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MAPPING TERRITORIAL CONTROL IN VIOLENT ARMED CONFLICT

EXECUTIVE SUMMARY

Assessing whether foreign aid effectively targets challenges or simply fuels instability and violence are central, unresolved concerns in international development. Progress in answering these questions has been limited by poor data about how aid is targeted and whom it benefits most. Prominent theories of political violence emphasize the import of understanding whether governments or rebels control territory. Similarly, studies of foreign aid increasingly recognize that aid is often allocated sub-nationally and therefore may privilege some individuals or groups over others. And yet these strands of conflict and aid research have not been connected adequately. This brief presents a new methodology for coding the territorial influence of governments and rebel groups for use in conjunction with sub-nationally geocoded foreign aid data to understand whether and how foreign aid affects the intensity of violent armed conflict.

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WHY MAP CONFLICT CONTROL AREAS?

Prominent studies of political violence share expectations about where government and rebel groups operate.[1] Patterns of violence in war are attributed to territorial influence and control. The studies are theoretically rich, but empirical applications are typically limited to anecdotes. Indeed, with few exceptions,[2] empirical analyses of government and rebel control have not been conducted. While rebels do not always seek control of defined territories, in most conflicts rebels and governments establish some de facto areas of control, or attack and raid certain locations where they have a particular interest. These areas of control and areas of interest provide bases for operations or confer other benefits. But what precisely is the extent of those benefits?

This study considers whether territorial control and interest provides a basis for controlling important resources such as foreign aid. Because it is impossible to comprehensively observe whether rebels or governments control targeted aid resources, areas of government and rebel control and interest are mapped and then matched to sub-nationally geocoded locations of foreign aid projects to determine which party is expected to control, or to be particularly interested in dominating, aid resources as they are committed to arrive within a country.

This research examines whether foreign aid that the government or rebels expect to obtain results in higher or lower levels of violence. This analysis has thus far not been possible because of data limitations for control areas and foreign aid. Until now,[3] no standard methodology has existed for coding areas of territorial control by governments and rebel groups. And only recently did sub-nationally geocoded foreign aid data become available.[4]

METHODOLOGY

Coding Conflict Outcomes

This study developed an events dataset that contains information on which warring party initiated an attack and which party controlled the location of engagement after combat ended.[5] The dataset includes roughly 21,000 conflict events in Africa South of the Sahara from 1989 to 2008.

The dataset is based on, and is fully compatible with, the Uppsala Conflict Data Program's Georeferenced Event Dataset for sub-Saharan Africa (UCDP-GED).[6] The new dataset presented here disentangles the narrative of violent events recorded in the UCDP-GED. The purpose of the original UCDP-GED is to present information on battle fatalities, but there is more information contained in the event descriptions than the UCDP records in the GED. This new dataset thus uses this additional information to determine which actor initiated an engagement. Following each violent incident, the territory or the object in dispute can be defended or be conquered and, in the end, will most often be controlled by either party. This new dataset has hence been able to determine so-called areas of control.[7]

This study develops new methods for determining the territorial influence of governments and rebel groups and testing how this impacts their control of important resources like foreign aid.

Regarding initiation of these battles, this project determined which actor attacked in about 7,000 of the 21,000 conflict events. The project coded about 9,000 of the events as an actor not initiating combat, for instance by defending a territory. For the remaining 5,000 events, the information was too unclear to determine if either party attacked or defended.

Regarding control of the area after combat, it was possible to code which actor controlled a location afterwards in about 4,000 of the 21,000 clashes. For 12,000 battles, neither party assumed control of the location, or it could not determined which of the actors controlled the location afterwards. For the remaining 5,000 clashes, the information was too unclear to determine who controlled the area after the battle.

Defining the Conflict Areas

A country that suffers conflicts can be divided into different *contested* and *non-contested* areas. In non-contested areas, populations are not directly affected by political violence at any significant level and warring parties are safe to engage in activities that demand stability, such as investing in production or providing services. In contested areas, on the other hand, all activities are at risk to be exploited by warring parties.

