Living off the land: The connection between cropland, food security, and violence against civilians*

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Abstract

Food security has attracted widespread attention in recent years. Yet, despite preliminary evidence connecting food insecurity to political violence, we lack a systematic understanding of the relationship(s) between local food resources and violence against civilians. This study develops a food-security based theory to explain the significant variation that we observe in violence against civilians across both time and subnational geographic space. We argue that combatants, be they government or rebel actors, often must turn to local agricultural resources for sustenance. During times of relative peace, armed actors and civilians have long time horizons, and the prospects of repeated interactions thereby promote a strategy of co-optation to obtain food resources. However, the existence of immediate conflict in a region leads armed actors to discount the benefits of future interactions in favor of obtaining food immediately, using violence if necessary. In estimating a series of statistical models on a sample of all African countries (1997-2009), we find robust support for our expectations: cropland increases the frequency of violence against civilians during periods of conflict, but has an added pacifying effect during times of peace.

Keywords: *FOOD SECURITY*, *VIOLENCE AGAINST CIVILIANS*, *CIVIL WAR*, *POLITICAL VIOLENCE*,

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This article conducts the first systematic study of food access-motivated violence against civilians in Africa. We show that violence against civilians can often be attributed to food security-related concerns. In periods and locations that lack active fighting between government and rebel forces, we contend that armed actors and civilians each have relatively long time horizons, and that the prospects of repeated interactions compel armed actors to pursue a strategy of co-optation—and to avoid the use of violence—during their efforts to obtain food access from civilians. However, the existence of active civil conflict in a region dramatically reduces these horizons. This leads armed actors and civilians to discount the benefits of future interactions, making violence the preferred strategy to secure food access from civilians.

The argument that civil conflict affects violence against civilians is not new: Valentino, Huth & Balch-Lindsay (2004) estimate that civil, international, and colonial wars have killed between 13-26 million civilians since 1945. Yet, more recent data on local violence against civilians in Africa from the Armed Conflict Location and Event Dataset (ACLED Raleigh et al., 2010)—which we discuss in detail below and in the Online appendix—reveals a number of unanticipated trends. Namely, in comparing one sided violence across observations classified as civil conflict and non-civil conflict at the (i) African country-year level and (ii) 0.5 x 0.5 decimal degree African grid cell-year level in our Online appendix, we find that the *majority* of all acts of violence against civilians occur in African countries and cells that are *not* classified as experiencing "civil conflict" according to the UCDP/PRIO Armed Conflict Dataset's 25-battle death threshold (Melander, Pettersson & Themnér, 2016). We further find (see Online appendix) that these acts of violence also follow different *geographic* patterns, both within and outside of civil conflict-designated cells: violence against civilians disproportionately occurs within agricultural areas when civil conflict is present, but disproportionately occurs outside of agricultural areas when civil conflict is absent. By focusing on food security dynamics, our study highlights one potential explanation to this variation, thereby uncovering a novel and important linkage between civil conflict and the strategic use

of violence against civilians.

We develop a theory of one specific dynamic of violence against civilians related to food security, which we term"living off the land," and then test this theory using the aforementioned data on geo-located violence against civilians in Africa at the highly disaggregated 0.5 x 0.5 decimal degree grid-cell resolution for the years 1997-2009. By "living off the land," we refer to the necessity of armed groups, be they government or rebel forces,[1] to secure food access locally rather than relying on the organized delivery of food from their military support system. This necessity stems from the fact that the majority of armed forces in the developing world do not enjoy regular supply chains (Koren & Bagozzi, 2016), which forces these actors to obtain support by other means. As the need to sustain a continuous supply of food is perhaps the most acute aspect of this deficiency in logistic support, we suggest that interactions with local populations over food access will generate specific dynamics that can affect the rates of troop-violence against civilians. In positing that the presence or absence of local civil conflict will moderate these dynamics through its effects on armed and civilian actors' time horizons, we find that indeed, living-off-the-land dynamics increase the frequency of violence against civilians during periods of conflict but decrease its observed rates during times of relative peace, when civilian co-optation becomes more likely.

By "times of relative peace," we refer to periods where armed troops—both state and non-state—still exist and operate, but where, due to various reasons, there is no active conflict between them. During these periods, conflict is only temporarily absent, and so armed forces still recruit individuals and must support their operations (Sarbahi, 2014), which necessitates—among other things—obtaining food access. As evidenced in the variation discussed above and in the Online appendix, the potential for violence during such periods of relative peace is indeed an empirical reality, as over half of all instances of violence against civilians perpetrated in Africa over the 1997-2009 period have occurred outside of common conceptualizations of civil conflict. Our distinction between times of conflict and times of

[1]We further discuss our rational for analyzing violence by both and state and non-state actors (including militias) in the Online appendix.

relative peace thus refers not necessarily to the lack of existence of armed actors, but rather to different time horizons among armed actors and civilians alike. We thus account for the difference between the temporary lack of conflict and its complete absence (i.e., "permanent peace") both theoretically, by separating cases of relative peace from cases of permanent peace and tailoring our argument to the former; and empirically, by employing two-stage models that first separate cases of relative peace from cases of permanent peace, and then analyze the frequency of violence against civilians in the former.

Our findings concerning the effects of cropland on violence against civilians during times of relative peace and active conflict speak to a number of emerging literatures. Namely, these findings contribute to our existing understandings of (i) the implications of food security for armed conflict and political violence (e.g., Hendrix & Brinkman, 2013; Hendrix & Haggard, 2015; Wischnath & Buhaug, 2014), and (ii) the use of violence against civilians to extract civilian resources during armed conflict (e.g. Kalyvas, 2006; Raleigh, 2012; Wood, 2010; Collier & Hoeffler, 2005). Immediately below, we further situate our article within the existing literature, and develop our theoretical argument in full. This is followed by an empirical assessment of our theory, and a brief conclusion.

Cropland, food security, and violence

Concepts

In this section, we posit a theory that links (i) armed actors' tendencies to live off the land with (ii) these actors' strategies of violence and cooperation towards noncombatants. As such, we treat the use of violence against civilians as one strategy of obtaining sustenance from civilians, the other being co-optation. In many cases, armed actors have no reason to "kill the goose that lays golden eggs:" if civilians produce food and willingly support the troops, then no violence is needed to guarantee these provisions. However, we argue below that this situation is likely to change when constraints on (future) food access are added.

This argument follows previous studies to argue that violence can be used to secure

important natural resources (e.g. Weinstein, 2007; Collier & Hoeffler, 2005; Wood, 2010; Kalyvas, 2006). Specifically, we focus on one resource that we believe is especially important in many parts of the world: food. However, considering that food is a much more prevalent commodity and an integral part of every person's daily routine, any "food security" based theory of violence against civilians must not only account for factors shaping armed actors' decisions to target particular areas for food access, but also for these same armed actors' decisions to favor violence vis-à-vis co-optation for such endeavors. By "food access," we refer to the ability of individuals to obtain food, as well as the presence or absence of safeguards for those who cannot obtain food by licit means (Barrett, 2010). Correspondingly, food (in)security—in this context—relates to the (in)ability of actors, namely armed groups and civilians, to secure adequate access to food.

