Conflict Environments and Civil War

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Abstract

In this paper we demonstrate that a state’s conflict environment affects its proclivity for experiencing civil war. We conceptualize a state’s conflict environment as including spatial and temporal dimensions of conflict diffusion. As conflict in one’s environment becomes more spatially and temporally proximate, the likelihood of civil war onset increases. Based on theoretical expectations, we construct the Conflict Environment (CE) score, a composite indicator that taps into the spatially and temporally proximate violence in a state’s neighborhood. The constitutive elements of the CE score decay across both geographic distance and time. We incorporate the CE score into the standard models of civil war onset and demonstrate that the conflict environment is a robust determinant of civil war, even when domestic factors are taken into account. The newly developed measure is flexible and customizable, and in its current form, allows us to pinpoint the international dynamics of civil war.

Word Count: 9,425
Introduction

Can a state’s surrounding environment catalyze the onset of civil war? Analyses of civil war onset often focus on domestic explanations, demonstrating that long standing grievances over economic disparities, discrimination, access to basic government services, and political rights spur rebellions. Beyond these domestic factors, scholars recognize that civil wars do not occur in isolation of each other, but external influences are less well understood. When armed combatants migrate from one state to another, when internal violence disrupts regional economic stability, or when recent successes by rebels or secessionists embolden others, civil war is also driven by regional and global factors.

Consider for example the 2012 insurgency in northern Mali, which has been unequivocally fueled by a history of internal conflict and unrest. Since independence, Tuaregs have felt marginalized from the southern government in Bamako. Vying for their own independence, they organized an unsuccessful uprising against the Malian government in 1962. Over the subsequent decades, Malian Tuaregs incited rebellions in 1990 and 2007 in response to political marginalization and socioeconomic hardships. In recent years, drought and food shortages have exacerbated social tensions.

However, neither the magnitude nor the timing of Mali’s civil conflict can be divorced from its broader regional context. The 2012 conflict has direct links to the Libyan Civil War that culminated in late 2011. In a Security Council briefing at the United Nations in January 2012, Ambassador Rosemary DiCarlo anticipated these links, remarking, “We recognize that the Libyan crisis has brought a new set of cross-border challenges relating to security, including increased illicit weapons trafficking that pose a threat to the stability of the region.” DiCarlo further expressed concern that such weapons “could further destabilize already fragile areas of the Sahel and surrounding regions” (DiCarlo January 26, 2012). The porous borders in the Sahel region enabled migrants and arms to travel long distances. A report issued by the UN Security Council after the overthrow of Muammar al-Gaddafi expressed concern with the “influx of hundreds of thousands of traumatized and impoverished returnees as well as the
inflow of unspecified and unquantifiable numbers of arms and ammunition from the Libyan arsenal” (Ki-Moon 2012, p. 2). The International Organization for Migration estimated that 420,000 people fled Libya, 30,000 of which returned to Mali (Ki-Moon 2012, p. 6). These migrants included Tuareg combatants who aided the Gaddafi regime and returned to Mali trained and armed; the head of the MNLA, Mohammed Ag Najim, was a former colonel in Gaddafi’s army.

Not only was Mali’s 2012 conflict spurred by spatial proximity to Libya, it was also influenced at various points in the preceding decade by recent civil conflicts afflicting Algeria, Niger, Sierra Leone, Liberia, Côte d’Ivoire, Senegal, Guinea, and Nigeria. The temporal proximity of conflict in Mali’s neighborhood reinforced feelings of insecurity and dominated the consciousness of actors within the country. Mali’s conflict environment – a spatial and temporal context of insecurity and violence – serves as a reminder that external factors contribute to the onset of conflict.

Research on the effects of nearby violence, however, has focused largely on the dimension of space. Studies of conflict diffusion often rely on contiguity or short temporal lags. The result is a gap in our ability to understand how conflict environments trigger civil wars. In this paper, we develop a model of a state’s conflict environment to facilitate a better understanding of how a state’s neighborhood exacerbates the risk of civil war. Building on existing diffusion theories, we develop a conflict environment measure that represents both spatial and temporal dimensions of neighborhood violence. In so doing, we address how and why the conflict environment matters for states while at the same time recognizing the causal complexity of conflict. Our conflict environment approach to understanding the causes of civil war heeds Solingen’s (2012) advice to “integrate domestic, regional, and global considerations under a common theoretical framework” (p. 640). Modeling exogenous factors is a complement to, not a substitute for, understanding domestic determinants of conflict.
What We Already Know About Exogenous Influences on Internal Conflict

Previous analyses have examined regional and global trends to consider how these external factors influence the occurrence of conflict within a state’s borders. On a systemic level, the relationship between international structure and the occurrence of civil war has received considerable attention following the demise of the U.S.S.R. Lacina (2004), for example, argues: “The end of the Cold War fundamentally altered the place of civil war in international politics” (191). She suggests that the changes in the polarity of the international system and the resurgence of nationalism following the dissolution of the Soviet Union led to the rapid rise in internal armed conflict during the 1990s.

An additional body of literature focuses on exogenous determinants of civil conflict below the systemic level. Gleditsch (2002), for instance, encourages researchers to “study conflict, cooperation, and democratization through regional interactions rather from more conventional perspectives that emphasize relations at the level of either the global system or individual states” (p. 10). This work recognizes that civil wars, while domestically driven, do not occur within a vacuum. In order to gain a full picture of the causes and risk factors for civil war, one must look at what is going on in a state’s neighborhood. This literature lays a foundation for our own theoretical and empirical approach, which couples exogenous regional forces with recognized domestic determinants of conflict.