This research aims to divide contested areas between different sides of the conflict. To include areas that were contested, rather than troop movements within non-conflict areas or other uncommitted actions, all events used to create areas are serious enough that there were reports of at least one person killed at the time of the event.

Contested areas could either be s*trategically defined* by the respective warring parties ("battlespaces" in American parlance), or *objectively defined* by observing actual military operations. Strategically defined areas may not always take physical form and can exist on paper alone, or merely in the minds of commanders, and are therefore difficult to observe without a high risk of misrepresentation. This research focuses on objectively defined areas. Some of the terms used below are inspired by strategic language but the meanings are different.

Areas of Control: In an Area of Control the civilian population, and any intruders, can expect forces from the controlling actor to appear suddenly and regularly. An Area of Control is small enough to be entirely dominated by the forces of one warring party. It is operationally defined as the area around a controlled point that can be reached within a specified travel time. Points of Control are locations that have either been violently conquered or forcefully defended.[8]

Areas of Interest: In an Area of Interest, an actor has exhibited some interest in extracting resources from, or upholding control over, that area. There is, however, not enough information to conclude that the actor controls the area in which it has an interest. The population, and any intruders, can feel the interest of the controlling actor through patrols, raids, and occasional one-sided violence and appropriation of resources. The area is large enough that any point within it could suffer overlapping layers of interest by several actors.

PROCEDURE FOR ESTABLISHING AREAS OF CONTROL, INTEREST, AND ACTIVITY

First, using ArcGIS, points are plotted according to what type of area will be established. An Area of Control results from Points of Control established by the warring party. An Area of Interest is based on points of attack; only attacks that do not result in control are used for the coding.[10] An Area of Activity is determined by points where events signal violent activity but where it is unclear which actor has expressed interest in dominating or controlling the area.[11]

Second, the spatial precision of points used to create areas must be 1 or 2, meaning that the point either refers to a specified location, like a city, or that the point refers to a location within 25 km of the coded location.

Third, the areas are created by establishing buffer zones around each point. The buffer zone is preferably defined based on a travel time of 30 to 60 minutes in all directions from the point. If there is no road network, or if travel time cannot be processed for lack of data, then the size of the buffer zone depends on the population density at the point, as a proxy for the quality of the road network.

Fourth, if two areas of a specific type overlap, and if both areas belong to the same actor in the same conflict dyad, then the borders dissolve and the two areas are treated as one.

Lastly, if areas of control or interest overlap, and if the areas belong to different actors but the same conflict dyad, then the resulting overlap is treated as an Area of Activity.

Areas of Activity: For a number of battles, it is difficult to determine which actor initiated the engagement and which actor controlled the location afterwards. The fact that an engagement has occurred in a particular area is nevertheless significant enough to report as an Areas of Activity for all actors involved.[9]

Combining Areas: A fourth type of mutually contested area, Area of Influence, can be created by adding an actor's Area of Control to the Area of Interest. The actors' respective Areas of Influence can then be compared to each other and to the entire non-conflict area. Another possibility to leverage the unique information in this dataset is to add Areas of Control to non-conflict areas to arrive at Total Controlled Areas; and to combine all Areas of Interest and Areas of Activity into Total Contested Areas. This would make it possible to test hypotheses prevalent in the literature but never tested for several cases at once.[12]

USING CONTROL AREAS WITH OTHER INFORMATION

A number of other datasets can be combined with the contested areas in this dataset. By overlaying the contested areas with data on resources, population, climate, and type of terrain, it is possible to estimate warring parties' relative access to conflict-driving and conflict-dampening factors.