Anecdotal evidence supports the dynamics outlined above. In Sierra Leone stable relationships with the local population were crucial for groups'—e.g., the civil defense forces (CDFs) or the Revolutionary United Front (RUF)—efforts to guarantee food support (Keen, 2005; Humphreys & Weinstein, 2008). However, when conflict intensity flared, violence was often used to obtain food resources; practices which frequently involved the destruction of property and the killing of innocent civilians (Mkandawire, 2002; Keen, 2005). Similarly, in Uganda the National Resistance Army (NRA) tended to encourage peaceful participation and contributions of food (Weinstein, 2007, 174-179). However, when operating in hostile territory, which increased the frequency of clashes with other groups such as the Uganda People's Democratic Army (UPDA), "executions, torture, rape and looting became part of their normal conduct" (Doom & Vlassenroot, 1999, 15) for the NRA. Indeed, violence is frequently used because troops seek food support but are unable, due to informational asymmetries or frequent rotations resulting from conflict, to differentiate between potential collaborators and opposition supporters (Kalyvas, 2006).

The argument developed below complements these accounts of civilian victimization by underscoring the effect of food insecurity on violence against civilians in these contexts. For

our purposes, croplands are used to approximate locations where food is likely to be grown and stockpiled, and thus can be accessed relatively easily. We consider armed troops to be armed government actors, armed rebel actors opposing a central authority, or auxiliary (formal or informal) militias working at the behest of either of these two groups. Note that this argument does not imply that no killings or repression occur during periods of relative peace, nor does it suggest that civil war always leads to a substantial number noncombatant casualties. Rather, we contend that violence is *less likely*, all else equal, during times or relative peace compared with periods of intensified conflict. We accordingly develop an *interactive* hypothesis to explain why we find variation in violence against civilians along both dimensions—croplands during times of relative peace and croplands during periods of conflict—*simultaneously* below. This theory thereby allows us to account for the puzzling variation in violence against civilians highlighted above. However, it is not the only explanation for such violence, and we provide an extended discussion of competing explanations—in addition to an extensive set of corresponding robustness models—in the Online appendix.

Theory

Why would armed troops ever need to "live off the land" and turn to the local population for support? Throughout history, living off the land has been a regular characteristic of warfare. Although the utilization of logistic supply chains has significantly reduced the need of modern militaries to rely on local populations for support, the bureaucratic and economic capabilities required to maintain such systems ensured that the vast majority of armed groups in the developing world lack regularized support (Koren & Bagozzi, 2016; Bagozzi, 2016, 8). This deficiency forces many contemporary armed actors to routinely live off the land in times of war and peace. The logic is fairly clear when rebel groups or militias are concerned. For instance, in his analysis of African rebel groups, Weinstein emphasizes that "it is fair to say that most rebel organizations rely on the population for the provision of food" (2007, 174). However, considering that many African countries also have relatively lower levels of state capacity (Fearon & Laitin, 2003)—especially during ongoing conflict—even official military

forces are frequently required to rely on local population for support (Koren & Bagozzi, 2016).

Anecdotal evidence provides ample support for this claim. For instance, during the Civil War in Sierra Leone, regular Sierra Leone Army (SLA) troops were paid not with money, but with bags of rice, a meager payment usually appropriated by generals located back in the capital Freetown.[2] This lack of support pushed the SLA to perpetrate violence against local populations in order to extract sustenance (Keen, 2005). Similarly, among the military forces in Uganda operating against the Lord Resistance Army (LRA), "[r]ank and file soldiers [were] not properly fed, and war fatigue [was] high" (Doom & Vlassenroot, 1999, 31). Moreover, while senior officers "receive[d] operational allowances in the combat zones" (Doom & Vlassenroot, 1999, 31), regular troops could not afford to buy food, because payment was infrequent or nonexistent. The only alternative is to extract these supplies from the population, either peacefully or using coercion (Doom & Vlassenroot, 1999; Kalyvas, 2006). As a result, in some instances leaders actively encouraged troops to commandeer such supplies from the population. In Zaire, for instance, Mobutu Sese Seko notoriously replied to his troops when the latter complained about not being paid their wages: "you have guns; you don't need a salary" (Stearns, 2011, 115). While these conditions might not be characteristic of all official military forces in Africa, these accounts nevertheless suggest that state and nonstate armed groups—while engaged in active fighting or otherwise—will often by necessity live off the land. We further argue below that at times this lead these groups to perpetrate violence against civilians in order to extract sustenance.

While armed groups can commandeer a variety of different resources (e.g., markets, fish stocks) to support themselves, we focus on croplands because we believe that, despite the relative lack of attention given to these agricultural areas by conflict scholars,[3] these geographic areas and the interactions therein will explain a large number of violent acts against

[2]The appropriation of food and abuse of power by military officials was not unique to Sierra Leone. See for example, Cilliers (2000, 8-9), for similar conditions in Angola.

[3]Note that some studies have examined the relationship between some cropland measures and violent conflict, see e.g. Urdal (2005); Homer-Dixon & Blitt (1998).

civilians perpetrated in rural settings during civil wars. This is because in many parts of the world, especially rural regions in developing countries where most conflict (Fearon & Laitin, 2003) and atrocities (PITF, 2009) occur, croplands[4] produce the majority of the food that people in the region, civilians and troops alike, consume.

Moreover, due to infrastructure limitations (e.g., lack of refrigeration) that prevent mobilizing food across the large distances that characterize many of these regions (Kastner et al., 2012), market places where food resources can be obtained are also likely to be located in towns and villages situated close to these croplands in order to ensure freshness and avoid degradation. Scholars of civil conflict (Kalyvas, 2006; Fearon & Laitin, 2003) also emphasize that armed troops are more likely to operate in rural regions rather than urban centers, which—again, considering infrastructure limitations—constrains these troops to secure sustenance locally. Hence, such troops must rely on food grown and sold in these rural regions, which, in many regions worldwide is mostly crops such as wheat, cassava, maize, and sorghum, or meat products. Because civilians stockpile food or cattle for personal consumption on their cropland, these become easily accessible to armed troops, which can obtain them either through co-optation or by coercion.