A closer look at contagion and clustering

Early conflict diffusion research focused on interstate war and conceptualized it as a disease that infects neighboring states (Alcock 1972; Houweling and Siccama 1985). Most and Starr (1980) suggest that states with neighbors involved in interstate conflict are more likely to engage in warfare than states with no neighbors engaged in conflict. Siverson and Starr (1990) highlight how both geographic (borders) and political (alliances) factors increase the probability that a nation would go to war. Taking a more theoretical approach, Kadera
(1998) focuses on the mechanisms and barriers to the transmission of conflict. Transmission mechanisms (such as defense pacts) enable the spread of violence, while barriers (such as distance) and resource constraints diminish contagion.

Contemporary studies of civil war diffusion draw on arguments similar to those in the earlier interstate war diffusion literature, however, empirical evaluations of civil war onset provide mixed support, at best, for the contagion phenomenon. In an analysis of forty-seven civil war onset studies, Dixon (2009) demonstrates the contradictory findings about the effect of a state’s neighborhood on its own propensity for civil conflict. Using regional dummy variables to assess the impact of neighborhoods on civil conflict, Fearon and Laitin (2003) find that only one geographic region (Asia) has a significant effect on civil war onset and ultimately exclude regional variables from their baseline model. Hegre and co-authors (2001) also find neighboring civil war to be an insufficient explanation for conflict outbreak. On the other hand, Sambanis (2001) finds a positive correlation between neighboring ethnic war and war onset. Similarly, Hegre and Sambanis (2006) determine that the existence of war-prone neighbors is a determinant of civil war onset.

In perhaps the most comprehensive study of civil war diffusion, Buhaug and Gleditsch (2008) confirm that conflict in a contiguous state increases the likelihood of civil war onset in the focal state. However, more nuanced measures of neighboring conflict perform poorly. Buhaug and Gleditsch conclude that “neither the distance to the nearest conflict, the weighted density of conflict in the neighborhood, the influx of refugees from a conflict neighbor, nor the severity of the neighboring conflict explains the trajectory of contagion” (230). Their discussion highlights one particular diffusion mechanism—transnational ethnic ties between states. Other researchers have since investigated this link, providing compelling evidence that transborder kin in conflict make civil war more likely in a focal state (Cederman, Girardin and Gleditsch 2009; Cederman et al. 2013; Forsberg 2014b).

One probable reason for a lack of scholarly consensus on the existence and prevalence of conflict diffusion is that researchers are divided as to whether the spatial clustering of civil
conflict is evidence of a contagion phenomenon (Salehyan and Gleditsch 2006; Buhaug and Gleditsch 2008; Braithwaite 2010a; Forsberg 2014b) or simply an artifact of clustered states with similar domestic attributes (Hegre et al. 2001; Elbadawi and Sambanis 2002; Gleditsch 2002; Fearon and Laitin 2003; Collier and Hoeflter 2004; Bosker and de Re 2014). For instance, Gates and his colleagues (2006) investigate the clustering of political characteristics, demonstrating that relatively homogenous political neighborhoods experience more stability. In short, the character of external influences has been under-explored. Scholars must think critically about the transmission mechanisms involved in the diffusion process and create models that appropriately capture these dynamics.

The Mechanisms of Conflict Diffusion

How do states’ environments influence their own likelihood of experiencing civil war? Here, we propose an explanation that addresses the complex contagion dynamics by framing the environmental effect in terms of the spatial and temporal proximity of others’ civil wars. This approach allows us to incorporate both direct and indirect diffusion mechanisms and to model some of the regional risk factors that produce similar effects for neighboring states.

Direct and indirect mechanisms both drive the spread of conflict. Direct (or physical) diffusion happens when geographically proximate violence, especially when it is in contiguous states, produces externalities. For example, Murdoch and Sandler (2002) discuss spillover economic effects of violence including damage to infrastructure, disturbance of trade patterns, and withdrawal of foreign direct investment from a region. These effects, in turn, spur political unrest in a fragile neighboring state. The movement of weapons and ammunition from one state’s conflict also abets violence in nearby states. An influx of arms might transform a simmering dispute into a full blown crisis. Finally, emigration of people (whether refugees or trained combatants) across porous borders may generate new waves of violence by fostering economic instability (Salehyan 2008) or by altering the domestic power balance (Krcmaric 2014). In the latter scenario, a demographic shift undermines an existing balance
between political groups, making it difficult for them to credibly commit to nonviolence.

Negative externalities affect not only nearby states, but entire neighborhoods. Severe conflict triggers broad, regional aftershocks (Bremer 1982), producing spatially clustered states with similar domestic risk factors such as weakened economies. Such effects are not mere artifacts of coincidence; they emerge from shared exposure to hostile environments.

