The downstream effects of combatant fragmentation on civil war recurrence

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Abstract

We consider whether the fragmentation of combatants during civil war has downstream effects on the durability of peace following civil wars. We contend that the splintering of combatant groups, a primary manifestation of rebel group fragmentation, produces potential spoiler groups that are neither incidental nor unimportant in the process of civil war resolution. Making connections to the spoiling and credible commitment literatures, we hypothesize that rebel splintering hastens the recurrence of civil wars. Using event history modeling and propensity score matching to analyze two different civil war datasets, we examine whether the occurrence of fragmentation during a civil war influences the length of peace after the civil war. The empirical analysis of fragmentation events during civil wars since World War II offers support for the hypothesis that splintering decreases the duration of post-civil war peace. The results suggest the need to pay closer attention to the dynamics of fragmentation, and particularly how these dynamics lead to future consequences – even when those consequences take place after the war has concluded. For example, governments that attempt to splinter groups or to use existing fragmentations within rebel groups to end a civil war may encourage the unintended consequence of shorter peace duration.

Keywords

civil wars, fragmentation, peace duration, rebel groups, rebel splintering

Introduction

Accounts of civil wars are replete with examples of changes to the set and characteristics of the combatants. Evidence from Chad, Sudan, Chechnya, Burundi, Peru, Angola, and India, among many others, demonstrates that actors change substantially even during short periods of time. Groups often fracture, leading to new groups that are sometimes closely allied to their former group, or may break ties completely. It is uncertain, however, whether the effects of splintering are incidental or fundamental to the likelihood that civil wars are resolved peacefully. Certainly, there are a number of cases, such as Afghanistan, Chad, and Liberia, where groups splinter (UCDP, 2010), and subsequent peace does not last (Doyle & Sambanis, 2000). In this article, we ask: are wars that experience such fragmentation more likely to recur, and if they do recur, how quickly?

Most theoretical accounts of civil war consider two primary actors, a government and rebel group, or leave unspecified the set of actors involved. With some recent exceptions (Doyle & Sambanis, 2000; Cunningham, 2006; Nilsson, 2008; Cunningham, 2011; Cunningham, Bakke & Seymour, 2012), few quantitative studies account for the role of a lengthy and dynamic roster of combatants. In most qualitative accounts, the full set of actors in a civil war may be appreciated much more, but it is unclear what generalizable lessons can be learned. The recent work on the dynamics of multiple warring factions is largely considered in the context of comparing wars with greater numbers of actors against wars with fewer (Doyle & Sambanis, 2000; Cunningham,

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2006). We question whether there is something unique about the dynamics of group formation and change that needs to be considered.

We contend that fragmentation events, specifically the splitting of combatant groups during a civil war, can alter the environment in which groups interact, and change their propensities to seek peace or spoil peace processes in the pursuit of further war. Whereas splintering could shorten civil war, such as with the 'win away pieces' (Zartman, 1995: 23) argument, we ask whether the duration of *post*-war peace is shortened, even if fragmentation contributed to the cessation of hostilities. Splintering not only creates new groups with divergent preferences and potentially significant capabilities, but may also lead to significant commitment problems that persist after war ends. These conditions lead to the recurrence of conflict, as new groups may be unwilling to accept the postwar situation, and governments may be wary of rebel groups that agreed to a negotiated settlement.

Using the UCDP Actor Dataset (UCDP, 2010) and Doyle & Sambanis (2006) data on civil war recurrence, we examine how rebel group splintering affects the timing of civil war recurrence. While fragmentation could refer to a generic decentralization of actors, institutions, and power (Ishiyama & Batta, 2011; Bakke, Cunningham & Seymour, 2012), we focus this study specifically on the effects of splits within groups, which we hereafter refer to as 'fragmentation' or 'fragmentation events'. Our coding indicates that splintering takes place in 16% of civil wars in the Doyle & Sambanis (2006) data, but even this relatively small proportion of fragmentation cases appears to lead to a significant shortening of post-civil war peace.

Literature

The civil war resolution literature has boomed in recent years, and has been guided by the rationalist approach of commitment and information problems (Fearon, 1995; Mason & Fett, 1996). Substantial attention has been placed on what makes negotiated agreements strong enough to be signed and hold over the long run (Fortna, 2003; Mattes & Savun, 2009). Some contend that wars ending in victory are likely much more secure than negotiated agreements (DeRouen & Sobek, 2004; Quinn, Mason & Gurses, 2007; Flores & Nooruddin, 2009; Toft, 2009). Related, the issue that has drawn perhaps the most attention is the existence and character of power-sharing arrangements (Hoddie & Hartzell, 2003; Hartzell, Hoddie & Rothchild, 2001; Hartzell & Hoddie, 2003; Hartzell, 1999; Walter, 2002; Mattes & Savun,

2009; Mukherjee, 2006). Work questioning the importance of power-sharing arrangement points to the important role of ethnicity (Downes, 2004), suggesting that ethnic wars may face more severe commitment problems and ethnic actors are likely to see issues as indivisible (Doyle & Sambanis, 2006). Some scholars contend that a third-party security guarantee is a near necessary condition for successful implementation of peace agreements (Hampson, 1996; Walter, 2002; Fortna, 2004). Third parties could also occupy a central role in a more holistic peacebuilding process (Doyle & Sambanis, 2000, 2006), especially if implemented in a paced and measured way (Paris, 2004). Contextual factors such as economic development, improvements, and incentives may be crucial to successful peace implementation (Collier, Hoeffler & Soderbom, 2008; Walter, 2004; Flores & Nooruddin, 2009), a result that implies a strong role for third parties in granting foreign aid and other economic incentives.