This study looks in particular at how these contested areas relate to international aid flows. To analyze this relationship, the study uses the UCDP and *AidData Aid Locations during Civil Wars South of the Sahara* dataset.[13] The structure of the dataset is such that each row represents an aid project committed to a particular location. A project going to several locations will therefore be represented on several rows and contain information on the average amount of aid per location. The information used to code aid locations varies in precision from case to case. To deal with this variation in accuracy, the most precise locations are given the precision code 1 (exact location) or 8 (location assumed to be capital or regional capital). Areas vary in precision codes from 2 to 6, moving from more localized up to 6 at the national level. Entirely unclear aid flows are given the precision code 7.[14]

There are several ways to make use of the geo-coded aid data. In the Uganda example included here, only the aid that was distributed to named locations is displayed

(populated places, capitals, counties, and districts).[15] These peaks above the baseline level of aid to nation-wide projects provide the most conservative measures of differences in aid across the nation.

The data that result from overlaying aid commitments and control variables on the contested areas can then be pulled out from the geographic format into tabular data. Researchers can then explore how these relationships may predict the number of future fatalities or battles, the spread of future contested areas, or the total population size affected by battles.

A CASE EXAMPLE: UGANDA

Uganda's long civil war has been mostly fought in the north between the Lord's Resistance Army (LRA) and the Government of Uganda. The civil war has resulted in tens of thousands of deaths over the course of more than 25 years.

Looking at a single year of the conflict explains clearly what can and cannot be captured by this new dataset, while progressively adding years shows what can be picked up when looking at the conflict more dynamically. This example begins with the restart of the conflict in 1994 (149 battle related deaths) and continues through 1995 (295 deaths) to the escalation in 1996 (659 deaths) and ends with a slightly decreasing fatality trend in 1997 (502 deaths).[16]

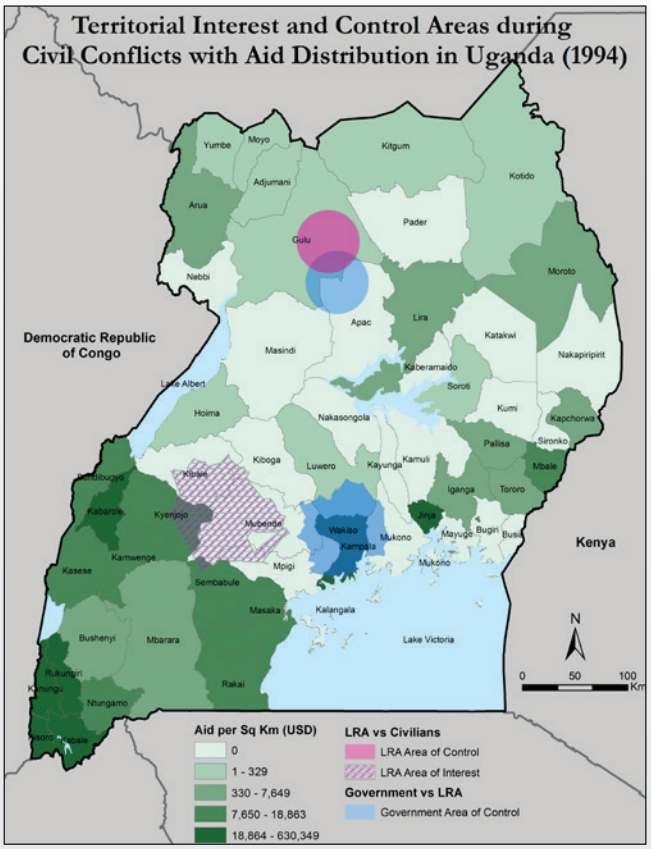
With the exception of the first illustrative map, this example has based the areas of control and interest on points of control and attacks up to two years before a current year. The current year is the last year in the range displayed at the top of each map. This procedure reflects the assumptions that there is some inertia in what an actor controls and is interested in dominating. If two actors controlled the same point during this period, only the latest conqueror is counted as the controlling actor. If an area has not been contested in a long time (not necessarily just the two years referred to here) then it is dropped.

Each current year includes the local level of aid committed that year. To display differences in aid between locations and years, all aid flows that could not be disaggregated below the national level are excluded. This setup is intended to show the usefulness of combining areas of territorial influence with areas receiving aid, without at this point establishing causality in either direction. To improve clarity in reading the maps, other rebel groups that were active during these years are excluded as well.