Conflict may also indirectly affect entire neighborhoods as well. Information about a neighboring conflict, for example, can cause a rebel group to revise its beliefs about success (See, e.g. Hill, Rothchild and Cameron 1998). One such form of learning is through demonstration effects, whereby tactical successes incentivize neighboring groups to adopt similar strategies (Kuran 1998). Rebels engaged in civil conflict recycle innovations used in prior uprisings, fueling concentrated waves of protests and violence. Processes of learning or imitation occur more readily when there is a preexisting link—such as ethnic, linguistic, religious, or cultural ties—between a neighboring conflict and a focal state. For instance, the presence of a separatist ethnic kin group in a neighboring country increases the likelihood of secessionist movements (Saideman and Ayres 2000; Ayres and Saideman 2000).

Rethinking time and space

Most cases of civil conflict diffusion are probably best explained by a conjunction of direct and indirect mechanisms. However, because the mechanisms associated with indirect diffusion processes are elusive, empirical studies of civil conflict onset often neglect them. In a recent article, Forsberg (2014a) describes the difficulties of capturing indirect diffusion processes in

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1Communication, especially via social media, is an important mechanism for diffusion and political contestation, but this process is not easily integrated into current spatial models. Tufekcci and Wilson (2012) provide an excellent introduction to the connection between social media and protest. For those interested in developing measures of diffusion driven by social media or communication technology, we suggest developing them as complements to, rather than replacements of, the current spatial approaches.
large-N studies:

“While spatial proximity may be relevant for direct forms of diffusion, such a restriction may be of less relevance when studying indirect diffusion, as processes of inspiration and strategic learning can travel longer distances. In addition, the temporal dimension of diffusion presents a challenge for future theoretical development and associated statistical models. For instance, a standard time-lag of any kind would miss several of the cases which regional experts would consider to be diffusion” (p. 195).

With this in mind, our analysis of civil conflict carefully considers both the spatial and temporal components of a state’s neighborhood to better explain how regional context conditions domestic outcomes. In what follows, we present our conceptualization of the conflict environment, a new means to incorporate diverse diffusion mechanisms into models of civil war onset.

While recent conflict literature demonstrates great progress in the analysis of geographic space (Gleditsch and Ward 2001; Gleditsch 2007; Buhaug and Gleditsch 2008; Weidmann, Kuse and Gleditsch 2010; Danneman and Ritter 2014), theoretical and empirical treatments of the temporal impacts of civil conflict are less advanced. Scholars’ typical approach to time has been to either set it aside in order to focus on other factors, or to use a simple temporal lag (almost always in the form of one year). This approach hints at, but doesn’t fully capture, the potential cumulative effects of ongoing regional violence or peace. Here we see an opportunity to improve the way we model the historical dynamics of the conflict environment.

We propose a learning- and memory-based approach that considers a state’s unique conflict history as generated by its own conflict experiences and those of its neighbors. We eschew the standard time lags in favor of momentum effects from recent and nearby violence and decay effects from long-ago and distant events. Thus, the effects of environmental instability do not switch off after a set amount of time or because they are not immediately
next door. Instead, regional conflict lingers for years in a state’s collective memory and has security consequences, albeit declining ones, over geographic space. Our approach uses three simple assumptions.

First, when conflict occurs in a state’s local environment, the information it produces immediately affects actors within the state and then its valence degrades over time. Within this framework, new conflict events take primacy in the information queue as old information decays in importance. Thus, the impact of the conflict environment does not simply appear and disappear, but rather fades over time.

Second, the speed at which conflict information decays is itself a function of relevant histories of peace and violence. As years of neighborhood peace accumulate, memories of violence fade more rapidly. If, on the other hand, the neighborhood is plagued with numerous civil war events, this historical memory is harder to shake. A highly conflictual neighborhood institutionalizes violence, making it harder to forgive and forget, increasing the likelihood of conflict spillover, and priming actors to think of force as a legitimate form of discourse. When a state’s or society’s consciousness is shaped by years of nearby instability, the domestic environment in which decisions are made is much different, and much more conflict-prone, than one that is dominated by the view that civil war is a rare and isolated event. These claims are consistent with the logic of “conflict traps” and “conflict hot spots” explored by Sambanis and his colleagues (2003) and Braithwaite (2010b), respectively.

Third, as a state experiences more civil war within its own borders, it becomes more sensitive to its conflict environment’s history. As a state’s domestic experiences become more entrenched in internal violence, that violence becomes increasingly institutionalized, and the decay of information contributing to its environmental history abates. When domestic tensions between factions endure, proximate and recent conflict in the region more persistently condition the political, economic, and social systems within the focal state.

We have conceptualized a state’s conflict environment and laid out a variety of direct and indirect mechanisms, operating over space and time, by which it augments a state’s
proclivity for civil war. Multiple mechanisms play a role in any particular case. In Mali, for example, the cross-national spread of arms, combatants, and refugees all directly contributed to conflict diffusion, as did more indirect exposure to a recent history of civil war in other African states. Our theoretical approach does not distinguish among these mechanisms. Instead, it integrates them into a unified explanation of the kind of environmental conditions that give rise to civil wars.

A more general link between a state’s environment and its susceptibility to civil war can be found in the bargaining process that preserves peace among domestic actors. A conflictual environment increases the likelihood of bargaining failures, thus increasing the chances of civil war onset through two primary pathways. It amplifies commitment problems given the uncertainty over changing conditions. Whether proximate conflict directly diffuses across borders or indirectly through mechanisms of learning and emulation, domestic actors will have greater difficulty credibly committing to peaceful relations. The threat of changing security conditions precludes the ability to commit to a peaceful bargain. Similarly, conflict in the neighborhood may also lead to civil war onset insofar as it triggers authoritarian policies and promulgates extremism, fueling tensions between opposition groups and governments.