Evidence for this relationship can be found across the developing world. In eastern India, rebel troops made numerous attempts to forcefully seize cropland from peasant farmers (Sundar, 2007), while in Thailand members of the Pattani United Liberation Organization and militant groups associated with the "redshirts" in Chiang Mai attempted to take over farmers' croplands during the 2004 drought (Davis, 2010). Likewise, in Somalia and Burundi, rebels recently expropriated agricultural land from local farmers to attain food not only for consumption, but also as a "reward" to attract volunteers (Hansen, 2013). These actions are not limited to rebel actors. In Uganda, observers have noted that atrocities were routinely perpetrated by government soldiers fighting against the Lord's Resistance Army, "especially those venturing from the camps in search of food" (Dunn, 2004, 142). Together with the ex-

[4]I.e., irrigated regions used for growing edible grains and other types of crops, or utilized as pasture land.

amples discussed above, these incidents suggest that access to cropland is a key determinant of where troops will seek to extract food supplies from civilians, while the existence of conflict explains when these efforts are more likely to involve violence against noncombatants.[5]

These dynamics and our broader argument are thus consistent with studies that emphasize the importance of "greed" within civil conflicts, and especially the contention that armed actors will seek to secure valuable resources during conflict (e.g., Collier & Hoeffler, 2005; Azam & Hoeffler, 2002). The idea that armed actors strategically commit violence against civilians to attain specific goals is well established in extant studies (e.g., Kalyvas, 2006; Weinstein, 2007; Wood, 2010; Fjelde & Hultman, 2014), including during times of relative peace (Wilkinson, 2004; Varshney, Panggabean & Tadjoeddin, 2004). Building on these insights, we contend that securing food access in the face of sudden shocks, here the intensification of active conflict, is one goal that justifies such violent means. Our argument thus highlights the motivations of *agents*, specifically armed groups and civilians, to secure sustenance, while focusing on cropland and food access as a mediating factor in a similar manner to that highlighted by past research (e.g., Theisen, Gleditsch & Buhaug, 2013).

Access to food, however, does not automatically imply that rebels or government troops will incite violence to obtain these goods. The likelihood of violence against civilians can be influenced by the types of units operating in the region, with weaker armed organizations being more likely to use violence against civilians because they lack the capacity to obtain support by other means (Wood, 2010). Moreover, in many cases, the civilian population provides the required support willingly, or at least without the need for violence to coerce cooperation (Azam & Hoeffler, 2002). Food support might be willingly given not because the civilians fear violence, but rather because civilians view the troops as partners during times of relative peace (Weinstein, 2007). Within Northern Uganda, for instance, the Acholi people have been noted for their voluntary provision of food and shelter to Ugandan soldiers, not out of fear of violence but out of anticipation of protection against the Lord's Resistance Army

[5]Nevertheless, we recognize that alternative explanations for violence against civilians exist, and we address these systematically in the Online appendix.

(Doom & Vlassenroot, 1999, 15). Similarly, the CDFs in Sierra Leone were recruited from local populations, and were hence more likely to be given food support willingly (Humphreys & Weinstein, 2008; Keen, 2005). In the latter situation, the locals were more likely to view the CDFs as long term partners, and hence more likely to support them. However, even the relatively localized CDFs were still implicated in atrocities, especially during times of intensified active conflict (Humphreys & Weinstein, 2008). What explains this variation?

Mechanisms

We argue that, due to its effects on the time horizons of *both* armed actors *and* civilians, the presence (or absence) of active civil conflict within a particular cropland region introduces temporal constraints, leading to an overall increase in armed actors' pursuit of violence against civilians to guarantee food support. Identifying the contextual factors influencing armed troops' *willingness* to use violence as a strategy rather than co-optation is therefore critical. While the availability of cropland gives armed individuals the opportunity to obtain sustenance, the existence of political conflict gives them *increased willingness* to use violence against civilians. That is, in times of active civil conflict, armed government troops and/or rebel associated actors have strong incentives to extract food from civilian farmers through violence rather than co-optation.

Relative to times of peace, civil conflict can shorten the time horizons of armed actors for at least three reasons. First, during civil conflicts, death or capture is a very immediate concern, which limits the ability of armed actors to make credible commitments and thus bargain over food access (see, e.g. Wood, 2014), thereby encouraging the obtainment of necessary foodstuffs via violent predation. Second, conflict is more likely to obligate government, rebel, and associated militia forces to change location frequently, which leads troops to discount the gains of current interactions with civilians in favor of future gains—territorial or others—effectively shortening armed actors' time horizons of interaction with proximate civilians (e.g. Toft, 2006). Third, during conflict, both state and rebel troops are more likely to perpetrate violence if they suspect that locals provide support, specifically food supplies,

to the other side (see, e.g., Kalyvas, 2006). From this perspective, violence against civilians is the result of both opportunity (the region offers access to food sources) and willingness (the benefits of using violence outweigh the benefits of co-optation).

During periods of active civil conflict, civilians also have added incentives to resist armed actors' attempts to extract agricultural produce, thereby further increasing the likelihood of violence in such contexts. Through devastation and the destruction of infrastructure (Fearon & Laitin, 2003), active conflict can severely strain food access in the region, implying that civilians will often produce fewer crops in these contexts, and therefore have less food to spare. The civilians will thus be much less likely to willingly provide food support to troops because they need food for personal consumption. Second, in those conflict-afflicted regions that frequently change hands between different combatants, such as the eastern regions of the DRC (Stearns, 2011), the uncertainty over who would be occupying the region "tomorrow" can make strategies of co-optation less appealing to civilians "today." One reason for this is that locals might fear that the new occupier will punish them for aiding the enemy (Wood, 2010). Another reason is that the promises for future rewards (or punishments) made by the current occupier in return for support (or lack thereof) will appear less credible given that these troops might be driven out of the region relatively soon, ensuring that the current occupier will be unable to deliver on its promises (Wood, 2010).

During more peaceful times, however, armed forces will have stronger incentives to rely on co-optation as the preferred strategy to obtain food access.[6] First, and in contrast to periods and locations of active fighting, peacetime armed forces are likely to be more established in their respective regions of operation, leading these actors to anticipate more repeated interactions with a given local population (Sarbahi, 2014). In these situations, government and rebel-associated troops are hunkered down, and—in most cases—have incentives to both secure cooperation and avoid alienating the local population (Wood, 2010; Sarbahi, 2014). While (as noted above) armed troops are typically unable to buy food in these contexts, they

[6]Rebels can exist for long periods of time without actively fighting government troops (Sarbahi, 2014).

are likely to receive it from locals without the need to use violence, although the implicit threat to do so might serve as an additional incentive (Stearns, 2011). Moreover, especially when defense militias are concerned, troops are both recruited from and live among the local population, which increases the frequency of daily interaction with civilians and the probability that the latter will supply food to these troops (Humphreys & Weinstein, 2008). Note that this situation does not mean that civilian killings will not occur, only that their frequency will be *lower* compared with periods of active conflict.

Similarly, during times of relative peace, civilians who live off their croplands have fewer incentives to resist armed actors' demands for food stockpiles. In many cases, they might view these troops as potential long-term partners, and be allowed to choose the amount of food support they provide in return for more political participation (Weinstein, 2007). In such contexts, the probability of being punished by a new occupier for supporting the enemy (namely, the current occupier) is far lower, because territorial turnover is not expected (e.g. Kalyvas, 2006). At the same time, the current occupier's promises for rewards (or punishments) in return for food support (or lack thereof) are more credible given their local embeddedness, and hence are more likely to influence future interactions (e.g. Weinstein, 2007; Wood, 2010). Therefore, even for military forces the lack of regular support from the government is not a grave threat; food can be easily and willingly obtained, or at least extracted without the need to use indiscriminate violence (Kalyvas, 2006).