Scholars have begun focusing more attention on the behavioral dynamics of combatants, including the number of combatants fighting wars or attempting to make peace, as well as the incentives that these dynamics create. It is becoming clear that the roster of actors cannot be ignored: some combatants may exercise a 'veto' over the decision to end a war (Cunningham, 2006), governments may refuse to make concessions to some groups if they are likely to face demands from many other groups afterwards (Walter, 2003), and even third-party military intervention can complicate the length and terms of a war's resolution (Regan, 2002; Balch-Lindsay, Enterline & Joyce, 2008; Elbadawi & Sambanis, 2000; Akcinaroglu & Radziszewski, 2005; Cunningham, 2010). Delving deeper into this relation, others ask whether it matters *how* the various actors are involved and find that excluding actors from a peace agreement may not always matter, especially if the included parties prepare for likely violence from these additional actors (Nilsson, 2008). Moreover, the effects of the number of actors on different stages of a peace process may depend on the stage, with greater numbers of actors making negotiations more likely, but implementation less likely (Findley, 2013). And it may be the case that third parties have developed ways to mediate conflicts to overcome such problems (e.g. Crocker, Hampson & Aall, 1999; Crump & Glendon, 2003; Crump & Zartman, 2003; Raiffa, 1982).

However, it is likely the case that the *process* of actor fragmentation, whereby new actors are formed, modified, or even destroyed (Findley, 2008), affects civil wars differently than a simple count of the actors and complicates resolution. Greater understanding of how actors are

formed and behave, along with all the associated complexities of structure and adaptation (Kalyvas, 2003), could offer new insights into the behavioral conclusions of wars. Fragmentation, for example, could be conceptualized as an event or as a characteristic. We suggest that the event of splitting may itself matter, rather than just the characteristic that a large group is fractured along several lines for a variety of reasons (Bakke, Cunningham & Seymour, 2012) or alternatively the exclusive rise of new actors (Fjelde & Nilsson, 2012).

A focus on splintering challenges the unitary actor and fixed set of actors assumptions in much of the current literature (Pearlman & Cunningham, 2012; Bakke, Cunningham & Seymour, 2012; Cunningham, Bakke & Seymour, 2012; Cunningham, 2013). It implies that how actors form, change, and cease to exist may be important for how conflict rises and falls.[1] Some work suggests this is the case during wartime (see, for examples, Kalyvas, 2006; King, 2004; Humphreys & Weinstein, 2006; Weinstein, 2007) and has stimulated a number of questions in need of greater investigation. There is little empirical work on how splintering affects conflict *after* civil war, however. Ishiyama & Batta (2011), for example, focus on the effects of group disunity and group cooperation during a civil war on the durability of subsequent peace agreements. This neglects the specific process of group splintering, which we argue is not only the most dramatic, but the more important, form of group disunity. This may be why their study finds mixed evidence that group disunity affects the durability of peace agreements (Ishiyama & Batta, 2011: 449).

Some literature examines fragmentation in greater depth and contends that fragmentation may actually be beneficial to ending a war, because groups are weakened and easier to defeat (Findley & Rudloff, 2012), otherwise known as 'divide and conquer' (Cunningham, 2011). For instance, a split in the Ugandan rebel group WNBF led to the easier defeat of the WNBF and its splinter faction, the UNRF II. It may be the case that, rather than pursue victory, the government pursues a negotiation strategy that attempts to 'win away pieces' (Zartman, 1995: 23) or 'divide and concede' (Cunningham, 2011) in an attempt to reach a settlement (Nilsson, 2010), encouraged by incentives not to make major concessions, especially too early in a war (Bapat, 2005) or if

more combatants remain (Walter, 2003).[2] Such a strategy may increase the likelihood of successful settlements, as it decreases the prevalence of inherent 'commitment problems' (Driscoll, 2012). However, there is a potential paradox: as groups fragment, perhaps between moderates and extremists, some new groups can press for peace more easily. Fragmentation could encourage quicker negotiated agreements (Findley & Rudloff, 2012), but the process of reaching an agreement quickly following fragmentation might simply sow the seeds for later breakdown.

By conventional wisdom, splits that create weak groups should not matter, because weaker groups possess insufficient ability to affect the outcome of the war (Cunningham, 2006). This contrasts, however, with work arguing that even small, weak groups may be able to use other strategies to create mistrust or derail the peace process (Werner & Yuen, 2005a; Kydd & Walter, 2002). Indeed, the literature on 'spoiling' (Stedman, 1997; Greenhill & Major, 2007; Nilsson & Kovacs, 2011) highlights the perils of implementing peace following civil wars, especially in the face of marginalized groups with incentives to disrupt peace. As internal political divisions affect a group's opportunity and willingness to spoil (Pearlman, 2009), we now turn to a discussion of conditions under which this could occur.

Theory

Fragmentation creates difficulties for peace after the conclusion of fighting in a civil war. Fragmentation may create new groups with different preferences and sufficient capability to continue fighting. Furthermore, the fragmentation of a rebel group during a civil war may create commitment problems in the post-civil war period, as governments and other rebels are uncertain of the prospects of continued adherence to the postwar status quo.

Combatants engaged in civil war are motivated by the desire to achieve a number of possible outcomes. Conventional wisdom holds that the war's outcome is paramount for both the government and rebel factions. For governments, the goal is typically thought to be a preservation of the status quo to retain power. The motivation for rebels: achieve political change – limited concessions, independence, or government overthrow. Wars, however, are complex and leave room for many other motivations, both political and personal (Mueller,

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[1] Our interest is in the effects, not causes, of fragmentation. The literature on the causes of fragmentation is extensive (see review in McLauchlin & Pearlman, 2009), especially in the social movement literature.