Because a state’s conflict environment alters the ability to accurately evaluate intentions and capabilities, the conflict environment drives bargaining failures, and ultimately, civil war onset. Thus, we propose:

**Hypothesis 1** As a state’s conflict environment worsens, it is more likely to experience the onset of civil war.

**Generating the Conflict Environment Score**

To capture the background conditions against which the traditional domestic determinants of civil war operate, we construct a Conflict Environment (CE) score. A state’s CE score represents both spatial and temporal dimensions of neighborhood violence and help provide a more holistic picture of how and why civil war occurs. We also note that the CE score
is customizable to other research agendas; raw conflict data can be drawn, for example, from extant datasets on interstate wars, interstate militarized disputes, and civil wars. The constituent lags can be built using either ongoing conflict, new conflict onsets, or conflict intensity. As such, we hope that the CE score will serve as both a theoretical and empirical contribution beyond its present application. For purposes of this paper, the core piece of the CE score is civil conflict onset.

To construct the spatial component of the CE score, we begin with a standard $N \times N$ matrix, where $N$ is the total number of states in the system. Its cells are populated with binary values, where 0 indicates that the row and column states are not neighbors, and 1 indicates that they are (Ward and Gleditsch 2008). Rather than only evaluating the impact of contiguous states, our calculation includes larger geographic neighborhoods. Spatial diffusion, as the literature shows, does not require a shared border. Following convention, our measure considers two states to be “neighbors” when the minimum distance between them is 950 kilometers or less (Gleditsch and Ward 2001). We obtain data on minimum distances between states from the CShapes dataset (Weidmann, Kuse and Gleditsch 2010). Following Danneman and Ritter (2014), we replace the 0s and 1s in the matrix with distance-sensitive weights; all states that share a “neighborhood” (i.e., dyads with a value of 1) receive a spatially lagged value reflecting their proximity. This spatial lag weights contiguous states more heavily than states that are farther away. Each dyad’s cell in the matrix is generated with this distance-degraded formula:

$$1 - \left( \frac{\text{MinDistance}}{950} \right)^{\frac{1}{2}} \quad (1)$$

We also set the diagonals of each weights matrix to 0, so conflict involving the focal state will not be part of its own CE score. Finally, in order to capture the spatially-weighted impact of nearby conflict, we multiply the row associated with the focal state by a vector of annual conflict values across all states, resulting in a scalar value that is the distance-degraded spatial lag of conflict onset in the neighborhood a given country-year ($slco$). For
the purpose of this research, we use two different civil conflict vectors, one generated with Intrastate War COW data and one generated with UCDP/PRIO Armed Conflict Data.\textsuperscript{2} We also generate two spatial lags, one for ongoing conflict (slc) and one for conflict onset (slco).

After calculating the spatial components of the CE score, we add a temporal dimension. The temporal lag for the model is based on the interstate interaction model developed by Crescenzi and Enterline (2001). We adjust their functional form to make it consistent with the theoretical assumptions outlined above. A state $i$’s CE score in year $t$ is given by:

$$CE_{it} = \left( e^{\frac{1+\delta_{it}}{\alpha_{it}}} \right) CE_{it-1} + slco_{it}$$ (2)

In this equation, $CE_{it}$ is a state’s CE score in a given year, $CE_{it-1}$ is a state’s CE score in the previous year, and $slco_{it}$ is the spatial lag of civil conflict onset within the state’s neighborhood at time $t$. The decay of neighborhood conflict’s effect does not disappear after one year, but dissipates over time. We capture the accumulation of continuous peace in the neighborhood ($\delta_{it}$); more peace in the neighborhood accelerates the decay of old conflict information. We represent the buildup of violent history within a state ($\alpha_{it}$) as a running total of state $i$’s civil conflicts. As such, a state’s history of armed conflict decelerates this decay, making conflict memories more permanent. Table 1 illustrates the descriptive statistics for civil CE scores across various datasets. As the values of the CE scores increase, we expect civil war onset to become more likely.

The net result is a CE score that reflects both the spatial and temporal effects of civil conflict diffusion from a state’s neighborhood to the state itself. Figure 1 plots annual CE scores across all states in our analysis.

\textsuperscript{2}We have also generated CE measures using alternative civil war datasets from Fearon and Laitin (2003) and Sambanis (2004) wars.
Figure 1: Conflict Environment Scores (1960-2006)

Table 1: Civil Conflict Environment Scores Across Civil War Data (1960-2006)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>N</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil CE Score (ACD v 4-2012)</td>
<td>5,971</td>
<td>0.142</td>
<td>0.334</td>
<td>0.000</td>
<td>3.291</td>
</tr>
<tr>
<td>Civil CE Score (COW)</td>
<td>5,602</td>
<td>0.248</td>
<td>0.529</td>
<td>0.000</td>
<td>9.646</td>
</tr>
<tr>
<td>Civil CE Score (Sambanis 2004)</td>
<td>5,208</td>
<td>0.126</td>
<td>0.337</td>
<td>0.000</td>
<td>3.713</td>
</tr>
<tr>
<td>Civil CE Score (Fearon &amp; Laitin 2003)</td>
<td>5,024</td>
<td>0.087</td>
<td>0.266</td>
<td>0.000</td>
<td>3.000</td>
</tr>
</tbody>
</table>

