variables *crops*, *junctions*, *roads-junction*, and *clan borders* were regressed on the event indicator controlling for *neighborhood effect*, *rainfall* in the last 6 months, *population* in the grid, as well as for the already described *time dependencies*. In all models a logistic regression using clustered robust standard errors is run. Every grid is defined as a cluster across time as these cannot be seen as independent from each other. This procedure leads to robust standard errors and additionally corrects for the effects of clustered data (Long and Freese, 2006: 86). Table 1 shows the results of the base model.

TABLE 1: Logistic Regressions on the Dependent Variable Event_Indicator comparing the basic model with and without controlling for time-dependency

	Model I		Model II	
Variables	*Beta*	*Robust SE*	*Beta*	*Robust SE*
Crops	0.736	0.302**	0.600	0.260**
Roads-Junctions	1.492	0.272***	1.331	0.214***
Junctions	2.443	0.444***	1.993	0.376***
Clan Borders	0.385	0.351	0.321	0.269
Neighborhood Indicator	1.101	0.224***	1.053	0.182***
Population Density	0.003	0.000***	0.002	0.000***
Dev_Rain in last 6 months	-0.001	0.000***	-0.001	0.000**
Peace Months			-0.089	0.014***
Cubic Spline 1			-0.000	0.000***
Cubic Spline 2			0.000	0.000***
Cubic Spline 3			-0.000	0.000
Constant	-6.919	0.158***	-4.894	0.239***
Pseudo R^2	0.237		0.290	
Log-Likelihood	-3656.5		-3400.6	
Wald Chi-square	733.9		2842.9	
Prob. Chi-square	<0.0001		<0.0001	

N=188100, number of events = 732, all models with adjusted standard errors for 198 clusters = 198 grids,
* p<0.1, ** p<0.05, *** p<0.01, two-tailed tests.

Crops as well as *junctions* and *roads-junction* have a positive and significant effect on the occurrence of an event. Grid cells with *clanborders* on the other side have no significant effect on the occurrence of an event. The controls for *spatial dependency* and *rainfall* in the last 6 months are both significant, but *rainfall* seems to have no effect on event occurrence. Interestingly also *population density* has only a small significant effect, even though one would probably expect to see more violence in densely populated grids. In model 2 one can see how both temporal and spatial dimensions matter when analyzing grid structured data. These findings stress that both vertical and horizontal escalation processes can be traced in the data.

Using the same estimation method as before *crop*^{2} was introduced in our second model (table 2) to test for the first hypothesis stating an inversed u-shape relationship between agricultural density and the probability of an event taking place. The coefficients of *crops* and *crops*^{2} support the first hypotheses as *crops* (5.05) have a positive and significant coefficient and *crops*^{2} (-5.89) have a negative significant coefficient. Analyzing marginal effects the increase in *crops* from model 2 to model 3 is substantial. A ten percent increase in *crops* for example increases the probability of an event by roughly 4.8 percent. All other explanatory and control variables stay robust.