[2] It may be the case that fragmentation complicates bargaining, such as in Cunningham (2007), though this approach treats fragmentation as a characteristic of the group and not as an event.

2000; Kalyvas, 2003). A combatant is not likely to have a single political goal, furthermore, but rather a variety of goals depending on the particular internal organization of the group.

During the process of war, the internal organization of a group, and its preferences about the outcome of the war, may change in response to events on the ground. As battles are won or lost and as opportunities for negotiations arise, combatants must attempt to navigate their way through the 'fog' of war (von Clausewitz, 1832/1993). Decisions, such as how to prosecute the war, whether to pursue peace, and on what terms, face combatants regularly. Much hangs in the balance: the war could be won or lost, with much at stake for the individuals who participated. Such existential threats result from the decision of rebels to part ways and fight separately or remain together, despite different goals.

As groups splinter, the creation of new groups with divergent preferences affects how war ends and whether a war ultimately recurs. The most direct way that rebel group fragmentation impedes successful civil war resolution is through the creation of factions that prefer to continue violence rather than agree to a particular settlement (Stedman, 1997; Pearlman, 2009). Fragmentation likely occurs because combatants within the original rebel group disagree over the strategies or the end goals of the group, especially in response to outside hostility (McLauchlin & Pearlman, 2009). In either case, the fragmentation is indicative of an underlying divergence of preferences among rebels (Bakke, Cunningham & Seymour, 2012), which can lead to differences in commitment (or opposition) to peace agreements or the acceptance of a combatant's victory.

Although the presence of multiple rebel groups may complicate war resolution (Cunningham, 2006), it does not necessarily mean a significant divergence of preferences. Geographic limitations, such as the inability of groups with limited capability to coordinate attacks, could account for the difficulty of securing peace. Each group may possess similar preferences, with significant overlap in their demands on the government. As groups pursue a split or dissolution of part of their group, however, resulting groups are likely to have different sets of preferences, and it may be more difficult for a settlement to satisfy all combatants. This is particularly true when newly splintered groups are less willing to end the violence (Stedman, 1997; Pearlman, 2009).

Negotiated agreements occur under a wide variety of circumstances. In the bargaining literature, the key to reaching an agreement is that all sides know the preferences and capabilities of the other actors, allowing for a settlement to be reached that is preferred by all sides

compared to the status quo (Wagner, 2000; Filson & Werner, 2002; Powell, 2002, 2004).[3] During war, combatants interact with one another, allowing all parties to gain more information about the other sides (Filson & Werner, 2002). Actors attempting to negotiate a peaceful end to conflict can also be strategic about what actors to include in the settlement, excluding parties with the expectation that the agreement will survive in spite of violence by those parties (Nilsson, 2008). Therefore, an all-inclusive settlement may obtain, but be more beneficial to some groups and not others, especially if a significant divergence of preferences characterizes the various groups. In cases where the government and rebels do not yet possess knowledge of the other side, an agreement may not be reached at all, but the war stalls or ends. Such war endings are intermediate steps towards the end goal of successful peace implementation (Hampson, 1996; Walter, 2002).

Even in cases where the preferences for continuing the war do not diverge, or when all fragmented groups are included in a negotiated agreement (Nilsson, 2008), fragmentation may create uncertainty regarding the future that may lead to renewed violence. The fragmentation of a group during a civil war may create commitment problems (e.g. Kydd & Walter, 2002) that are difficult to overcome after the end of a civil war. Some argue that these issues are lessened by fragmentation, because the resulting groups that ally with the government will retain the capacity to punish the government for failing to follow through on any resulting settlement (Driscoll, 2012: 121). Fragmentation is not only about the resulting capability of groups, however. Splintering may indicate a significant divergence of preferences within a group, and that future fragmentations are likely. This creates uncertainty in the post-civil war environment, even when all sides tentatively agreed to a settlement to end the war. This can cause the breakdown of settlements, even when all sides prefer the settlement to a recurrence of violence. A government, for example, may believe that existing rebel groups are likely to follow the terms of a peace agreement, but also that these groups are unlikely to exist in the future in their current form. A past fragmentation may lead to the belief that significant divisions remain within a group, and that a fragmentation may still occur that will lead to a breakdown in the agreement (Stedman, 1997; Pearlman, 2009).

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[3] In civil wars, capabilities are not readily apparent and may be latent until combatants engage each other in a direct and sustained way (Findley & Edwards, 2007).

Although fragmentation may lead to new groups with diverse preferences and strategies, we focus here on violent groups. Groups committed to violence are more likely to create significant commitment problems, even if these groups initially or eventually support a peace agreement. A peaceful group, even if it is opposed to an agreement, is unlikely to cause the breakdown of the settlement due to its unwillingness to use violence. Therefore, although their preferences may be important for the resulting peace agreement, such peaceful groups are unlikely to end an agreement, even if the group opposes the terms of the settlement. Violence, or more importantly, the threat of future violence, is much more likely to lead groups to end a settlement, as such existential threats can create a willingness to re-engage in violence rather than to fail to fully implement an agreement.