Empirics: Embedding the CE Score in Standard Models of Civil War Onset

One key advantage of our approach is that we craft the CE score such that it complements current analyses of civil war onset. Incorporating environmental or extra-state factors often leads scholars to tools such as network analysis, which can make comparisons to what we already know about the onset of civil war difficult. Moreover, while Social Relations Models
(SRMs) and Exponential Random Graph Models (ERGMs) reduce bias in the estimation
of the central relationship of interest (e.g., GDP’s impact on civil war onset) and reveal
the data’s underlying structure, they do not theorize spatial dependencies and even newer
versions have difficulty managing time dependencies (Cranmer and Desmarais 2011; Dorff
and Ward 2013). Our goal is to evaluate our hypothesis without dismissing widely recognized
causes of civil war. In this section, we therefore briefly review the state of the field in order to
develop the proper platform for our research design before laying out that design, conducting
the analyses, and performing robustness checks.

What we already know: Domestic explanations of civil war onset

Initial domestic explanations of conflict onset rest on economic motivations. Gurr’s theory of
relative deprivation, a grievance-based approach, describes how violent rebellion originates
from a perceived gap between a group’s expectations and its capabilities 1970. Inequali-
ties across groups fuel mobilization (Stewart 2002). Studies have confirmed that unequal
resource distribution as well as political and socioeconomic disparities increase the risk of vi-
olent conflict (Regan and Norton 2005; Cederman, Gleditsch and Buhaug 2013). Economic
deprivation, low rates of economic growth, and low income levels are also empirically associ-
ated with civil war onset (Fearon and Laitin 2003; Hegre and Sambanis 2006). Poverty is
indicative of low state capacity, and therefore, an environment ripe for insurgency. Focusing
on economic opportunity for insurgency, Collier and his co-authors (Collier 2000; Collier
and Hoeffler 2004; Collier, Hoeffler and Rohner 2009) postulate that civil war is driven
by “greed.” Although grievances motivate rebels, groups must have sufficient opportunity to
pursue civil war in order for one to begin.

Beyond economic explanations of civil war, scholars have investigated the role of variables
such as size, state capacity, and regime type. Weak states, defined by their persistent inability
to deliver basic public services to a growing population, exacerbate collective grievances and
provide opportunity space for rebellion (Call 2011; Rotberg 2004). Regime type also has
implications for civil conflict. Highly institutionalized democracies and autocracies face a
very low risk of civil war, while semi-democracies and transitioning regimes are most likely
to experience conflict. Ellingsen and Gleditsch (1997) confirm the inverted U-shaped curve
that represents that relationship between regime type and risk of conflict onset. Hegre and
co-authors (2001) extend this analysis, arguing that regimes which fall somewhere in the
gray area between autocracy and democracy face a higher likelihood of civil war onset.

Finally, intuition suggests that ethnic and religious diversity determine civil war onset.
However, Fearon and Laitin (2003) argue, “It appears not to be true that a greater degree
of ethnic or religious diversity...by itself makes a country more prone to civil war” (75).
While this conclusion runs contrary to common views of ethnic divisions and conflict, further
analyses by Fearon, Kasara and Laitin (2007) and Hegre and Sambanis (2006) also find that
ethnic difference is not robustly associated with civil war onset. Blimes (2006) attempts to
reconcile the disconnect between popular belief and scholarly works, and he finds an indirect
but statistically significant relationship between ethnicity and civil war onset. In what
follows, we include in our statistical models several variables to control for the determinants
of civil war that have been identified in existing research.

**Research Design**

To assess the extent to which the spatial and temporal treatment of a state’s conflict environ-
ment improves our understanding of internal armed conflict, we conduct a probit regression
analysis of civil war onset. Our universe of analysis includes all country-years from 1960
through 2006, so our observations are limited to the postwar and postcolonial era. We use a
binary dependent variable; country-years experiencing civil war onset are coded as 1 while
all others are coded 0.

As Hegre and Sambanis (2006) note, the coding for civil war onset is highly inconsistent
across various studies. To mitigate the effects of these data discrepancies and ensure that our findings are robust across definitions of civil war, we use two different civil conflict datasets to code our dependent variable, one with intrastate war data from the Correlates of War dataset (Sarkees and Wayman 2010; Singer and Small 1982) and one from the Uppsala Conflict Data Project (Themner and Wallensteen 2012; Gleditsch et al. 2002), henceforth COW and ACD, respectively. These datasets are widely used in studies of conflict behavior and also represent the two most extreme thresholds for civil war coding. UCDP codes a civil conflict using a minimum of 25 battle deaths while COW codes a civil war using a minimum of 1000 battle deaths. The UCDP dataset further restricts armed conflicts to those fought over government or territory, in which at least one party is the government of a state (Gleditsch et al. 2002).

To control for domestic determinants of civil war, we first include a state’s per capita income. As a proxy for economic well-being and development, per capita income is thought to be negatively correlated with the risk of civil war onset (Fearon and Laitin 2003; Sambanis 2004; Collier, Hoeffler and Rohner 2009; Bleany and Dimico 2011). That high-income countries are less likely to experience civil war is the most “widely accepted relationship between economic factors and civil war” (Dixon 2009, p.714). On the other hand, poorer states with minimal resources at their disposal are thought to be more conflict-prone. In our model, we control for the natural logarithm of a state’s gross domestic product per capita using data from Heston, Summers and Aten (2012).