Anecdotal evidence again lends support to this claim. In the Mizoram and Naga states in India, where the intensity of violence has been relatively low for several decades, rebels are highly embedded in the local population. They thus purport a strategy of persuasion and cooperation with the locals to obtain different forms of support, while pro-government forces attempt to appeal to the hearts and minds of the population in peaceful ways (Das, 2007). In these contexts, armed actors have longer time horizons because proximate battles or enemy capture are less likely, which factors into these actors' food security calculations: it is less than optimal to extract all cropland yields now using violence, because this strategy

would undermine enjoying the continuous access to food via co-optation. Similarly, troops of the Tigrayan People's Liberation Front have been noted for garnering "support from local populations through providing selective benefits, such as land reform, parallel systems of governance, and security from government forces in the areas in which it exercised control" (Young, 1997; Salehyan, Siroky & Wood, 2014, 636).

These dynamics were also evident in Uganda, with the NRA providing benefits and allowing for more inclusive political participation in return for food support (Weinstein, 2007). However, as mentioned above, the situation deteriorated when conflict intensified, and violence was increasingly used to extract food resources for poorly fed soldiers (Doom & Vlassenroot, 1999). Therefore, we expect that within cropland areas that are characterized by spells of peace, the (re)actions of civilians to food-demands are less likely to provoke the subsequent use of violence by armed forces seeking to obtain necessary food access compared with time of intense conflict. In this respect, cropland can be seen to have an added pacifying effect, relative to non-cropland locals, within areas or periods of relative peace.

Our argument can be summarized as follows. During relatively peaceful periods, both armed troops and civilians have longer time horizons, ensuring that civilian co-optation is likely to be the preferred strategy for local food attainment among armed actors. We therefore anticipate a significantly lower level of violence against civilians in cropland regions during periods where no local conflict is recorded, relative to the level of violence against civilians observed in comparable peacetime areas that do not offer access to croplands. However, during conflict spells, actors' time horizons shrink, constraining both armed groups' and local populations' abilities to secure immediate food access, leading them to discount the status quo in favor of guaranteeing their future survival. We therefore expect to see cropland engender *more* violence against civilians during periods of local conflict, relative to the levels of violence against civilians observed within non-agricultural zones that are likewise experiencing local conflict.

As this is a *relativistic* argument, we develop an *interactive* hypothesis to explain the

variation in violence against civilians in cropland during times of relative peace and periods of intensified conflict. This argument does not posit that cropland—in and of itself—*drives* the risk of violence against civilians. Rather, it posits that within conflict prone regions and countries, areas with more access to crops will experience a *relatively higher number of* violent attacks on civilians during times of conflict, all else equal.[7] These dynamics imply that local civil conflict will moderate the pacifying effects of cropland on political violence so as to yield the following testable hypothesis:

- *Hypothesis*: Increases in the abundance of local crops will increase violence against civilians when civil conflict is present; but will decrease violence against civilians when civil conflict is absent (i.e., during times of relative peace).

Empirical analysis

Our hypothesis posits that the availability of fertile cropland will increase armed actors' pursuit of violence against civilians during times of civil conflict, but will instead decrease instances of violence against civilians during times of peace. We test this hypothesis on a sample encompassing 13 years of data (1997-2009), which is the total temporal range for which information on our independent and dependent variables was available.[8] These 13 years of data are structured into a cell-year level dataset, where cells are the cross-sectional unit of interest, and are measured at the 0.5 x 0.5 decimal degree cell resolution,[9] for the 49 African countries included within Armed ACLED (Raleigh et al., 2010).[10] While this grid-cell size and structure is now common within studies of local civil conflict, including violence against civilians (e.g., Fjelde & Hultman, 2014), we nevertheless demonstrate that our results are robust to larger grid-cell aggregations in the Online appendix. We limit our

[7]The statistical models discussed below control for these different issues, and account for the potential that some regions and countries are effectively "immune" to acts of violence against civilians by treating such cases as "zero-inflated" and estimating this propensity alongside the primary relationships of interest.

[8]While records for many of our variables end in 2008, we lag all independent and control variables by one year, which allows us to include outcomes occurring in the year 2009 for our dependent variable.

[9]I.e., cells of approximately 55 x 55 kilometers at the equator (3025 square kilometers area), which become slightly smaller as one moves to the Poles (Tollefsen et al., 2012).

[10]We list these countries in Table A.IX of our Online appendix.

analysis to the African countries included within ACLED as this dataset provides us with the most comprehensive, and fine grained, information on geo-located instances of violence against civilians—and their perpetrators—for use in constructing our primary dependent variable.[11] There are 10,639 total cells observed for any given sample-year within the 1997-2009 period of interest, with the average African country in our sample containing roughly 222 cells.

Our dependent variable, violence$_t$ against civilians, is operationalized as the yearly (t) count of instances of violence committed against civilians by armed (state, nonstate, and associated militia) actors within a given African grid cell. This measure was coded from the ACLED dataset, which defines violence against civilians as "deliberate violent acts perpetrated by an organized political group such as a rebel, militia or government force against unarmed non-combatants," and records any such instance for which civilians are harmed or killed (Raleigh & Dowd, 2015, 13). ACLED uses local and international news sources, Africa-oriented news reports and analyses, and NGO reports to geo-code source-target based incidents of armed conflict occurring within the 49 African countries mentioned above for the years 1997-2014, thereby limiting the start of our sample to the year 1997. From these data, we subset out all instances of violence directed at civilians as targets, and then further subset out only those incidents that could be credibly seen as being perpetrated by armed state, non-state, or militia actors by omitting any recorded instances of violence against civilians that were instead perpetrated by (i) rioters, (ii) protesters, or (iii) other non-rebel/militia/military based actors. Lastly, we omit any events that do not have sufficient geo-coding accuracy for merging to the 0.5 x 0.5 cell level, and then merge all remaining violence$_t$ incidents to our African country cell-year dataset based upon their recorded latitude-longitude coordinates, before summing each cell's remaining violence$_t$ incidents to the yearly-count level.

For violence$_t$, there were 12,206 incidents of violence against civilians within our 1997-

[11] Indeed, one recently published study of violence against civilians described these data as "the most comprehensive subnational political violence data" (Raleigh, 2012, 462). Even so, we verify the robustness of our analysis with an alternative dataset and measure of violence against civilians in our Robustness Section.