Figure 1 displays the areas of control and interest for a single, low-activity year (1994) layered on top of foreign aid levels aggregated to the district level. In the north, there are two areas of control represented by different colored circles. In the south, there is an LRA area of interest represented in pink and a government area of control in blue. The different shapes are a function of the quality of the underlying information used to compute travel time. In the south, the LRA area of interest is not circular because higher quality data allowed the shape of this area to be determined by what travel time might actually look like in this area. Because the data are lower quality in the north, circular regions are computed. Currently, attempts are being made to improve this data so as to capture more realistic travel time areas. The two areas of control in the north also overlap to some extent. This overlap will be represented an area of activity in the full analysis.

In 1994 the most concentrated aid commitments were made to southern Uganda and to areas close to the capital of Kampala (see Figure 1).

Figure 1: Areas of Control and Interest, 1994



Sources: Strandow and Findley 2013[17]; Findley et al. 2011

The capital is per definition considered contested in conflicts over government power and the greatest amount of aid is committed to government-controlled areas. The LRA was primarily operating around Gulu in 1994, but attacks on civilians around Mubende were also attributed to the LRA.

The situation in 1995 suggests a shift of aid commitments to areas closer to the main contested areas (see Figure 2). In the north there appears to be increases in aid commitments to areas with greater government control, compared to neighboring areas. Overall the peak levels of aid decreased compared to the previous, less violent year. The situation in 1995 suggests a shift of aid commitments to areas closer to the main contested areas (see Figure 2). In the north there appears to be increases in aid commitments to areas with greater government control, compared to neighboring areas. Overall the peak levels of aid decreased compared to the previous, less violent year.

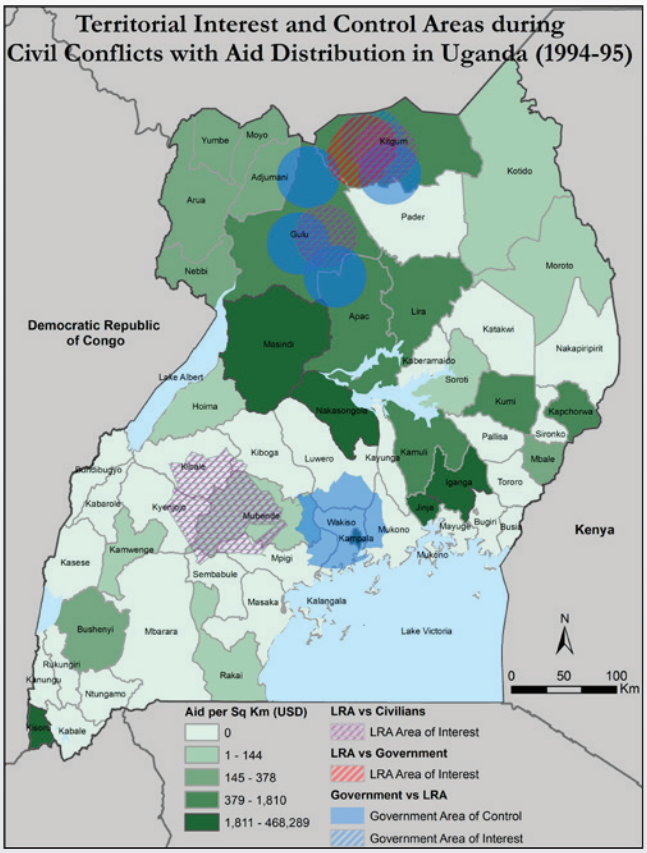
Figure 3 provides a more complete picture of the areas the LRA controls and is interested in dominating during this period. The greater fatality level suggests that the

Initial findings show how areas of control and interest can be used to gauge differences in expected access to aid and where aid is most likely to be misappropriated and result in unintended side effects.

LRA became increasingly active and information from 1996 shows where the group managed to control locations around Gulu. The government appears to be on the defensive and there is a decrease in the levels of aid committed to contested areas in the North. Instead, aid levels in the areas close to the eastern border and the southwest are increased, relative to other areas. This is the most violent of the years included here, and compared to preceeding years there is an additional decrease in the level of localized aid.