Second, we control for population size. Typically, scholars expect that states with a higher population are more likely to experience civil conflict (Sambanis 2001; Collier and Hoeffler 2004; Fearon and Laitin 2003; Reynal-Querol 2002; Salehyan and Gleditsch 2006; 3Bleany and Dimico (2011) analyze the pairwise correlation for war onsets across five different datasets and find that it ranges from 0.197 to 0.634. 4We use the 2010 updates from the COW dataset and the 2012 updates from the UCDP/PRIO Armed Conflict Dataset.
Gleditsch 2007). In a subnational analysis of African states, Raleigh and Hegre (2007) demonstrate that conflict incidence increases with population size and tends to erupt in densely populated areas. We use the natural logarithm of a state’s population drawing on data from Heston, Summers and Aten (2012).

A study of civil war onset must also control for regime type. Ellingsen and Gleditsch (1997) demonstrated a curvilinear relationship between democracy and conflict: highly democratic and highly autocratic regimes are the most resistant to political instability. Following others (DeNardo (1985); Muller and Weede (1998); Regan and Henderson (2002)) we expect anocratic states to be more likely to experience violent conflict. We therefore control for the presence of anocracy using the square of a state’s Polity IV score, lagged by one year (Gurr 1974; Marshall and Jaggers 2002).

Next, we control for the existence of ethnic grievances within a state. The extensive literature on its connection to civil war onset remains divisive because so many metrics are used to capture ethnic fractionalization, dominance, and violence. Early civil war models included a measure of ethnolinguistic fractionalization (ELF) popularized by Easterly and Levine (1997). Critics question its calculation and application in conflict models (Alesina et al. 2003; Fearon 2003; Posner 2004), and several refined indices of ethnic division, identity, and grievances have been developed (see Scarritt and Mozaffar 1999; Roeder 2001; Reynal-Querol 2002; Posner 2004; Chandra 2009; Wimmer, Cederman and Min 2009; Chandra 2012) to better operationalize the mechanisms that fuel violence. Our model employs an ethnic dominance measure from Salehyan and Gleditsch (2006), which captures the percent of the population that does not belong to a dominant group, whether religious, linguistic, or racial. Higher values, based on coding from Vanhanen (1999), indicate a smaller
dominant ethnic minority. Finally, because multiple civil war onset studies note time dependence issues, we follow Carter and Signorino (2010) and use a cubic polynomial approximation. We opt for this method over the time dummies or splines suggested by Beck, Katz and Tucker (1998) because it avoids the quasi-complete separation problem.

**Results: Civil Conflict Across Time and Space**

Models 1 and 3 in Table 2 present baseline domestic models of civil war onset, using ACD and COW data, respectively. Increasing population and ethnic heterogeneity have positive and statistically significant effects on the likelihood of conflict onset in both models. As GDP per capita increases, the likelihood of conflict onset decreases when using UCDP’s definition of conflict. Although this variable does not attain statistical significance in the COW model, the direction of the effect remains the same. The squared Polity Score captures the strength of a regime (democracy or autocracy), with higher values indicating a more consolidated regime. Model 3 confirms that a more consolidated regime (less anocratic) is less likely to experience civil conflict onset. While the effect is not significant in Model 1, it does attain statistical significance in Model 3 (p<.01).

Next, Models 2 and 4 (ACD and COW, respectively) add the CE score to the baseline models. Both specifications reveal that a more conflictual environment increases the likelihood of civil war onset. The effects of the CE score are statistically significant (p<.001 for both the ACD and COW model). Models 2 and 4 indicate that including the CE score improves the statistical model’s fit over that for models that exclusively rely on domestic

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5We run alternative models with Fearon and Laitin’s (2003) traditional ethnic fractionalization measure and Wimmer, Cederman, and Min’s (2009) excluded population measure. The excluded population measure codes access to executive power, or the percentage of the population excluded from executive positions.
Table 2: Effects of the Conflict Environment on Civil War Onset

<table>
<thead>
<tr>
<th></th>
<th>(1) ACD</th>
<th>(2) ACD</th>
<th>(3) COW</th>
<th>(4) COW</th>
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<td>Civil CE Score (ACD)</td>
<td>0.375***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
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<tr>
<td>Civil CE Score (COW)</td>
<td></td>
<td></td>
<td>0.459***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.048)</td>
<td></td>
</tr>
<tr>
<td>GDP (ln)</td>
<td>-0.142**</td>
<td>-0.109**</td>
<td>-0.0835</td>
<td>-0.0384</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
<td>(0.042)</td>
<td>(0.052)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>Population (ln)</td>
<td>0.116**</td>
<td>0.0845*</td>
<td>0.1757***</td>
<td>0.154***</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(0.033)</td>
<td>(0.037)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>Ethnic Heterogeneity</td>
<td>0.00664**</td>
<td>0.00545*</td>
<td>0.00624*</td>
<td>0.00378</td>
</tr>
<tr>
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<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Squared Polity Score</td>
<td>-0.00313</td>
<td>-0.00363**</td>
<td>-0.00451**</td>
<td>-0.00435*</td>
</tr>
<tr>
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<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Time</td>
<td>-0.0400</td>
<td>-0.0453</td>
<td>0.0234</td>
<td>0.0308</td>
</tr>
<tr>
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<td>(0.030)</td>
<td>(0.035)</td>
<td>(0.036)</td>
<td>(0.041)</td>
</tr>
<tr>
<td>Time Squared</td>
<td>0.00247</td>
<td>0.00238</td>
<td>-0.00062</td>
<td>-0.00141</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Time Cubed</td>
<td>-0.0000434</td>
<td>-0.0000389</td>
<td>0.0000022</td>
<td>0.0000149</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.864***</td>
<td>-1.778***</td>
<td>-2.978***</td>
<td>-3.201***</td>
</tr>
<tr>
<td></td>
<td>(0.439)</td>
<td>(0.411)</td>
<td>(0.567)</td>
<td>(0.550)</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Variables lagged one year (except neighborhood and time variables)