2009 sample, with an average cell-year count, standard deviation, and range of 0.09, 0.337, and 0↔161, respectively. A total of 48 out of the 49 African countries in our sample experienced at least one instance of violence against civilians for our perpetrators-of-interest and sample period, which underscores our earlier contention that the determinants of modern-day violence against civilians are not limited to factors arising during active civil wars. The event count nature of violence$_t$ indicates that this variable can only take on non-negative integer values, is bounded at zero, and unbounded above. Accordingly, we employ a negative binomial (NB) model as a baseline model in our analysis. However, as a frequency histogram of violence$_t$ in the Online appendix demonstrates, roughly 98% of our observations record a zero value on violence$_t$. This extreme number of zeros suggests that for many cells violence against civilians was highly improbable due to either a stringent rule of law or an absence of human presence. Many of these zeroes likely reflect cell-years where civilians could never have experienced violence, rather than true count stage instances where armed actors could have initiated violence against civilians, but chose not to do so. Treating all zero observations as if they were true count-stage zeroes risks biasing our estimates and thus the conclusions that we draw from them about the relationships between our independent variables and violence$_t$.

To avoid these biases, our primary models use a zero-inflated negative binomial (ZINB) model to statistically estimate, and account for, the mixture of excess (structural) zeroes that exist within violence$_t$. This approach allows us to test and account for the presence of excess zeroes in violence$_t$ and, in turn, to evaluate the effects of our covariates upon the very cases that are of most interest to the study at hand: cell-years that are *potentially* violence-prone. The ZINB model does so by combining the results from a binary logit equation testing for whether (or not) a zero observation is likely to have been produced by the zero-only process with the results of a NB count equation that tests for the effect of our covariates on the expected frequency of violence$_t$, conditional on a case being non-zero inflated. We equate such a case to a cell-year that is structurally able to experience violence against civilians,

which we can contrast with a cell devoid of any human presence or interaction due to climate and geographic factors, or with a cell that simply lacks the opportunity for violence due to (i) an absence of conflict-prone social conditions or (ii) a harmony of interests.

To fully test our hypothesis within the models described above, we interact two independent variables. The first, cropland, is measured at the same 0.5 x 0.5 cell resolution as our dependent variable and—in line with the living off the land dynamics described above—captures the percentage of a given cell's area whose land cover class was denoted as (irrigated and non-irrigated) cropland by the Globcover 2009 project (Bontemps, Defourny & Van Bogaert, 2009). This measure is used in extant cell-year analyses in a comparable manner to its treatment here (e.g., Wischnath & Buhaug, 2014), and while its static nature is less than ideal, we believe that this is defensible for the following two reasons. First, cropland, like any land type, is relatively slow moving over time. This, when combined with our relatively short window of analysis (i.e., 1997-2009), helps to minimize the adverse effects of any foregone temporal variation in our independent variable. Our second independent variable, civil conflict$_{t-1}$, is taken from the PRIO-GRID (Tollefsen et al., 2012) and captures whether (or not) a given grid-cell experiences civil conflict[12] during the previous calender year. We then include each composite term (cropland and civil conflict$_{t-1}$) and their product (croplandXcivil conflict$_{t-1}$), in our models so as to fully test our hypothesis. As elaborated upon in the Online appendix, all findings discussed below remain highly robust to the use of a (non-lagged) civil conflict$_t$ measure in place of civil conflict$_{t-1}$, though we favor the latter in our primary models so as to minimize simultaneity concerns. Summary statistics for each composite term, and all control variables, are presented in the Online appendix.

A number of cell-year controls are included in our models' count stages. These variables are derived from either the PRIO-GRID or ACLED and—aside from our geographic controls—are lagged one year if they are time varying. Several cell-level controls are included to ensure that any findings pertaining to croplandXcivil conflict$_{t-1}$ are robust to

[12]As defined by the ACD's 25-battle death, civil conflict threshold (Melander, Pettersson & Themnér, 2016), and elaborated upon in our Online appendix.

proximate levels of violence against civilians. Here we specifically control for the spatial lag of violence$_{t-1}$ so as to ensure that our findings are attributable to the grid-cell specific effects of cropland and civil conflict$_{t-1}$. Next, we account for civilian population, as well as state-penetration and economic wealth, by controlling for each cell's ln population$_{t-1}$, travel time to the nearest major city (in logged minutes), and logged gross cell product (Nordhaus, 2006). We also control for a cell's broader geographic characteristics by including ln cell area, ln border distance, and a binary indicator denoting whether or not there was a change in the territorial control within a given grid cell. Finally, we additionally control for factors associated with various agricultural outcomes that are related to conflict but do not fit the causal story that we lay out above, in particular: ln precipitation$_{t-1}$, drought$_{t-1}$,[13] and temperature$_{t-1}$.

To further verify that it is indeed our key independent variables, and not the political-economic conditions commonly associated with the prevalence of croplands or conflict, that are affecting violence$_t$, the models presented below also include a number of additional country-year level controls. We first account for a country's political regime via an ordinal Polity$_{t-1}$ indicator (Marshall, Jaggers & Gurr, 2013), and its squared term, as political regime-type has been shown to be related to both violence against civilians (Valentino, Huth & Balch-Lindsay, 2004) and agricultural development (Bates & Block, 2013). Next, we include a country's (ln) military expenditure$_{t-1}$ (Singer, Bremer & Stucky, 1972), in order to hold constant countries' military resources— which we recognize may only pertain to some actors of interest (i.e., state rather than nonstate actors). Our fully specified models also include a country's overall ln GDP pc$_{t-1}$ (World Bank, 2012), year fixed-effects, clustered standard errors (by cell-id). We further account for additional alternative arguments of civilian violence by adding a number of additional cell and country-year controls to the models discussed in our robustness section and Online appendix.

Lastly, we include several of the control variables listed above within the inflation-stage of

[13] An ordinal indicator of a cell's Standardized Precipitation Index (Tollefsen et al., 2012).

our ZINB models. Recall that this stage of the ZINB model seeks to account for the factors that may systematically predispose some cells and regions to be structurally (non)violence-prone. As we contend that population presence is a necessary condition for a cell to have at least some opportunity for violence against civilians, we include our primary population controls, ln travel time, ln population$_{t-1}$, and ln cell area, within our inflation stage. As more population implies more opportunities for violence, we expect the ln travel time to be positively associated with inflation, and the latter two measures to be negatively associated with inflation. Our justifications for including these population-oriented variables in our inflation-stages are consistent with extant zero-inflation civil conflict research (Hegre, Ostby & Raleigh, 2009; Fjelde & Hultman, 2014). We argued above that stable socio-political environments and an absence of violence each likely limit the opportunities for violence to arise within some cells and regions. Hence, we additionally include our cell-level civil conflict$_{t-1}$ measure in our inflation stages. This approach is consistent with previous conflict studies employing ZINB models, which demonstrated that previous civil conflict levels are robust predictors of zero-inflation in these contexts (Fjelde & Hultman, 2014; Bagozzi, 2015).