Therefore, parties may engage in renewed violence not because of conditions today, but of what they perceive conditions will likely be in the future (Fearon, 1995; Powell, 2006). Fragmentation during the civil war may lead to a fragile peace, as states are unwilling to fully implement a resulting peace agreement. If a civil war ends in an agreement, all included parties must commit to implementing the peace agreement (Walter, 1999). This includes splintered groups that subsequently side with the government in the conflict, and how much can the government trust a rebel group that has so recently been an enemy? Groups may be unwilling to fully implement an agreement when there is a belief that *any* of the parties of the agreement will fall apart. This creates caution for implementation, either because this possible fragmentation creates an opportunity to obtain a greater portion of the spoils, or because groups are afraid to commit significant resources to implementing an agreement that will likely fall apart (Walter, 2002). Fragmentation itself may be the most ready indicator of whether future splintering of groups is likely to undermine peace.

Fragmentation is also likely to lead to renewed violence in cases where there is a victory. We argue that fragmentation during civil wars, although it may lead to information problems (Findley & Rudloff, 2012), is perhaps more problematic for post-conflict peace in terms of creating significant commitment problems (Fearon, 1995; Kydd & Walter, 2002; Powell, 2006). The splintering of an existing group means that each resulting group is likely to maintain some combative capacity. Fragmented groups are more likely than newly formed groups to be made up of members with experience in fighting the conflict, and will have knowledge of how to obtain weapons, funding, and new recruits. Fragmentation results not only in the creation of groups that are

likely to possess divergent interests, but the creation of groups that are likely to possess the means to pursue those different interests. Fragmented groups may be better able to continue fighting in opposition to the government compared to newly created groups, because they will possess important knowledge, infrastructure, and combative capacity from the previous group. Regardless of how the civil war ends, fragmented groups thus present a consequential obstacle to peace. If war ends with relative victory, splintered groups may be unwilling to accept the finality of this outcome, and may bide their time until they are able to mount a new campaign against the postwar status quo. Fragmented groups may also be much smaller than the groups from which they splintered, and may only be capable of engaging in limited forms of violence. Over time such a group may grow in strength and become a new focus for those opposed to the status quo to rally around. Even small fragmented groups may be better able to carry out disproportionately violent attacks against the victorious side, even after widespread violence ceases.

We argue that fragmentation creates new groups that are likely to continue fighting after the civil war, or groups that increase commitment problems among the other actors in the post-civil war period. Peace after a civil war (regardless of whether the civil war ended through negotiation or fighting), is much more tenuous in cases where rebel group fragmentation occurred during the civil war. This leads to the expectation that peace is much less likely to last in cases of civil war rebel group fragmentation:

> *Hypothesis 1:* The duration of peace after a civil war is likely to decrease if at least one rebel group fragmented during the civil war.

Fragmentation is an important process during civil war, but the consequences of fragmentation are felt even after the conclusion of the civil war. Fragmentation creates significant obstacles to peace, whether the obstacle is a new group or a severe commitment problem that make peace implementation difficult. In either case, fragmentation may lead to a shorter duration of peace after the civil war.

Research design

We use the Doyle & Sambanis (2006) dataset to analyze civil war recurrence for several reasons.[4] They include data not only on civil wars, but on the recurrence of civil

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[4] We obtained their replication dataset from http://pantheon. yale.edu/%7Ens237/DS2006replication.zip.

wars. The data are extremely well documented, especially the war beginnings and war endings, information that is often ambiguous in other datasets. This additional information is necessary when determining whether a participant fragments during a civil war as opposed to before or after. The data contain information on civil wars from 1946 to 2002, a significant number of years.

The unit of analysis for this study is the post-civil war period, as the hypothesis refers to the duration of peace following civil war. Furthermore, we include all civil wars in the dataset, regardless of whether any negotiated agreements were reached (unlike Nilsson, 2008). The theoretical arguments in the previous section indicate that fragmentation may affect civil war recurrence regardless of how the civil war ended. Given this, we utilize all of the cases in the Doyle & Sambanis (2006) data as a baseline.

Dependent variable

The hypothesis requires that we use information on the amount of time that passes prior to a civil war recurrence (Hypothesis 1). Fortunately, the Doyle & Sambanis (2006) dataset contains variables fulfilling this requirement. These data code civil wars between 1946 and 2002, where the armed conflict takes place between organized sides with political goals and leads to at least 500–1,000 deaths in the first year. Civil war endings are also carefully coded based on whether the political objectives change, the violence effectively becomes one-sided or a military victory lasting six months, a peace treaty produces at least six months of peace, or a ceasefire or truce ends the fighting for at least two years.[5]

The dependent variable used to test Hypothesis 1 is Doyle & Sambanis's (2006) variable of the number of months that pass prior to civil war recurring. This variable contains information not only on how much time passes prior to a civil war recurrence, but also whether a civil war recurs. This is necessary, because even though we are interested in the amount of time that passes prior to civil war recurrence, it is possible that civil wars never recur, and this information should be considered in the analysis. Unlike Ishiyama & Batta (2011), we do not restrict the data to cases of civil wars that ended in peace agreements. The theoretical discussion and hypothesis in the previous section apply to a broader set of cases, including cases that ended in the victory of one of the combatants.

As a further check on the ability of fragmentation to explain future conflict, we utilize Rustad & Binningsbø's (2012) version of the UCDP data, which calculates 'conflict episodes' (2012: 536) within a civil war as a means of testing models of peace duration covering the period 1946–2005. This dataset must be used with caution, however, as it does not measure post-civil war peace, but instead periods of time when a particular conflict does not reach the threshold of 25 deaths as a result of conflict per year (UCDP, 2011). As a result, these data are likely to capture many interconflict lulls in violence, rather than post-civil war peace. The Doyle & Sambanis (2006) data, on the other hand, were carefully collected to capture post-civil war peace duration (Sambanis, 2004, n.d.).