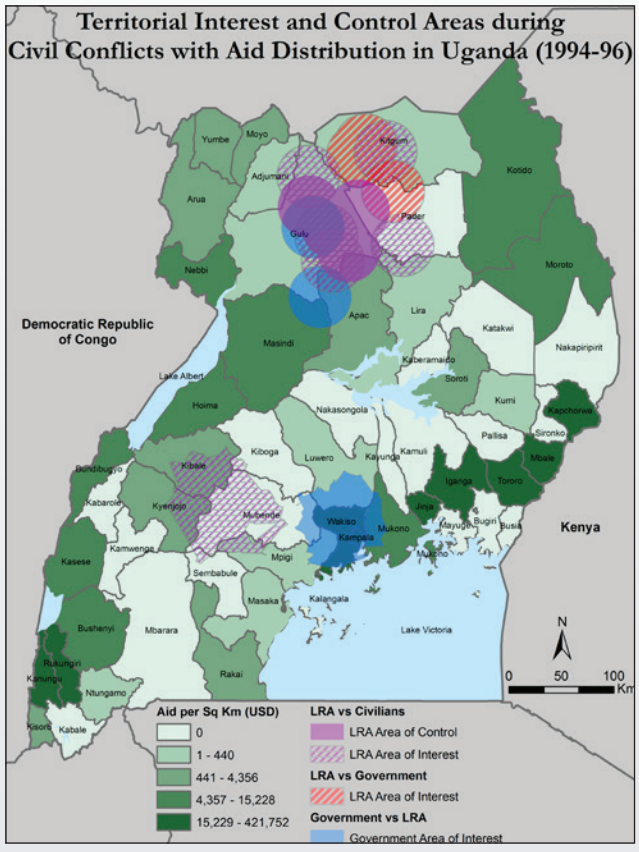
In Figure 4, which details the situation in 1997, the area of interest around Mubende has been dropped due to lack of further contestation. New information reveals that the government was able to assert control in a location north of Gulu and that it took to the

Figure 2: Areas of Control and Interest, 1995



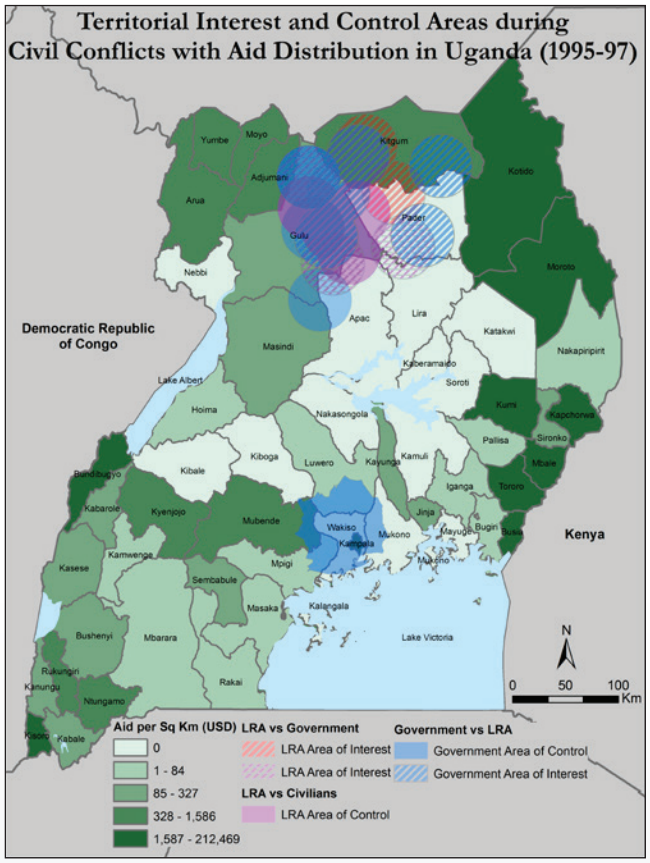
Sources: Strandow and Findley 2013; Findley et al. 2011