Results

Table 1 reports a baseline NB model of violence$_t$ against civilians followed by three ZINB models that each add an increasing number of control variables. While we wait to fully interpret our primary results until we have extracted and plotted the marginal effects of cropland on violence$_t$ at different levels of civil conflict$_{t-1}$, we can note here that the directions and significance of our interaction term and its component parts are supportive of our hypothesis. The individual coefficient estimate on cropland reports the effect of cropland on violence$_t$ for conflict-prone (i.e., non-inflated) grid-cells that *do not* experience civil conflict$_{t-1}$. Across all models in Table 1, the coefficient estimate on cropland is negative and significant, implying that—in support of our hypothesis—cropland has a violence$_t$ depressing effect in times of peace, ostensibly because these conditions compel armed actors to favor acts of co-optation over violence$_t$ in securing food resources from civilians. On the other hand, the coefficient

on the interaction term (croplandXcivil conflict$_{t-1}$) is positive and significant, implying that the marginal contribution of an increase in cropland within a given violence-prone grid-cell *during times of civil conflict*$_{t-1}$ is positive and statistically significant in Models 1-4. In support of our hypothesis, this suggests that increases in cropland have an added violence$_t$ intensifying effect during times of civil conflict, though again we must examine our marginal effects below to fully ascertain the significance of this result. Finally, note that the coefficient estimate for civil conflict$_{t-1}$ itself—which corresponds to the effects of civil conflict on violence$_t$ within violence-prone cells that are wholly devoid of cropland—is unstable in both its direction and significance across Models 1-4.

[Insert Table 1 here]

Before extracting our marginal effects, we examine our inflation stages to verify that our decision to use zero-inflated models is appropriate. The inflation stage estimate for civil conflict$_{t-1}$ is consistently negative and significant, suggesting that recent civil conflict makes a cell less likely to be inflated, and thus more likely to be able to experience violence against civilians in year t. Ln travel time is positive and significant in the inflation stages of Models 3-4, implying that the further one moves away from urban centers, the more likely that a given cell is an inflated case. Likewise, our estimate for ln population$_{t-1}$ is consistently negative and significant. This result, like that for ln travel time, indicates that cells that lack substantial population are more likely to be structurally predisposed from experiencing any level of violence against civilians.[14] Taken together, our inflation stage is performing as expected, which suggests that our decision to account for inflation was appropriate. Vuong tests support these claims, in indicating that each ZINB model reported in Table 1 is preferable to its NB counterpart ($p < .01$).

Returning to the count stages of Models 1-4, the coefficient estimates for several control variables are statistically significant and warrant additional discussion here. Beginning with our country-year controls in Model 4, ln GDP pc$_{t-1}$ and Polity$_{t-1}$ are each negative

[14]However, ln cell area is not significant in the inflation stages of Models 2-4.

and significant, suggesting that—conditional on a cell being able to experience violence$_t$—more economic development and more democracy each reduce violence against civilians, though the positive and significant coefficient estimate on Polity$^2_{t-1}$ implies that democracy may have a non-monotonic effect on such violence. Ln population$_{t-1}$ consistently implies that more populous violence-prone cells are more apt to experience violence$_t$ events. Ln precipitation$_{t-1}$, unlike temperature$_{t-1}$ and drought$_{t-1}$, is positive and significant in Models 3-4, implying that increased rainfall is positively associated with violence against civilians within these specifications. Finally, our larger ZINB specifications also intuitively reveal that more populous cells, as well as cells that are more proximate to either international borders or nearby to violence against civilians, or cells that have had a change in territorial control, are each more likely to experience violence against civilians provided that they are already violence-prone. The remaining coefficient estimates were not robust in direction and/or significance across Models 1-4 and hence are not discussed here.

[Insert Figure 1 here]

To evaluate whether our interaction supports our hypothesis, we combine the individual component terms of cropland and civil conflict$_{t-1}$, along with civil conflict$_{t-1}$, to plot the marginal effect of a reasonable change in cropland on violence$_t$ at each level of civil conflict$_{t-1}$ (i.e., for civil conflict$_{t-1} = 0$ and civil conflict$_{t-1} = 1$). To do so, we use our Model 4 estimates to calculate the percentage change in the expected count of violence$_t$ given a one standard deviation (SD) increase in cropland from its mean, at each level of civil conflict$_{t-1}$, while holding all other count-stage control variables to their means or modes.[15] We plot these estimated marginal effects, along with their 95% confidence intervals, in Figure 1. As Figure 1 reveals, the marginal effect of a one SD increase in cropland within a non-civil conflict$_{t-1}$ cell is negative and statistically significant, implying that increases in cropland in times (and locations) of relative peace can be expected to significantly decrease an area's observed

[15] In other words, these quantities are calculated from the outcome stage of our Model 4 estimates, and report the effects of our interaction on an (already) violence$_t$-prone (i.e., non-inflated) observation.

instances of violence against civilians, in this case by roughly 18%. By contrast, Figure 1 also demonstrates that a comparable SD increase in cropland within a civil conflict$_{t-1}$ cell can instead lead to a statistically significant, 21% increase in the number of violence$_t$ events perpetrated against civilians by armed state or nonstate actors. These results support our hypothesis, and suggest that while cropland may indeed compel armed actors to pursue co-optive strategies towards civilians in times of peace, it may instead compel these actors to employ heightened tactics of violence$_t$ against civilians during times of war.

Robustness tests

To evaluate the sensitivity of our findings, we reassess our empirical models under a range of alternative specifications. We report all corresponding robustness tables in our Online appendix, and summarize each robustness model here. The first set of robustness models (Table A.III) incrementally add-in controls for local ethnic group composition, cell-level distance to national capitals, and (lagged) country-year level indicators of economic growth, the percentage of total cropland, oil and natural gas production, government repression, the presence of informal militias, and the presence of peacekeeping forces, as well as a lagged dependent variable to our full specification. Our primary findings remain statistically significant in light of these additional controls. In Table A.IV, we verify that our primary results hold to a variety of different model re-estimations, including (i) using a subsample of African countries that experienced at least one civil conflict$_{t-1}$ and (ii) African countries that did not, respectively, over the period of our analysis, (iii) employing a zero-inflated Poisson (ZIP) model, (iv) omitting year fixed effects and adding temporally lagged controls, (v) using the a dependent count "atrocities" variable derived from the Political Instability Task Force (PITF) Worldwide Atrocities Dataset (PITF, 2009) for government and nongovernment perpetrators, (vi) removing outliers from our sample, (vii) employing an alternate cropland measure (ISAM-HYDE) collapse to the (larger) 1 x 1 decimal degree grid-cells, (viii) using an alternate version of our spatial lag, (ix) samples limited to below average military expenditure and military expenditure per soldier country-years, and (x) a logistic regression using pe-

nalized maximum likelihood estimation to address the relative rarity of our violence$_t$ events. Finally, Tables A.V-A.VIII then establish that our results are reasonably robust to the use of civil conflict$_t$ in place of civil conflict$_{t-1}$, to the disaggregation of civilian-directed violence by perpetrator, and to alternate approaches to controlling for territorial change, and to multi-level Bayesian random effect specification with random effects at the cell-level, country-level, and cell and country-levels simultaneously. In all cases, our core results remain significant to at least the $p < 0.05$ level.