We utilize event history analysis to test the duration of peace, similar to previous studies interested in the amount of time prior to recurrence (Hartzell & Hoddie, 2003; Fortna, 2003, 2004; Werner & Yuen, 2005a; Mattes & Savun, 2009). There is less agreement on which type of event history model to use in the civil war recurrence context, with some studies utilizing a Cox Proportional Hazards model (Hartzell, Hoddie & Rothchild, 2001; Hartzell & Hoddie, 2003; Fortna, 2004; Werner & Yuen, 2005b; Mattes & Savun, 2009), and others utilizing alternatives, such as the Weibull model (Fortna, 2003; Hartzell & Hoddie, 2003). We use the Cox Proportional Hazards model, because we do not have a strong justification to assume that civil war recurrences take place in a particular pattern (Box-Steffensmeier & Jones, 2004).

Independent variables

In order to test the hypothesis we must construct a variable indicating whether or not a fragmentation takes place during a civil war. We used various sources to code the variable. The actor list in UCDP (n.d.) details rebel groups, and contains 'a dummy variable that indicates whether a non-state actor was formed by breaking away from an actor that has also been registered in UCDP data' (UCDP, 2010: codebook, p. 12). We then searched the text descriptions of the conflicts reported in UCDP (2011) to find references to fragmentations taking place during the course of the war. Finally, other sources are used to identify whether fragmentations took place during a civil war (Doyle & Sambanis, 2006) or a 'conflict episode' (Rustad & Binningsbø, 2012: 536).

One difficulty is that much of the information on fragmentation is derived from the UCDP/PRIO Armed Conflict Dataset (Pettersson & Wallensteen, 2010), rather than the Doyle & Sambanis (2006) data. In some

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[5] See Appendix A in Doyle & Sambanis (2006) for more information on data coding.

cases, UCDP (n.d.) indicates that a fragmentation takes place in a year when there is no ongoing civil war in the Doyle & Sambanis (2006) dataset. We are only interested here in fragmentations that take place during a civil war, so we exclude cases where a fragmentation takes place prior to the beginning date or after the ending date of a civil war. In cases where the UCDP (n.d.) does not clearly indicate the year a fragmentation takes place, we consult additional sources in an attempt to determine a more specific timing.

Although there is not a perfect overlap between the UCDP/PRIO data and Doyle & Sambanis (2006), it is important that we use Doyle & Sambanis (2006) because of the higher death threshold. Using the UCDP (n.d.) data would be problematic because splintering is identified when new groups contribute to the production of at least 25 deaths. If the death threshold for the dependent variable were also 25 deaths, then the analysis would verge on tautology. By including the higher death threshold from Doyle & Sambanis (2006), we can be sure that splintered groups are both conceptually and operationally separate from the outcome of interest. Further, by ensuring that newly splintered rebel groups are capable of causing 25 deaths, we exclude rebel groups too weak to influence conflict or even the perceptions of other actors.[6] This leads to a more conservative estimate of the frequency of fragmentation (e.g. compared to Findley & Rudloff, 2012: 881), but this coding of fragmentation (for the analysis in Table I) more closely follows the theoretical explanation in this article.[7]

We use a number of control variables from the Doyle & Sambanis (2006) dataset that correspond to theoretical arguments and empirical findings in the existing literature. First, variables are included to control for characteristics of the war: whether or not the war was an ethnic conflict (Licklider, 1995; Doyle & Sambanis, 2006), the costliness of the war (Quinn, Mason & Gurses, 2007), the number of factions involved in the war (Cunningham, 2006), and whether or not the civil war ended in a military victory (Licklider, 1995; Toft, 2009). Given third parties have been shown to affect the

Table I. Frequency of fragmentation

	Number of cases	% Cases
Fragmentation	22	16
No fragmentation	116	84
Totals	138	100

duration and final outcomes of wars, another key variable included as a control is whether there was a third-party peace operation (Hartzell, Hoddie & Rothchild, 2001; Hartzell & Hoddie, 2003; Walter, 2002; Fortna, 2004; Mattes & Savun, 2009). Finally, to consider the possibility that economic factors contribute to recovery from the war, two economic control variables regarding the country where the civil war takes place are included: the amount of primary commodity exports (Collier & Hoeffler, 2004; Doyle & Sambanis, 2006) and the level of development (Quinn, Mason & Gurses, 2007), as indicated by the amount of electricity used (Doyle & Sambanis, 2006). Similar variables for many of these controls are also included in the Rustad & Binningsbø (2012) dataset, including a variable for United Nations peacekeeping operations, whether or not the war ended in military victory, and a variable that estimates primary commodity exports as a percentage of gross domestic product, similar to Collier & Hoeffler (2004). In addition, we used the list of participants to create a list of the number of rebel groups involved in the conflict by summing the list of *named* rebel group participants (Rustad & Binningsbø, 2012). Finally, a development variable that measures electricity consumption was added to the dataset using the electricity consumption information in the Correlates of War Project's National Material Capabilities Dataset (Correlates of War Project, 2010; Singer, 1988).[8]

Empirical analysis

Our empirical examination of the effect of fragmentation on post-civil war peace focuses on the duration of peace following war (Hypothesis 1). Throughout our analysis, we use the Cox Proportional Hazards model, where the dependent variable is a measure of time until war recurrence. In Table II, we report hazard ratios for each of the variables in the analysis.[9] A hazard ratio above 1 signifies

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[6] One potentially problematic case is Northern Ireland. Although a group calling itself the Real IRA did splinter prior to the peace agreement in 1998, the resulting group's activities did not lead to deaths until after the civil war (Connolly, 1998; *Irish Times*, 1998). We do not code this as a case of splintering during the civil war, but dropping the case of the United Kingdom from the data does not substantively change the results reported in Table II, Model 1.