Figure 3: Areas of Control and Interest, 1996



Sources: Strandow and Findley 2013; Findley et al. 2011

Figure 4: Areas of Control and Interest, 1997



Sources: Strandow and Findley 2013; Findley et al. 2011

offensive and started contesting areas to the northeast of Gulu. There are no obvious efforts made by the LRA to increase contested areas. The trend of aid being committed farther to the eastern border continues. There is, however, also a shift of aid upwards to the north, to the northwestern corner and into the contested areas west of Gulu. Although there was a decrease in fatality levels, the overall fatality level remained high. The peak level of aid continued to decrease.

This example illustrates how areas of control and interest can be used to gauge differences in expected access to aid and where aid is most likely to be misappropriated and result in unintended side effects. Comprehensive analyses of the relations between aid and conflict will be possible once areas of interest and control have been coded for a wider range of conflicts.

THE POTENTIAL OF MAPPING AID AND CONFLICT CONTROL

The first priority of this research is to create areas of control, interest, and activity south of the Sahara in Africa from 1989 to 2008. A country is included if it has seen at least one year of intra-state conflict over this period. An intra-state conflict is defined as violence between at least one organized group and the government that has resulted in at least 25 yearly battle-related fatalities, following the Uppsala Conflict Data Program's definitions.[18] Given that this research is also interested in the broader instability that results from the onset of civil wars, this project also includes the years where organized non-state groups battle each other, as long as a more typical intra-state conflict has already begun.

Although this research is primarily interested in conflict intensity between organized groups and governments, information about one-sided violence is included when the activity of groups and governments are mapped. One-sided violence is the situation where a group or a government massacres or otherwise kills non-combatant civilians.[19]

After coding sub-Saharan Africa, this research plans to conduct the following steps:

- Complete coding for areas of control, interest, and activity for all of Africa. This will include the Arab Spring, and associated activities by Islamic militants, in the analyses.
- Leverage area experts in order to determine which non-contested areas are dominated by different warring parties. This will address questions that require information beyond who dominates contested areas.
- Code Afghanistan and Iraq with this project's methodologies and with the UCDP as the data source for both countries. This will compare how varying effort levels and territorial presence by Western powers have influenced different intensity levels.

As the preliminary mapping illustrates, this new dataset will be able to differentiate between contested areas that rebels and governments control and areas that specific warring parties have expressed an interest in dominating.

It will also be able to account for those contested areas where controlling and interested actors cannot be separated from each other, as well as non-conflict areas. Using this dataset in conjunction with geo-referenced data on resources, such as aid flows, will refine our existing knowledge of how expected access to benefits results in higher or lower levels of violence.

ENDNOTES

1 Kalyvas, Stathis. N., 2006. *The Logic of Violence in Civil Wars*. Cambridge: Cambridge University Press; Kalyvas, Stathis. 2012. "Micro-Level Studies of Violence in Civil War: Refining and Extending the Control-Collaboration Model." *Terrorism and Political Violence.* 24(4): 658–668.

2 See for example, Bhavnani, Ravi, Dan Miodownik, and Hyun Jin Choi. 2011. Three Two Tango: Territorial Control and Selective Violence in Israel, the West Bank, and Gaza. *Journal of Conflict Resolution*. 55(1): 133–158.

3 Strandow, Daniel, and Michael Findley. 2013. *Codebook for Determining Territorial Interest and Control during Civil Conflicts. Version 1.0.*

4 Findley, Michael, Josh Powell, Daniel Strandow, and Jeff Tanner. 2011. "The Localized Geography of Foreign Aid: A New Dataset and Application to Violent Armed Conflict" *World Development*. 39(11): 1995–2009.; Strandow, Daniel, Michael Findley, Daniel Nielson, and Josh Powell. 2011. *The UCDP and AidData codebook on georeferencing aid. Version 1.1 UCDP Paper. No. 4.*

5 Strandow, Daniel. 2012. *Codebook for Assigning Points of Attack and Control to Civil War Actors. Version 1.0.*

6 Melander, Erik, and Ralph Sundberg. 2011. "Climate Change, Environmental Stress, and Violent Conflict: Test Introducing the UCDP Georeferenced Event Dataset", Paper presented at the International Studies Association, March 16-19, Montreal, Canada.