Conclusion

This article contends that the prevalence of croplands will increase the incidence of violence against civilians during periods of conflict, but will decrease such violence during times of relative peace. During the latter, armed actors—be they government or rebel troops—anticipate a high frequency of future interactions with the local population. They therefore prefer the more sustainable strategy of co-opting the local population in order to obtain necessary food access. Locals will also perceive that interactions with armed troops will continue for the foreseeable future, making the promises for rewards or punishments offered by these actors more credible, while also reducing the likelihood that another actor would conquer the region and punish those who supported the previous occupier. These dynamics reverse during times of active civil conflict. Armed groups have shorter horizons of interaction with locals, while the need to obtain food for immediate use becomes more acute. Civilians view armed actors' promises as less credible, becoming more concerned that the area will be taken over by a different group that may punish those who supported the previous occupier. This makes the use of violence against civilians more optimal for armed troops, as the benefits associated with securing maximum food access through this immediate strategy outweigh the costs of foregone cooperation and access to food in the future. We find empirical evidence for cropland's anticipated conflict-contingent effects on violence against civilians within a cell-year sample of African countries (1997-2009).

These findings suggest that the negative externalities arising from local interactions between civilians and armed troops remain a large and important component to one sided violence, and are deserving of our attention. In focusing on the varying constraints produced in zones of cropland, active conflict, and relative peace, we show that the shift from positive to negative externalities arising from troops' needs for food security explains a portion of the observed variation in violence against civilians. This represents an important step in advancing our understandings of (i) atrocities inside *and* outside of civil conflict settings and (ii) atrocities arising from bottom-up phenomena, rather than from deliberate top-down policies. These results also have several important policy implications. For example, our insights into armed agents' motivations for violence against civilians illuminate a new mechanism through which such violence can be ameliorated: improvements in food distribution within conflict afflicted zones. In this regard, our findings speak to extant studies emphasizing the role of the UN in reducing civilian causalities (e.g., Hultman, Kathman & Shannon, 2013), as food aid is often a relevant UN service in such cases. Likewise, our study may also help to identify precisely *where within a given country* UN forces or other external parties could intervene more generally, so as to most effectively prevent violence against civilians during ongoing conflict: in food abundant, agricultural areas.

Figure 1: Marginal effect of 1SD increase in cropland

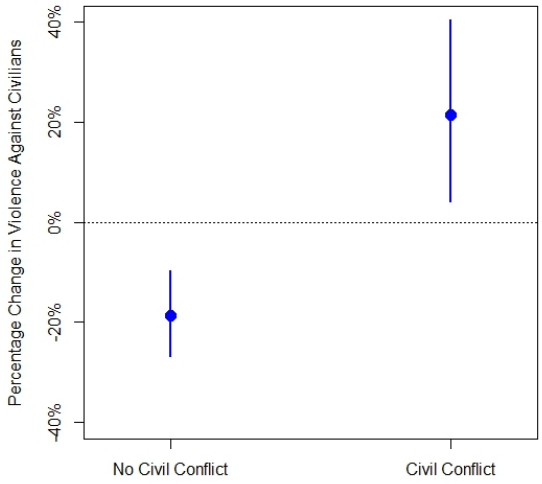

Table 1: Violence against civilians

	Model 1	Model 2	Model 3	Model 4
Count Stage				
Civil conflict$_{t-1}$	0.591**	0.192	0.062	-0.353
	(0.137)	(0.192)	(0.191)	(0.201)
Cropland	-0.007**	-0.011**	-0.011**	-0.008**
	(0.002)	(0.002)	(0.002)	(0.002)
CroplandXCivil conflict$_{t-1}$	0.023**	0.021**	0.019**	0.016**
	(0.003)	(0.003)	(0.003)	(0.003)
Ln population$_{t-1}$	0.829**	0.495**	0.219**	0.243**
	(0.055)	(0.058)	(0.058)	(0.059)
Ln cell area	-0.126	-0.082	-0.116	-0.813
	(0.120)	(0.180)	(0.444)	(0.458)
Ln GCP$_{t-1}$	-0.393**	-0.382**	0.072	0.298**
	(0.088)	(0.084)	(0.093)	(0.115)
Ln travel time	-0.216	0.087	-0.298	-0.048
	(0.130)	(0.147)	(0.152)	(0.136)
Temperature$_{t-1}$	.	.	0.009	-0.010
			(0.013)	(0.014)
Ln precipitation$_{t-1}$	.	.	0.601**	0.368**
			(0.081)	(0.086)
Drought$_{t-1}$	.	.	-0.065	-0.084
			(0.046)	(0.045)
Ln distance to border	.	.	-0.428**	-0.340**
			(0.045)	(0.047)
Spatial lag DV$_{t-1}$	.	.	.	0.262**
				(0.051)
Ln GDP pc$_{t-1}$	.	.	.	-0.236**
				(0.068)
Polity$_{t-1}$	.	.	.	-0.031**
				(0.011)
Polity$^2_{t-1}$	.	.	.	0.007**
				(0.002)
Ln military expenditure$_{t-1}$	.	.	.	0.009
				(0.040)
Territorial change	.	.	.	1.795**
				(0.119)
Inflation Stage				
Ln travel time	.	0.335**	0.294*	0.294*
		(0.102)	(0.118)	(0.149)
Ln population$_{t-1}$	.	-0.600**	-0.577**	-0.605**
		(0.044)	(0.049)	(0.058)
Ln cell area	.	0.104	-0.139	-0.687
		(0.135)	(0.416)	(0.508)
Civil conflict$_{t-1}$	.	-0.583**	-0.820**	-1.270**
		(0.107)	(0.119)	(0.173)
Constant	.	5.925**	7.801*	12.182**
		(1.357)	(3.539)	(4.301)
N	125,395	125,395	117,969	106,507

Values in parentheses are robust standard errors clustered by cell-id;
** indicates $p < .01$, * indicates $p < .05$;
Year fixed effects included in all models though not reported here.

References

Azam, Jean-Paul & Anke Hoeffler (2002) Violence against civilians in civil wars: Looting or terror? *Journal of Peace Research* 39(4): 461–485.

Bagozzi, Benjamin E. (2015) Forecasting civil conflict with zero-inflated count models. *Civil Wars* 17(1): 1–24.

Bagozzi, Benjamin E. (2016) On malaria and the duration of civil war. *Journal of Conflict Resolution* 60(5): 813–839.

Barrett, Christopher B. (2010) Measuring food insecurity. *Science 327*: 825–828.

Bates, Robert H. & Steven A. Block (2013) Revisiting african agriculture: Institutional change and productivity growth. *Journal of Politics* 75(2): 372–384.

Bontemps, Sophie; Pierre Defourny & Eric Van Bogaert (2009) Globcover 2009. products description and validation report.