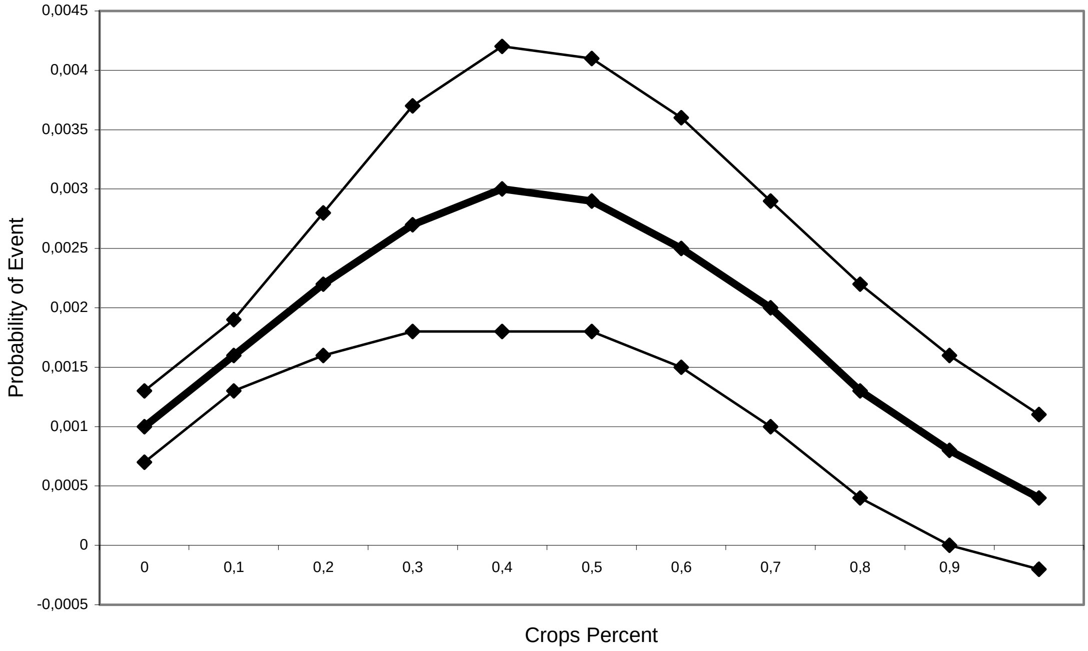
TABLE 2: Logistic Regression on the Dependent Variable Event_Ind testing for an inversed U-relationship of Crops and the Dependent Variable

	Model III	
Variables	*Beta*	*Robust SE*
Crops	5.053	1.394***
Crops^2	-5.894	1.873***
Roads-Junctions	1.156	0.203***
Junctions	1.909	0.350***
Clan Borders	0.288	0.246
Neighborhood Indicator	0.888	0.209***
Population Density	0.002	0.000***
Dev_Rain in last 6 months	-0.001	0.000**
Peace Months	-0.086	0.012***
Cubic Spline 1	-0.000	0.000***
Cubic Spline 2	0.000	0.000***
Cubic Spline 3	-0.000	0.000
Constant	-5.124	0.195***
Pseudo R^2	0.300	
Log-Likelihood	-3357.2	
Wald Chi-square	2995.54	
Prob. Chi-square	<0.0001	

N=188100, number of events = 732, model with adjusted standard errors for 198 clusters = 198 grids,
* p<0.1, ** p<0.05, *** p<0.01, two-tailed tests.

To get a better idea about how the inverted u-shaped relation between percentage of *crops* in a grid and the probability of an violent event looks like we plotted it as seen in graph 2. U-shaped relationships in a logit-model cannot be interpreted as straightforward as in a linear model. We therefore fixed *crops* and at values 0,.1,.2…, and 1 (and accordingly *crops*^{2} at 0, 0.01, 0.04,…1) holding all other variables at their mean. The graph shows how the probability of an event first rises with an increase in the percentage of *crops* and then slowly decreases going to almost zero. It is interesting to see that the probability of a violent event in a highly agricultural grid is lower than in a non-agricultural grid. This means that highly agricultural grids have the overall lowest probability of experiencing a violent event.

FIGURE 2: Graphical interpretation of the relationship between the Probability of an Event taking place and Crops/Crops^2 including the upper and lower bound of the 95% Confidence Interval holding all other variables at their mean