[7] For an expanded list of all case codings, see the online appendix, Tables 1–3.

[8] In the online appendix, we provide a correlation matrix with more details on how the independent variables relate to each other. See online appendix, Table 4.

[9] Tables II and IV report clustered standard errors, and Table III reports robust standard errors.

Table II. Cox proportional hazards model, 1947–2002: Doyle & Sambanis (2006)

	Model 1	Model 2	Model 3	Model 4
Fragmentation	2.240[*]	2.254[*]	2.053[*]	2.247[*]
	(0.718)	(0.712)	(0.671)	(0.732)
Ethnic civil war	1.528	1.523	1.504	1.316
	(0.440)	(0.436)	(0.435)	(0.400)
Costs of civil war	1.095	1.097	1.093	1.077
	(0.069)	(0.069)	(0.066)	(0.071)
Number of factions	1.014	–	1.027	1.080
	(0.079)	–	(0.079)	(0.085)
Strong peace operations (all)	0.765	0.772	–	0.801
	(0.320)	(0.323)	–	(0.374)
Strong peace operations (UN)	–	–	0.371	–
	–	–	(0.287)	–
Military outcome	0.816	0.810	0.770	0.756
	(0.221)	(0.217)	(0.207)	(0.226)
Level of development/electricity	0.553[*]	0.556[*]	0.528[*]	0.549[*]
	(0.148)	(0.147)	(0.140)	(0.137)
Commodity exports/GDP	2.930[**]	2.875[**]	2.729[**]	3.193[*]
	(1.115)	(1.070)	(1.041)	(1.582)
Length of civil war	–	–	–	0.998
	–	–	–	(0.002)
Log of population	–	–	–	1.138[†]
	–	–	–	(0.083)
Terrain (Mountains)	–	–	–	0.999
	–	–	–	(0.006)
Decade civil war began	–	–	–	1.086
	–	–	–	(0.121)
N	131	131	131	131
Log-likelihood	–277.343	–277.354	–276.403	–275.384
χ^2	< 0.001	< 0.001	< 0.001	< 0.001

Table reports hazard ratios, with clustered robust standard errors in parentheses. *p*-values: [†] < 0.1, [*] < 0.05, [**] < 0.01.

an increasing likelihood of civil war recurrences (i.e. the length of peace after the civil war decreases), whereas a hazard ratio below 1 signifies the opposite (Box-Steffensmeier & Jones, 2004).[10]

Table II presents four separate analyses, each with a different model specification to examine the robustness of the fragmentation finding. Across each of the models, the fragmentation variable is statistically significant, and the hazard ratio indicates that the presence of a fragmentation during a civil war decreases the duration of peace after the civil war. That is, civil war is more likely to recur sooner after civil wars where a splinter group has formed. These findings provide robust support for Hypothesis 1.

The findings are consistent across each of the model specifications. After employing a baseline model specification in Model 1, we then turn to Model 2, which excludes the variable indicating the number of groups active in the civil war in order to separate the effect of the process by which rebel groups may be created (i.e. fragmentation) from the results of this process (the number of groups active). The fragmentation variable is statistically significant across both models, indicating that the process by which new groups are formed is distinctly important relative to the overall number of groups in explaining civil war recurrence.

Model 3 uses a different variable to indicate the presence of a peacekeeping mission, focusing on United Nations peacekeeping rather than peacekeeping from a variety of sources.[11] Again, the effect of the fragmentation

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[10] We further test to ensure the assumptions of the Cox Proportional Hazards model are not violated in our primary model (Model 1). Both the 'link test' and the 'Schoenfeld residuals' test indicate the assumptions are not violated (Cleves et al., 2010).

[11] Both of these peacekeeping variables are from Doyle & Sambanis's (2006) data, insuring measurement consistency across the two variables.

variable is consistent with previous models, although when examining the presence of United Nations peace-keeping, the hazard ratio of the fragmentation variable decreases slightly. Regardless of the source of the peace-keeping operation, however, there appears to be little evidence from the models that peacekeeping increases the length of peace after the termination of a civil war. This runs counter to the finding in much of the literature that such operations increase peace in the post-civil war period (Hartzell, Hoddie & Rothchild, 2001; Walter, 2002; Hartzell & Hoddie, 2003; Fortna, 2004; Mattes & Savun, 2009).

The final model (Model 4) in Table II includes a number of other variables from the Doyle & Sambanis (2006) data that may also influence the length of peace after civil war. Only one of the additional variables in Model 4, the population of the state experiencing civil war, appears to be related to the length of peace. According to the model, as the population gets larger, the duration of peace decreases. Fragmentation remains a statistically significant indicator of a decrease in peace duration. There are, however, other consistent findings across the four models. First, the primary commodity exports variable is statistically significant, and indicates that as these exports increase, the duration of peace decreases. This supports existing findings in the literature (Collier & Hoeffler, 2004; Doyle & Sambanis, 2006). Second, the development variable indicates that the greater the development of a state, the longer the duration of peace after a civil war, as indicated in previous studies (Quinn, Mason & Gurses, 2007).[12]