Cilliers, Jakkie (2000) Resource wars—a new type of insurgency. In: Jakkie Cilliers & Christian Dietrich (eds) *Angola's War Economy: The Role of Oil and Diamonds*. Pretoria: Institute for Security Studies, 1–19.

Collier, Paul & Anke Hoeffler (2005) Resource rents, governance, and conflict. *Journal of Conflict Resolution* 49(4): 625–633.

Das, Samir Kumar (2007) Conflict and peace in india's northeast: The role of civil society.

Davis, Anthony (2010) Borderline support - malaysia and indonesia aid thai insurgency.

Doom, Ruddy & Koen Vlassenroot (1999) Kony's message: A new koine? the lord's resistance army in nothern uganda. *African Affairs 98*: 5–36.

Dunn, Kevin C. (2004) Uganda: The loard's resistance army. *Review of Africa Political Economy* 31(99): 139–142.

Fearon, James D. & David D. Laitin (2003) Ethnicity, insurgency, and civil war. *American Political Science Review* 97(1): 75–90.

Fjelde, Hanne & Lisa Hultman (2014) Weakening the enemy: A disaggregated study of violence against civilians in africa. *Journal of Conflict Research* 58(7): 1230–1257.

Hansen, Stig Jarle (2013) *Al-Shabaab in Somalia: The History and Ideology of a Militant Islamist Group, 2005-2012*. London, UK: Hurst and Co.

Hegre, Haavard; Gudrun Ostby & Clionadh Raleigh (2009) Poverty and civil war events: A disaggregated study of liberia. *Journal of Conflict Resolution* 53(4): 598–623.

Hendrix, Cullen S. & Hen-Jan Brinkman (2013) Food security and conflict dynamics. *Stability: Internatioal Journal of Security and Development* 2(2).

Hendrix, Cullen S. & Stephan Haggard (2015) Global food prices, regime type, and urban unrest in the developing world. *Journal of Peace Research* 52(2): 143–157.

Homer-Dixon, Thomas F. & Jessica Blitt (1998) *Ecoviolence: Links Among Environment, Population and Security*. Lanham, MD: Rowman & Littlefield.

Hultman, Lisa; Jacob Kathman & Megan Shannon (2013) United nations peacekeeping and civilian protection in civil war. *American Journal of Political Science* 57(4): 875–891.

Humphreys, Macartan & Jeremy M. Weinstein (2008) Handling and manhandling civilians in civil war. *American Political Science Review* 100(3): 429–447.

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

Kastner, Thomas; Maria Jose Ibarrola Rivas, Wolfgang Koch & Sanderine Nonhebel (2012) Global changes in diets and the consequences for land requirements for food. *Proceedings of the National Academy of Science* 109(18): 6868–6872.

Keen, David (2005) *Conflict and Collusion in Sierra Leone*. Suffolk: James Currey.

Koren, Ore & Benjamin E. Bagozzi (2016) From global to local, food insecurity is associated with contemporary armed conflicts. *Food Security* 8(5): 999–1010.

Marshall, M. G.; T. R. Jaggers & K. Gurr (2013) Polity iv project: Political regime characteristics and transitions, 1800-2012.

Melander, Erik; Therése Pettersson & Lotta Themnér (2016) Organized violence, 1989-2015. *Journal of Peace Research* 53(5): 727–742.

Mkandawire, Thandika (2002) The terrible toll of post-colonial 'rebel movements' in africa: Towards an explanation of the violence against the peasantry. *Journal of Modern African Studies* 40(2): 181–215.

Nordhaus, William D. (2006) Geography and macroeconomics: New data and new findings. *Proceedings of the National Academy of Sciences* 103(10): 3150–3517.

PITF (2009) Political instability task force worldwide atrocities event data collection codebook version 1.0b2.

Raleigh, Clionadh (2012) Violence against civilians: A disaggregated analysis. *International Interactions* 38(4): 462–481.

Raleigh, Clionadh & Caitriona Dowd (2015) Armed conflict location and event data project (acled) codebook.

Raleigh, Clionadh; Andrew Linke, Håvard Hegre & Joakim Karlsen (2010) Introducing acled: An armed conflict location and event dataset. *Journal of Peace Research* 47(5): 651–660.

Salehyan, Idean; David Siroky & Reed M. Wood (2014) External rebel sponsorship and civilian abuse: A principal-agent analysis of wartime atrocities. *International Organization* 68(3): 633–661.

Sarbahi, Anoop K (2014) Insurgent-population ties and the variation in the trajectory of peripheral civil wars. *Comparative Political Studies* 47(10): 1470–1500.

Singer, J. David; Stuart Bremer & John Stucky (1972) Capability distribution, uncertainty, and major power war, 1820-1965. In: Bruce Russett (ed.) *Peace, War, and Numbers*. Beverly Hills: Sage.

Stearns, Jason (2011) *Dancing in the Glory of Monsters: The Collapse of the Congo and the Great War of Africa*. New York, NY: Public Affairs.

Sundar, N. (2007) *Subalterns and Sovereigns: An Anthropological History of Bastar (1854-2006), 2nd Edition*. Delhi: Oxford University Press.

Theisen, Ole Magnus; Nils P Gleditsch & Halvard Buhaug (2013) Is climate change a driver of armed conflict? *Climatic Change 117*: 613–625.

Toft, Monica Duffy (2006) Issue indivisibility and time horizons as rationalist explanations for war. *Security Studies* 15(1): 34–69.

Tollefsen; Andreas Forø, Håvard Strand & Halvard Buhaug (2012) Prio-grid: A unified spatial data structure. *Journal of Peace Research* 49(2): 363–374.

Urdal, Henrik (2005) People vs. malthus: Population pressure, environmental degradation, and armed conflict revisited. *Journal of Peace Research* 42(4): 417–434.

Valentino, Benjamin; Paul Huth & Dylan Balch-Lindsay (2004) 'draining the sea:' mass killing and guerilla warfare. *International Organization* 58(2): 375–407.

Varshney, Ashutosh; Rizal Panggabean & Mohammad Zulfan Tadjoeddin (2004) Patterns of collective violence in indonesia (1990-2003).

Weinstein, Jeremy M. (2007) *Inside Rebellion: The Politics of Insurgent Violence*. Cambridge, UK: Cambridge University Press.

Wilkinson, Steven I (2004) *Votes and Violence: Electoral Competition and Ethnic Riots in India*. Cambridge: Cambridge University Press.

Wischnath, Gerdis & Halvard Buhaug (2014) Rice or riots: On food production and conflict severity across india. *Political Geography 43*: 6–15.

Wood, Reed M. (2010) Rebel capability and strategic violence. *Journal of Peace Research* 47(5): 601–614.

Wood, Reed M. (2014) From loss to looting? battlefield costs and rebel incentives for violence. *International Organization* 68(4): 979–999.

World Bank (2012) *World Development Indicators 2012*. World Bank Publications.

Young, John (1997) *Peasant Revolution in Ethiopia: The Tigray People's Liberation Front, 1975-1991*. Cambridge, UK: Cambridge University Press.

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