In the third and forth model we focus on hypotheses 2a and 2b. As we could see in model 2 and 3 *roads-junction* and *junction* had a positive and significant effect on event occurrence. These results could point to the strategic as well as the financial arguments made in the theoretical part of this paper. In case violence along roads is connected to war economies hypotheses 2a and 2b suggest that we should see more violence along roads and junctions that are more heavily used for transport. To test for this hypothesis we assume that roads which run through more intense agricultural regions are being used more frequent for transporting goods than roads in other regions. Therefore in model 3 we introduce the variable *region_cropxgrid* which proxies the absolute agricultural output in a region. In model we model 4 we then introduce the interaction terms of regional output with *junctions* and *roads-junctions*. The interaction term for *junctions* is positive, but insignificant. Therefore no support can be found for hypothesis 2b. The interaction with *road-junction* on the other hand is significant, but negative. To investigate the interaction term further, we conducted several graphical analysis as the sign and the size of the beta values are not straightforward to interpret. Non of our analysis points to the fact that a positive interaction exists at any values of x and y. Therefore we also reject hypothesis 2a. In discussion we will come back to this point.

TABLE 3: Logistic Regressions on the Dependent Variable Event_Ind including Interaction Terms of Roads-Junction*Regional Crops and Junctions*Regional Crops

	Model IV		Model V	
Variables	*Beta*	*Robust SE*	*Beta*	*Robust SE*
Crops	4.088	1.383***	3.993	1.309***
Crops^2	-4.898	1.786***	-4.816	1.687***
Roads-Junctions	1.165	0.201***	1.608	0.284***
Junctions	1.845	0.324***	1.571	0.508***
Regional Crops	0.280	0.137**	0.044	0.016***
Roads-Junctions * Regional Crops			-0.047	0.020**
Junctions * Regional Crops			0.014	0.038
Clan Borders	0.333	0.220	0.365	0.209*
Neighborhood Indicator	0.902	0.195***	0.879	0.193***
Population Density	0.002	0.000***	0.002	0.000***
Dev_Rain in last 6 months	-0.001	0.000**	-0.001	0.000**
Peace Months	-0.086	0.012***	-0.085	0.011***
Cubic Spline 1	-0.000	0.000***	-0.000	0.000***
Cubic Spline 2	0.000	0.000***	0.000	0.000***
Cubic Spline 3	-0.000	0.000	-0.000	0.000
Constant	-5.293	0.192***	-5.437	0.211***
Pseudo R^2	0.301		0.303	
Log-Likelihood	-3348.5		-3338.8	
Wald Chi-square	3783.6		2984.9	
Prob. Chi-square	<0.0001		<0.0001	

N=188100, number of events = 732, all models with adjusted standard errors for 198 clusters = 198 grids,
* p<0.1, ** p<0.05, *** p<0.01, two-tailed tests.

In the models so far presented we could provide strong evidence for hypotheses 1 and non for hypotheses 2a and 2b. Hypotheses 3, stating a relationship between *clanborders* and event occurrence could however only be supported in model 5. Due to the fact that this result is not very robust across the models we should reject hypothesis 3. Three reasons could account for this fact: (1) shortcomings in our theoretical framework, (2) errors of measurement, or (3) a high level of clanborders does not increase the risk of particular grids, but has an effect on the regional level. So we run model 4 again, but this time not taking *clanborders* in a particular grid as explanatory variable but the frequency of grids with *clanborders* in its *region* relative to the number of grids in the region. At the same time the control variable population density in a grid is replaced by the *absolute population* of the region a grid belongs to. This also introduces an additional test whether population has an effect on event occurrence.

TABLE 4: Logistic Regression on the Dependent Variable Event_Ind testing for regional effects of clan borders and Population

	Model VI	
Variables	*Beta*	*Robust SE*
Crops	5.275	1.585***
Crops^2	-7.138	2.309***
Roads-Junctions	1.693	0.307***
Junctions	2.723	0.491***
Regional Crops	0.270	0.165*
Roads-Junctions * Regional Crops	-0.058	0.020***
Junctions * Regional Crops	-0.028	0.027
Clan Borders in Region	1.269	0.461***
Neighborhood Indicator	0.534	0.277*
Population in Region	0.000	0.000
Dev_Rain in last 6 months	-0.000	0.000**
Peace Months	-0.103	0.014***
Cubic Spline 1	-0.000	0.000***
Cubic Spline 2	0.000	0.000***
Cubic Spline 3	-0.000	0.000
Constant	-5.509	0.213***
Pseudo R^2	0.282	
Log-Likelihood	-3438.8	
Wald Chi-square	465.9	
Prob. Chi-square	<0.0001	

N=188100, number of events = 732, model with adjusted standard errors for 198 clusters = 198 grids,
* p<0.1, ** p<0.05, *** p<0.01, two-tailed tests.