Perhaps most interesting across these models is that despite findings in the literature that civil wars that end in military victory are associated with longer periods of post-conflict peace (Rustad & Binningsbø, 2012), there is no evidence here that this is the case. If there is a link between fragmentation and rebel group defeat (Cunningham, 2011), for example, then the association between fragmentation and peace is spurious. Further, it would mean that our theoretical arguments regarding commitment problems above and similar arguments (Cunningham, 2013) are incorrect – rebel groups splintering may have little independent effect on peace duration, and may be the incidental result of military losses (Findley & Rudloff, 2012) or

government strategies meant to weaken rebel opposition (Cunningham, 2011; Akcinaroglu, 2012; Driscoll, 2012), which are the true drivers of post-conflict peace. Cross-tabulations and χ^2 tests of fragmentation and various civil war endings (reported in the online appendix, Tables 7–10) demonstrate that military victory is an important factor, but that rebel fragmentation is much less likely to occur in conflicts that end in government victory (all outcome variables are drawn from Doyle & Sambanis (2006)). This could be due to our reliance on the UCDP data for indications of fragmentation, and that splintering among small groups unable to meet the threshold for violence (Gleditsch et al., 2002; Driscoll, 2012) is more likely to occur in cases of rebel defeat (Cunningham, 2011). On the other hand, we believe that this measurement is much more consistent with the theory of commitment problems, where the fragmentation of larger groups is more likely to lead to civil war recurrence. Indeed, while cross-tabulations indicate that fragmentation is more likely to occur in cases of peace treaties, there is no statistically significant association between fragmentation during civil wars and the implementation of treaties after civil wars in the Doyle & Sambanis (2006) data. This is consistent with the argument that fragmentation can prevent parties from effectively committing to peace.

The statistical evidence offers support for Hypothesis 1, illustrating the negative effects that fragmentation can have on the durable peaceful resolution to civil wars. Figure 1 presents the rate at which civil wars recur over time, comparing cases where a splinter group was created during the civil war (the dashed line) with cases where no fragmentation took place. The figure indicates that a number of cases of civil war appear to recur immediately; however, a civil war is much more likely to recur in the first month after civil war if a fragmentation occurred during the civil war (i.e. approximately 0.9 survival rate for non-fragmentation compared with approximately 0.8 survival rate for fragmentation cases). Further, the rate at which civil wars recur is much greater over time when fragmentation takes place during the conflict. Both Table II and Figure 1 thus provide support for Hypothesis 1.

The UCDP data derived from Rustad & Binningsbø (2012) also provide support for the role of fragmentation during conflict in decreasing subsequent periods of peace. Table III summarizes the findings of this analysis. In four of the five models presented, the fragmentation variable decreases the duration of periods without violence and is statistically significant. The exception to this

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[12] We estimated a series of additional models that provide alternative specifications of the Cox Proportional Hazards model and report on them in the online appendix (Tables 5 and 6). The results are consistently substantial and significant across these models.
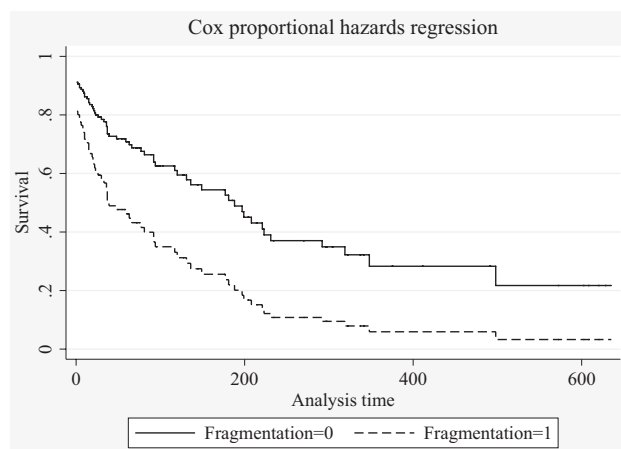
Figure 1. Comparison of survival rates over time (fragmentation vs. no fragmentation)

is Model 5, where the fragmentation variable becomes only weakly statistically significant.[13]

The direction and significance of the fragmentation variable, indeed, are among the most consistent findings across the analysis of the Doyle & Sambanis (2006) and Rustad & Binningsbø (2012) data. For example, variables that appeared to have little effect on peace duration in the Doyle & Sambanis (2006) data appear to play an important role in the Rustad & Binningsbø (2012) data. Most strikingly, the military outcome variable is statistically significant across all of the models, and indicates that a military outcome will greatly increase the length of time without violence (see Licklider, 1995; Toft, 2009). United Nations peacekeeping missions also seem to play a more prominent role, at least in the Table III models that include the larger number of cases, which is more consistent with the findings of studies, such as Fortna (2004), that find peacekeeping plays an important role in decreasing the recurrence of civil war.

Propensity score matching
The above models demonstrate a clear association between fragmentation during civil war and shortened post-conflict peace. It is possible, however, that the link we observe between fragmentation and post-conflict peace is spurious or that endogeneity prevents a clear assessment of the relationship. Given the non-random sample of civil war cases and the confounding possibility that fragmentation is related to civil war outcomes (see above), further analysis that attempts to isolate the effects

of fragmentation from other factors is necessary. Isolating a causal impact is particularly challenging because fragmentation is not randomly assigned. We are thus left with the need to consider possible quasi-experimental identification strategies. Table IV presents a propensity score matching analysis (Dehejia & Wahba, 2002), based on Model 1 from Table II. Propensity score matching helps isolate the role of fragmentation by creating conditions similar to an experiment – each civil war case with fragmentation is 'matched' with a similar civil war case where fragmentation did not take place (see Dehejia & Wahba, 2002, for a more detailed discussion of propensity score matching).[14] In this way, the role of fragmentation can be analyzed among cases where all of the other control variables are held relatively constant. Propensity score matching does not fully enable causal identification, but in the absence of suitable instruments, it represents one step towards providing greater balance on possible confounding, observable variables. Table IV displays the results when each of the 21 cases of fragmentation was matched with one other similar case.