* p < 0.05, ** p < 0.01, *** p < 0.001
determinants of civil war onset.⁶

Using Model 2’s results and holding all domestic controls at their median values, Figure 2 plots the predicted probability of civil war onset as the CE score increases. As the CE score (ACD specification) ranges from its minimum value to its maximum, the predicted probability of civil war onset ranges from approximately one percent to close to twenty percent. In very violent conflict environments, then, the likelihood of civil war onset is substantially larger than those environments marked by peace.

Figure 2: Predicted Probabilities of Civil War Onset

 Alternative Measures of Neighborhood Effects

While Table 2 reveals that the relationship between conflictual environments and civil war onset is robust across civil war datasets, we acknowledge that researchers have used alternative measures of that environment. Therefore it seems prudent to ask whether our CE

⁶ A comparison of Model 2 to Model 1 (baseline) demonstrates that both the AIC and BIC are lower for the conflict environment model; the same holds true when comparing Models 4 and 3.
score outperforms traditional measures of regional or neighborhood violence, especially since other measures have produced mixed results, as we noted above.

First, we explore the effects of neighborhood civil war when its operationalization depends on contiguity. In their analysis of the determinants of civil war onset, Hegre and Sambanis (2006) found the presence of civil war in an immediate neighbor to be one of the most robust explanations for civil war onset. Consequently, this measure has been used in later studies of civil war onset (see Buhaug and Gleditsch 2008; Braithwaite 2010a). We use Buhaug and Gleditsch’s (2008) dichotomous variable to indicate the existence of a neighbor at war, reconstructing their variable to be consistent with the most updated version of UCDP’s ACD (Themner and Wallensteen 2012).

Second, we test a variable measuring the presence of regional conflict. If conflict diffuses via mechanisms beyond physical contagion, we expect that states with regionally-based cultural, political, and geographic ties would exhibit similar levels of conflict susceptibility. Post-communist Eastern Europe during the 1990s and the Middle East/North African region during the late 2000s illustrate why we should not assume that conflict-ridden, non-contiguous states in the same region are independent. Therefore, we generate a variable to capture the number of regional participants in civil conflict, basing our coding of region on Fearon and Laitin’s work (2003) and the Minorities at Risk Project (Gurr et al. 2009).

Finally, we also consider how neighborhood economic conditions influence the onset of civil war. Buhaug and Gleditsch (2008) suggest that neighborhood effects on conflict occur because states with conflict-prone characteristics, such as poverty, are geographically clustered. The conflict trap hypothesis popularized by Sambanis and co-authors (2003) suggests that relatively poor and politically unstable countries are spatially grouped. Following Braithwaite (2010a), we include the average income of a state’s neighbors as a measure of neighborhood income.

Table 3 replicates the analyses using each of the three alternative neighborhood measures to the baseline model of civil war onset. Only the Regional States in Conflict (Model 6)
Table 3: Regional and Neighborhood Effects on Civil War Onset

<table>
<thead>
<tr>
<th></th>
<th>(5) ACD</th>
<th>(6) ACD</th>
<th>(7) ACD</th>
</tr>
</thead>
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<tr>
<td>Neighborhood Civil War</td>
<td>-0.120</td>
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</tr>
<tr>
<td></td>
<td>(0.103)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional States in Conflict</td>
<td></td>
<td>0.0407*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood GDP (ln)</td>
<td></td>
<td></td>
<td>-0.0769</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.077)</td>
</tr>
<tr>
<td>GDPpc (ln)</td>
<td>-0.150**</td>
<td>-0.0969</td>
<td>-0.111</td>
</tr>
<tr>
<td></td>
<td>(0.046)</td>
<td>(0.055)</td>
<td>(0.063)</td>
</tr>
<tr>
<td>Population (ln)</td>
<td>0.122**</td>
<td>0.116**</td>
<td>0.112**</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(0.036)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>Ethnic Heterogeneity</td>
<td>0.00679**</td>
<td>0.00670**</td>
<td>0.00592*</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Squared Polity Score</td>
<td>-0.00318</td>
<td>-0.00278</td>
<td>-0.00293</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Time</td>
<td>-0.0375</td>
<td>-0.0434</td>
<td>-0.0225</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.030)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>Time Squared</td>
<td>0.00245</td>
<td>0.00207</td>
<td>0.00130</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Time Cubed</td>
<td>-0.0000436</td>
<td>-0.0000340</td>
<td>-0.0000226</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.805***</td>
<td>-2.330***</td>
<td>-1.518**</td>
</tr>
<tr>
<td></td>
<td>(0.439)</td>
<td>(0.538)</td>
<td>(0.524)</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Variables lagged one year (except neighborhood and time variables)
* p < 0.05, ** p < 0.01, *** p < 0.001