7 The dataset consists of directed dyads but can easily be treated as an undirected dyadic dataset by toggling "directed" on and off. When assuming that the dataset is treated with a directed dyad structure, there is one column for attacks (Aattack) and one for control (Acontrol). When coded 1, the actor that is labeled actor_A has initiated the attack (Aattack=1). If the variable is coded 0, then the coder(s) has determined that the actor did not initiate the attack. If coded 9, then there was not enough information to code whether the actor was responsible or not for the attack. The same codes are used when coding control points with analogous meanings. The rules for coding which side initiated an attack are designed to deal with state-based and non-state events. For one-sided violence, the attacker and recipient are per definition Aattack (1) and Battack (0). For information on types of violence included in this dataset, see "UCDP Definitions," www.pcr.uu.se/research/ucdp/definitions (last accessed March 21, 2013).

8 Points of Control are labeled Acontrol if the point refers to side A in a dyad and Bcontrol if it refers to side B. For this project, coding is based on directed dyads where the actor that is A in one direction becomes B in the other direction. In order to not double count events, Acontrol is only used when drawing areas of control.

9 An Area of Activity is thus drawn around all points where all variables Aattack, Battack, Acontrol and Bcontrol are coded "0" or "9." Areas of activity are also created from the zones of overlap between areas of interest and areas of control.

10 Such points are for actor A defined as those where Aattack=1 and where Acontrol is not =1 and Bcontrol is not=1.

11 Such Areas of Activity are set up when Aattack, Battack, Acontrol, and Bcontrol cannot be determined (all are coded "0" or "9").

12 Kalyvas, 2006; Bhavnani et al., 2011; Kalyvas, 2012

13 Findley et al., 2011 presents the dataset. Details of the dataset are available in Strandow, Daniel, Michael Findley, Audrey Faber, Ettore Marchesoni, and Josh Powell. 2012. *Aid Locations during Civil Wars South of the Sahara: The UCDP and AidData User's Notes* Version 1.0. August 20. The actual dataset *Aid Locations during Civil Wars South of the Sahara* is available at www.pcr.uu.se/about/staff/strandow_d.

14 Findley et al., 2011; Strandow et al., 2011.

15 For complete analyses, future iterations of this project will add national-level aid and aid that goes to smaller or greater undefined areas (precision codes 2 and 5). The project will also deal with all aid projects where the intended location was completely unclear. The simplest procedure is to start by averaging all aid committed to the national level (precision 6), the biggest unspecified level (precision 5), districts (precision 4), and undefined small areas, to the smallest defined areas which are counties or equivalent (precision 3). This means that only the resulting administrative regions, and the exact point locations (precision 1), need to be aggregated into areas of control, interest, and activity. For robustness, the unclear aid commitments (precision 7) can be added in four ways. First, the commitments can be treated as national-level aid. Secondly, they can be distributed proportionally based on how much aid an area has already received. Thirdly, they can be added to the highest-receiving quartile or, lastly, to the lowest-receiving quartile of commitments.

16 UCDP. "Uganda." Last accessed March 21, 2013. http://www.ucdp.uu.se/gpdatabase/gpcountry.php?id=160&regionSelect=2-Southern_Africa#

17 Strandow, Daniel, Michael Findley. 2013. Codebook for Determining Territorial Interest and Control during Civil Conflicts. Version 1.0.

18 UCDP. "Definitions." Last accessed March 21, 2013. http://www.pcr.uu.se/research/ucdp/definitions/

19 For a list of the countries and years that we will initially release see Strandow et al. (2012, 3) and for definitions of different forms of violence see the UCDP Definitions url.

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