Looking at table 4 one can note that all coefficients stay relatively robust and again *population* also on a regional level has surprisingly no significant effect on event occurrence. *Clan borders* on a regional level now have a positive (1.27) and significant effect on event occurrence. This implies that either a measurement error in the grid based *clan border* variable exists or that indeed *clan borders* only matter on the regional level. A possible explanation for the latter is the observation that in the South the main settlement areas are more blurry and divided into smaller sections.

Goodness of Fit

As with many datasets that include a large number of non-cases it would be naïve to simply look at the correctly classified cases. If we would only take this measure we would correctly predict 99.66 percent of the cases. This is of course due to the could prediction of non-cases. What one is normally interested in is how good one can really predict events, also known as the sensitivity of a model. Overall we can predict 19.26 percent of the violent events in our dataset. This percentage has to be compared the percentage of positive events we would predict when doing a random draw. As we have 732 monthly based grids experiencing at least one violent event compared to the total of 188,100 monthly grids, a random draw would leave us with 0.3 percent of correctly predicted positive events. Therefore our model does much better than a random prediction.

TABLE 5: Predicted Cases for Model V

	True		
Classified	Event	Non-Event	**Total**
Event Predicted	141	53	194
Non-Event Predicted	591	187315	187906
Total	732	187368	188100

Classified as Event Predicted if predicted Pr(Event_Ind) ≥ .5

Robustness

To check the robustness of our model we performed two test: leaving out Mogadishu from the sample and running a jackknife model excluding always one region. The results of the robustness checks are two-sided. First we can report that the coefficients stay stable and significant under both procedures. This speaks for the model as the main results are not driven by particular regions or Mogadishu. On the other hand leaving out Mogadishu decreases the positive predicted cases dramatically. The model therefore has some bias in predicting the Mogadishu grid better than other grids. In future this point has to be further explored.

Discussion and Conclusion

The compilation of the event database on conflict and security shed new light on local conditions and patterns of who fights where and why allowing for testing hypotheses that highlight spatial dynamics of violence and the relevance of financially or strategically important grids. Moreover, the new data set enables conflict research to analyze contests in sub-state wars and differentiating secure and non-secure areas (or grids) of limited statehood.

We began by stating the question where violence in sub-state wars take place and how we can explain spatial patterns of violence. Starting from the assumption that actors have to fight their opponents and at the same time finance their military campaigns two basic theoretical arguments were derived. First, it was argued that actors try to protect the most valuable areas in regard to financing their fighting efforts. On the other hand, armed groups in area of limited statehood have an incentive to combat military opponents at the financially important grids. Therefore, we hypothesized that grids with the most productive agricultural areas should see the least fighting, but areas surrounding these areas should see the most fighting. Non-agricultural grids should experience no fighting, because the return to fighting or protecting these grids is low.

Empirically, we found strong support for this inversed u-shaped relationship between the probability of the occurrence of violent events and the percentage of agricultural activity. This implies that actors provide security for areas they depend on economically. At the same time it also indicates some evidence for that actors indeed try to strategically attack the financial important grids of an opponent. Putting this together, areas surrounding taxable productive areas have the highest risk of experiencing violence in sub-state wars. This fortifies the formal argument by Skaperdas (2002) that non-state armed groups in areas of limited statehood such as warlords compete basically for strategic important grids provding them with 'taxable' resources, but at the same time offering basic security functions within economic valuable territories. In the future one has to look at whether these results hold for other countries and for intra-state wars, especially when looking more detailed at various types of natural resources.