The coefficient is statistically significant (p<.05), but it is quite sensitive to model specification. Lagging the variable and altering the set of control variables renders its effects insignificant. In Models 5 and 7, the coefficients for *Neighborhood Civil War* and *Neighborhood GDP*, respectively, have the expected signs, but fail to attain statistical significance. The results for traditional neighborhood measures found here mimic the mixed support uncovered in the literature. We surmise that the indeterminate role of spatial diffusion is an artifact of
indicators that do not take into account more complex spatial features of the surrounding environment as well as temporal ones. As Model 2 from Table 2 demonstrated, our richer and more dynamic measure of neighborhood context, the conflict environment, has a positive and statistically significant effect on conflict onset ($p<0.001$). Furthermore, a model using the CE score generates better AIC and BIC values than the only one producing a statistically significant coefficient for an alternative neighborhood measure (Model 6).

**Additional Robustness Checks**

To verify the robustness of our findings, we complete a number of checks which are available in the online appendix. Following Collier and Hoeffer (2004), Hegre et al. (2001), and Sambanis (2001, 2004), we explore an alternative coding of civil war onset that drops observations in which a civil war is ongoing. This removes 430 observations in the COW baseline model and 549 observations in the ACD baseline model but our findings remain robust. Second, we explore the effect of alternative neighborhood variables on the Correlates of War dataset. Third, we run alternative models on both civil war datasets that include different operationalizations for ethnic diversity (Roeder, 2001; Alesina et al., 2003; Wimmer, Cederman, and Min, 2009), democracy (Marshall and Jaggers, 2002), and political instability (Fearon and Laitin, 2003; Cederman, Wimmer, and Min, 2010). Fourth, we experiment with different temporal lags for neighborhood variables to ensure that they do not become far more statistically significant when lagged by only one or two years. Finally, we add our CE score to models of civil war onset proposed by Buhaug and Gleditsch (2008) and Fearon and Laitin (2003). Doing so improves the explanatory power of the model without substantially changing the significance of other key variables. Ultimately, our robustness checks on the spatial and temporal effects of neighborhood conflict are consistent with our main empirical analysis.
Conclusion

A state’s surroundings affect its proclivity for civil war. That claim has made intuitive sense to scholars for a long time, but supporting evidence has been mixed and fleeting until now. Our improved conceptualization and measure of a state’s conflict environment fluctuates and updates as new events, especially those that are more geographically proximate, in that environment arise and as old ones fade away. Empirical analyses confirm that violent conflict environments increase the likelihood of civil war onset; suggesting that both direct and indirect diffusion mechanisms spur new cases of civil war and that lingering memories of violence contribute to its spread as well.

Additionally, our approach offers researchers the flexibility to incorporate the conflict environment history into an explanation of civil war that does not dismiss critical domestic determinants of violence. This strikes a balance between recognizing and incorporating a state’s surroundings and connections with the world and grounding civil war explanations in domestic political processes.

Future research is warranted along both theoretical and empirical lines. For example, more work is needed on the factors that condition the transmission of conflict across space. In other words, how can scholars be smarter about when and how conflict in the neighborhood is expected to exacerbate the risk of violence at home? Environmental factors could include transmission mechanisms such as road networks, border crossings, and refugee flows (Krcmaric 2014). Future work must think theoretically about the internal factors, such as economic and institutional characteristics, that make states vulnerable to environmental pressures. In this analysis we assume that all states are equally susceptible to perturbations in their conflict environment, but we suspect this is an oversimplification. Mapping conflict environments in conjunction with identifying the states that are most likely to be affected by their surroundings will improve our ability to predict the onset of civil wars. Additionally, scholars should recognize that conflict is not the only important dimension of a state’s environment. Other meaningful dimensions might be defined by neighbors’ regime
characteristics and communities or economic factors (Ahlquist and Wibbels 2012).

Finally, it is important to note that our temporal innovations in modeling the conflict environment are intended to form a baseline model. Scholars who seek a more nuanced historical context for a particular state or part of the world can build upon this to better represent the way history influences decision-making with states. Some states have cultivated an institutional sensitivity to nearby threats that may affect the permanence of the impact of historical violence. Serbians, for example, represent outside threats by memorializing the fourteenth century Battle of Kosovo in poetry, song, and film. For Czechs it is the battle of Bila Hora in 1620. Such chosen traumas can make states more susceptible to reacting to neighboring violence with internal violence (Volkan 2011, 88-89). Quantifying the existence and impact of these institutionalized memories would be difficult if not impossible on a large-N scale, but these cases illustrates one of the many ways qualitative research can improve upon baseline quantitative analyses and extend our conceptualization of conflict environments.
References


Braithwaite, Alex. 2010a. *Conflict Hot Spots: Emergence, Causes, and Consequences*. Ashgate.


Heston, Alan, Robert Summers and Bettina Aten. 2012. “Penn World Table Version 7.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.”.


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