As is clear in Table IV, fragmentation still appears to be linked with shorter post-conflict peace. Model 1 presents a Cox proportional hazards model with only fragmentation, while Model 2 presents the full model from Table II above. In both cases, fragmentation is statistically significant and is associated with shorter lengths of peace. As this smaller sample of cases is able to better isolate the role of fragmentation by approximating an experimental design, there is less opportunity for other important variables that might be associated with both fragmentation and shorter peace to confound the results.

Conclusion

Splintering occurs in a number of civil wars (see Table I), and our analysis indicates that the presence of these fragmentations may significantly alter the peace after a civil war. The quantitative analysis here suggests that cases such as Liberia and Chad, where fragmentation occurs and peace is fleeting (UCDP, 2010; Doyle & Sambanis, 2006), are not outliers, but rather part of a general pattern. Although studies examine the possible effects of the number of combatants on civil wars (Cunningham, 2006; Doyle & Sambanis, 2006), we argue that the process by which groups emerge during civil war is an important indicator of whether civil wars are likely to recur. The findings here are particularly worrying given

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[13] The *p*-value of the fragmentation variable is 0.102 in this model.

[14] The PSMATCH2 Stata package (Leuven & Sianesi, 2003) was used to conduct the propensity score matching analysis.

Table III. Cox proportional hazards models: UCDP data

	1946–2005			1946–2000	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Fragmentation	2.517[**]	1.997[*]	1.707[†]	1.964[*]	1.686
	(0.732)	(0.592)	(0.534)	(0.620)	(0.539)
Number of factions	–	–	1.147	–	1.151
	–	–	(0.107)	–	(0.108)
UN peacekeeping	–	0.558[†]	0.508[*]	0.649	0.588
	–	(0.176)	(0.165)	(0.219)	(0.205)
Military outcome	–	0.436[**]	0.429[**]	0.391[**]	0.383[**]
	–	(0.086)	(0.086)	(0.087)	(0.085)
COW electricity	–	0.506[†]	0.513[†]	0.386[*]	0.394[*]
	–	(0.187)	(0.190)	(0.164)	(0.168)
Commodity exports/GDP	–	–	–	2.273	2.442
	–	–	–	(1.708)	(1.823)
N	251	250	250	202	202
Log-likelihood	−571.570	−560.953	−560.116	−459.921	−459.103
χ^2	0.003	< 0.001	< 0.001	< 0.001	< 0.001

Table reports hazard ratios, with robust standard errors in parentheses. *p*-values: [†] < 0.1, [*] < 0.05, [**] < 0.01.

Table IV. One to one propensity score matching analysis: Doyle & Sambanis (2006)

	Model 1	*Model 2*
Fragmentation	2.967[*]	3.635[**]
	(1.265)	(1.637)
Ethnic civil war	–	4.796[*]
	–	(3.660)
Costs of civil war	–	1.147
	–	(0.214)
Number of factions	–	1.007
	–	(0.115)
Strong peace operations (all)	–	1.324
	–	(0.871)
Military outcome	–	0.603
	–	(0.324)
Level of development/electricity	–	0.456[†]
	–	(0.204)
Commodity exports/GDP	–	3.579[*]
	–	(2.154)
N	42	42
Log-likelihood	−74.958	−67.776
χ^2	0.011	< 0.001

Table reports hazard ratios, with clustered robust standard errors in parentheses.
p-values: [†] < 0.1, [*] < 0.05, [**] < 0.01.

the potential incentives for a government to induce fragmentation in an effort to successfully end the civil war (Cunningham, 2011; Driscoll, 2012). It suggests that the strategies used by governments to help end civil conflict may be counterproductive for long-term peace. Further research is necessary to indicate whether supporting the splintering of rebel groups to arrive at peace is only an indicator of future violence, or a potential *cause* of that violence.

There are several possible theoretical explanations for the increased likelihood of civil war recurrence resulting from fragmentation. First, fragmentation may be tied to spoiling (Stedman, 1997; Pearlman, 2009), where the newly created group is likely to possess different preferences from the original group, as well as the capability necessary to further these goals. Second, adding to the growing number of ways that commitment problems may be associated with civil war (Walter, 1999; Kydd & Walter, 2002; Mattes & Savun, 2009), fragmentation may make it difficult for other groups to commit to peace with a fragmented group. Although there is support for the hypothesis that fragmentation decreases the duration of peace after a civil war, much remains to be done including addressing the mechanisms linking fragmentation to recurrence. A great deal of recent fragmentation work has focused on the dynamics of fragmentation during civil war (Christia, 2012; Staniland, 2014). These dynamics of fragmentation may explain some of the remaining variation in the duration of peace after civil war, and are an encouraging frontier for future research. Likewise, although fragmentation is likely to lead to renewed civil war violence, the specific path to the breakdown of peace will lead to significant insights into how recurrence occurs. Such studies are only possible as new data become available that disaggregate the actions of rebel groups (Raleigh et al., 2010; Sundberg & Melander, 2013).

Replication data

The dataset, codebook, and do-files for the empirical analysis in this article, along with the online appendix, can be found at http://www.prio.org/jpr/datasets as well as at www.michael-findley.com or www.peterrudloff.net.

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