Contrary to our expectations, the empirical findings do not confirm that roads and junctions transporting high levels of taxable goods should be more prone to violent events than those with lower levels of taxable goods. Two reasons could account for this finding. One reason could be that our proxy for high level of transport is not a valid measurement. It could be that roads from highly productive regions run for several hundred miles through unproductive regions where the roads are then fought for. This pattern cannot be picked up by our measurement. The other reason might be that roads and junctions are of such strategic importance that financial aspects only play a minor role. This could be especially the case for junctions. In further versions of this paper we will try to implement better measures for transports on major roads and incorporate these aspects in our theoretical framework.

Another assumption of our theory was that in sub-state wars actors are in control of some more or less well defined territory in which they are able to tax goods and resources indicating corcive forms of governance in areas of limited statehood (Chojnacki and Branovic 2007). It was therefore argued that one should observe territorial disputes along clan borders. When taking clan borders on a grid level, however, no robust finding could be derived from the models. Interestingly, when taking a regional measure of clan borders a significant and robust positive influence on the event probability could be found. Our conclusion from this finding is that grids in regions with many clan borders have an increased the probability of an event, but actually being at the clan border has no substantive effect. This also points to a more general point in the analysis of geographical conflict data, that one has to distinguish between regional effects and grid effects. To pursue this argument methodologically multi-level-analysis might be a way to tackle this point in the future.

Another important insight of this paper is that one has to control explicitly for spatial and temporal dependencies. This follows theoretically from the expectation of vertical and horizontal escalation patterns once fighting occurs and can empirically be traced on the data. In the future it is necessary to take a closer look at these escalation processes and even test specific hypotheses.

Finally, one cannot exclude the possibility that temporal effects and spatial dynamics of fighting may be highly dependend on third party intervention. It seems reasonable to assume that the UN/US intervention in the 1990s which provided a huge influx of external resources into the war economy and which intensified or created new informational asymmetries was accountable for a high proportion of violent events 1993-1995. In contrast, the time between 1995 and 2000 was characterized by a lack of external financing options (with the exception of some aid agencies) and is best understood as a period of „armed peace“ that was used by local armed groups to consolidate power and in some circumstances even introduce elements of security governance (rudimentary taxation systems, territorial limited orders of violence). Neither the introduction of the Transitional National Government in 2002 or the Transitional Federal Government in 2004, nor the rise of the Islamic Courts Union in 2006 did fundamentally change the nature of Somalia’s war economy. It is still heavily reliant on the control of taxable infrastructure and only selective strategies of security by highly fragmented and rivaling armed groups. Enduring contests and more competition under the conditions of anarchy, however, will strengthen the vicious circle of crowding out material welfare and rather investing in unproductive arming and fighting.

References

Adam, Hussein M. 1999: Somali civil wars, in: Ali, Taisier M. and Robert O. Matthews (eds.), Civil Wars in Africa. Roots and Resolutions. Montreal.

Azam, Jean-Paul, and Anke Hoeffler 2002: Violence Against Civilians in Civil Wars: Looting or Terror, in: Journal of Peace Research 39 (4):461-485.

Beck, Nathaniel 2001: Time-Series–Cross-Section Data: What Have We Learned in the Past Few Years?, in: Annual Review of Political Science (4):271-293

Beck, Nathaniel and Jonathan N. Katz, Richard Tucker 1998: Taking Time Seriously: Time-Series-Cross-Section Analysis with a Binary Dependent Variable, in: American Journal of Political Science 42 (2):1260-1288.

Biddle, Stephen 2004: Explaining Victory and Defeat in Modern Battle, Princeton: Princeton University Press.

Buhaug, Halvard 2007: Dude, where's my conflict? LSG, Relative Strength, and the Location of Civil War. Paper presented at the ISA Annual Convention 2007.

Buhaug, Halvard and Scott Gates 2002: The Geography of Civil War, in: Journal of Peace Research 39 (4):417-433.

Buhaug, Halvard and Jan Ketil Rød 2006: Local determinants of African civil wars, 1970-2001, in: Political Geography 25:315-335.

Chojnacki, Sven 2006: Anything New or More of the Same? Wars and Military Interventions in the International System, 1946-2003, in: Global Society 20 (1):25-46.

Chojnacki, Sven and Željko Branović 2007: Privatisierung von Sicherheit? Formen von Sicherheits-Governance in Räumen begrenzter Staatlichkeit, in: Sicherheit und Frieden 25 (4):163-169 [Privatization of Security? Forms of Security Governance in Areas of Limited Statehood, in: Security and Peace, 25 (4):163-169].

Collier, Paul and AnkeHoeffler 2001: Data Issues in the Study of Conflict, Paper prepared for the Conference on 'Data Collection on Armed Conflict', Uppsala, 8-9 June 2001.

Compagnon, Daniel 1998: Somali Armed Units. The Interplay of Political Entrepreneurship and Clan-Based Factions, in: Clapham, Christopher (ed.), African Guerillas. Oxford: James Currey, 73-90.

Duffield, Mark 2001: Global governance and the new wars. London: Zed Books.

Eck, Kristine and Lisa Hultman 2007: One-Sided Violence Against Civilians in War: Insights from New Fatality Data, in: Journal of Peace Research 44 (2):233-246.

Eck, Kristine, Margareta Sollenberg and Peter Wallensteen 2004: One-Sided Violence and Non-State Conflict. In States in Armed Conflict 2003, edited by L. Harbom. Uppsala: Universitetstryckeriet.

FAO 2005: Irrigation in Africa in figures – AQUASTAT Survey 2005: Somalia. Land and Water Development Division of the FAO, *http://www.fao.org/ag/agl/aglw/aquastat/countries/somalia/index.stm*

Fearon, James D. 1995: Rationalist explanations for war, in: International Organization 49 (3):379-414.

Fearon, James D. 2004: Why some civil wars last so much longer than others?, in: Journal of Peace Research 41 (3):275-301.

Garfinkel, Michelle R. and Stergios Skaperdas 2007: Economics of Conflict: An Overview, in: T. Sandler and K. Hartley. North (eds.), Handbook of Defense Economics Vol. II, Holland: Elsevier.

Gershenson, Dmitriy and Herschel I. Grossman 2000: Civil Conflict: Ended or Never Ending? Journal of Conflict Resolution 44 (6):808-822.

Gleditsch, Nils Petter and Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, Havard Strand 2002: Armed Conflict 1946-2001: A new dataset, in: Journal of Peace Research 39 (5):615-637.

Lotta Harbom and Peter Wallensteen 2007: Armed Conflict, 1989-2006, in: Journal of Peace Research 44 (5):623-634

Hegre, Havard and Clionadh Raleigh 2005: Population Size, Concentration, and Civil War. A Geographically Disaggregated Analysis. Paper read at Paper presented to the Summer Meeting of the Polarization and Conflict Project, Konstanz, June 2-5, 2005.

Holsti, K. J. 1996: The state, war, and the state of war. Cambridge: Cambridge University Press.

Humphreys, Macartan and Jeremy M. Weinstein 2006: Handling and Manhandling Civilians in Civil War, in: American Political Science Review 100 (03):429-447.

Jackson, Paul 2003: Warlords as Alternative Forms of Governance, in: Small Wars and Insurgencies 14 (2):131-150.

Kaldor, Mary 1999: New and Old Wars. Organized Violence in a Global Era. Cambridge: Polity Press.

Kalyvas, Stathis N. 2006: The Logic of Violence in Civil War. Cambridge: Cambridge University Press.

Robert D. Kaplan 1994: The Coming Anarchy, in: Atlantic Monthly, February, 273 (2):44-76

Konrad, Kai A. 2007: Strategy in Contests-an introduction, in: WZB Discussion Paper SP II 2007 – 01, Berlin: Wissenschaftszentrum Berlin.

Kreutz, Joakim and Kristine Eck 2005: UCDP Non-State Conflict Codebook V1.0. Uppsala: Uppsala Conflict Data Program Department of Peace and Conflict Research, Uppsala University.

LeBillon, Phillipe 2001: The political ecology of war: Natural resources and armed conflict, in: Political Geography 20 (5):561-584.

Lemke, Douglas 2007: Return to Realism: Power Politics and State Making in Africa. Paper presented at the Annual ISA Convention, February 28th - March 3rd, 2007, Chicago, Illinois.

Long, J. Scott and Jeremy Freese 2006: Regression Models for Categorial Dependent Variables using Stata, 2nd Edition, College Station: Stata Press.

Münkler, Herfried 2002: Die neuen Kriege. Reinbek bei Hamburg: Rowohlt.

Powell, Robert 2006: War as a Commitment Problem, in: International Organization 60 (Winter):169-203.

Raleigh, Clionadh and Håvard Hegre 2005: Introducing ACLED: An Armed Conflict Location and Event Dataset. Paper presented at 'Disaggregating the Study of Civil War and Transnational Violence', 7-8 March, University of California Institute of Global Conflict and Cooperation, San Diego, CA.

Reno, William 1998: Warlord Poltics and African States. Boulder: Lynne Rienner Publishers.

Risse, Thomas and Ursula Lehmkuhl 2006: Governance in Areas of Limited Statehood - New Modes of Governance? Research Program of the Research Center (SFB) 700, Working Paper No. 1, Berlin (URL: http://www.sfb-governance.de/publikationen/sfbgov_wp/wp1_en/index.html.

Roberson, Brian 2006: The Colonel Blotto Game, in: Economic Theory 29 (1):1432-0479.

Ross, Michael L. 2004: What do we know about natural resources and civil war, in: Journal of Peace Research 41 (3):337-356.

Sambanis, Nicholas 2004: What Is Civil War? Conceptual and Empirical Complexities of an Operational Definition, in: Journal of Conflict Resolution 48 (6):814-858.

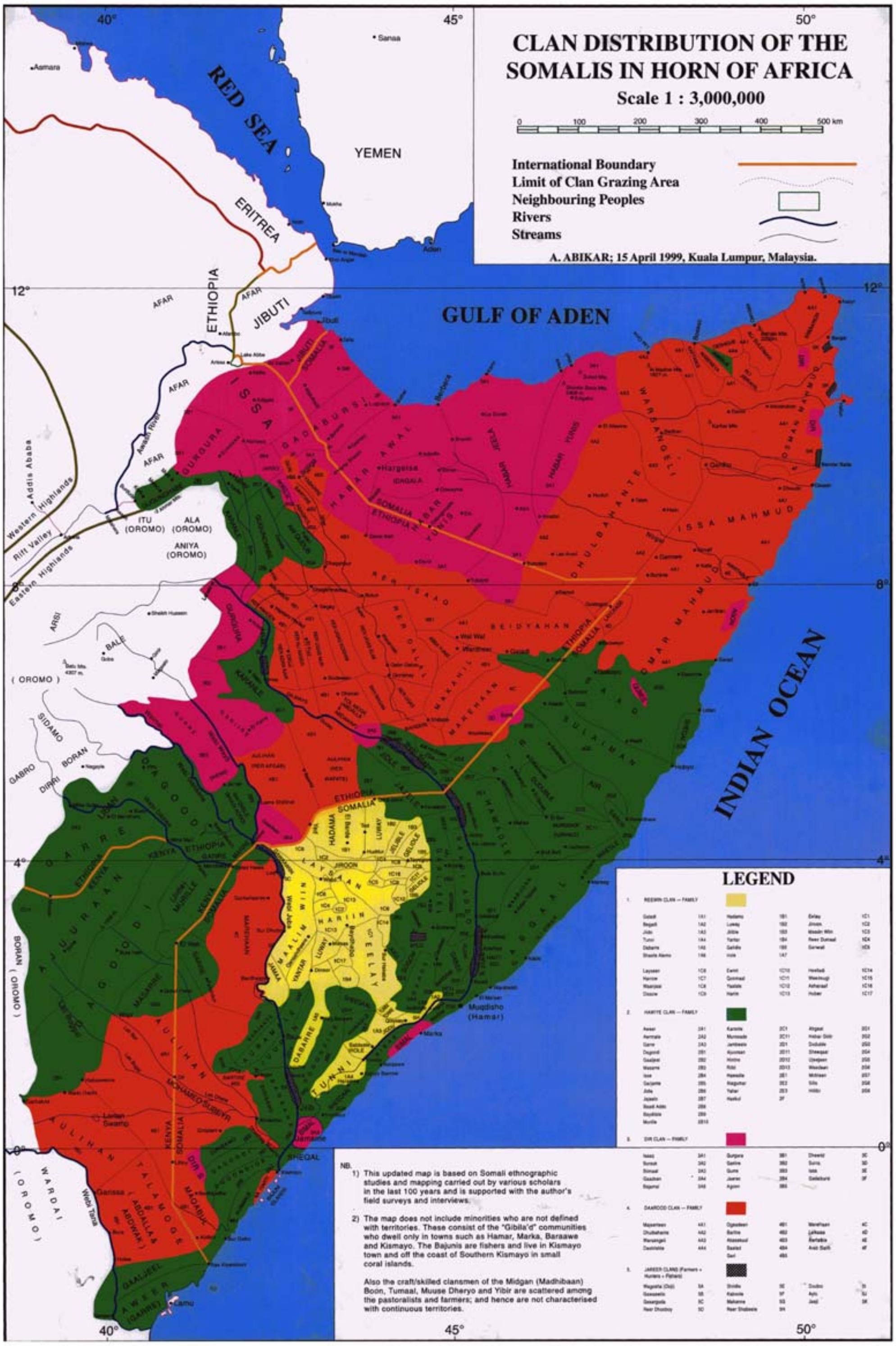
Sarkees, Meredith Reid and Frank Whelon Wayman, J. David Singer 2003: Inter-State, Intra-State, and Extra-State Wars: A compehensive look at their distribution over time, 1816-1997, in: International Studies Quarterly 47:49-70.

Schlee, Günther 2001: Regularity in Chaos: The Politics of Difference in the Recent History of Somalia. Halle/Saale: Max Planck Institute for Social Anthropology

Skaperdas, Stergios 2002: Warlord Competition, in: Journal of Peace Research 39 (4):435-446.

Walter, Barbara F. 2006: Information, Uncertainty, and the Decision to Secede, in: International Organization 60 (Winter):105-135.

Appendix


CLAN DISTRIBUTION OF THE SOMALIS IN HORN OF AFRICA
Scale 1 : 3,000,000
International Boundary
Limit of Clan Grazing Area
Neighbouring Peoples
Rivers
Streams
A. ABIKAR; 15 April 1999, Kuala Lumpur, Malaysia.
RED SEA
YEMEN
ERITREA
ETHIOPIA
JIBUTI
GULF OF ADEN
INDIAN OCEAN
LEGEND
NB.
1) This updated map is based on Somali ethnographic studies and mapping carried out by various scholars in the last 100 years and is supported with the author's field surveys and interviews.
2) The map does not include minorities who are not defined with territories. These consist of the "Gibila'd" communities who dwell only in towns such as Hamar, Marka, Baraawe and Kismayo. The Bajunis are fishers and live in Kismayo town and off the coast of Southern Kismayo in small coral islands.
Also the craft/skilled clansmen of the Midgan (Madhibaan) Boon, Tumaal, Muuse Dheryo and Yibir are scattered among the pastoralists and farmers; and hence are not characterised with continuous territories.