When and How the Fighting Stops: Explaining the Duration and Outcome of Civil Wars

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ABSTRACT
Previous research has shown that the duration of a civil war is in part a function of how it ends: in government victory, rebel victory, or negotiated settlement. We present a model of how protagonists in a civil war choose to stop fighting. Hypotheses derived from this theory relate the duration of civil war to its outcome as well as characteristics of the civil war and the civil war nation. Findings from a competing risk model reveal that the effects of predictors on duration vary according to whether the conflict ended in government victory, rebel victory or negotiated settlement.

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INTRODUCTION

It is now widely recognized that in the post-World War II era civil wars have surpassed interstate wars as the most frequent and deadly form of armed conflict in the world. The Correlates of War Project (COW) reports only twenty-three interstate wars between 1945 and 1997, resulting in 3.3 million battle deaths. By contrast, there were more than four times as many civil wars (108), resulting in almost four times as many casualties (11.4 million; Sarkees 2000). What is less widely recognized that these civil wars last on average about four times as long as interstate wars: the 108 civil wars in the Correlates of War lasted an average of 1,665 days, whereas the twenty-three interstate wars lasted only 480 days on average.

What factors explain variations in the duration of civil wars, and why should scholars and policymakers care? First, the duration of civil wars has been implicated in the observed increase in the number of on-going conflicts in the world from 1945 until about 1994. Fearon and Laitin (2003, 77) note that in this period, the average number of new civil wars starting in a year remained relatively constant (about 2.31), but the duration of these wars increased so that the annual rate at which civil wars were ending (about 1.85) was lower than the rate of new war onset. The result was a relentless accumulation of on-going conflicts that did not diminish until several years after the Cold War ended. This suggests that if civil war can be brought to an earlier conclusion, the total amount of armed conflict in the world at any given time would be diminished.

Second, the duration of civil wars has been implicated in their destructiveness as well. On average, casualties in civil wars occur at a much lower rate than in interstate wars. The 96 civil wars in the COW data set that began and ended after 1945 produced an average of
552 battle deaths per year, whereas the 23 interstate wars that began and ended during the same period produced an average of 3,625 battle deaths per year. However, because civil wars last so much longer, their cumulative death toll substantially exceeds that of interstate wars (as noted above), and the average number of battle deaths per interstate conflict is only about twice that of civil wars (144,942 versus 69,938) despite an annual casualty rate that is seven times that of civil war. Thus, if civil wars can be brought to an earlier conclusion, the cumulative destruction of each conflict in human terms would be substantially diminished.

Third, duration has been implicated in the manner in which civil wars comes to an end. Mason and Fett (1996) found that the duration of a civil war was the strongest single predictor of whether it would end in a negotiated settlement or a decisive victory for either side: the longer a war lasts, the less likely it is to end in victory for either side. Mason, Weingarten and Fett (1999) found that rebel victories (the least likely outcome) usually occur in the first few years of the war, and government victories also typically occur within the first five years of the war. After about ten years, decisive victory by either side is rare, and the conflict is likely to settle into what Zartman (1993) has termed a “mutually hurting stalemate.” Fearon (2004, 276) concludes that “civil wars last a long time when neither side can disarm the other, causing a military stalemate. They are relatively quick when conditions favor a decisive victory” (emphasis in the original). Thus, long civil wars do not “burn themselves out”, as Luttwak’s (1999) “give war a chance” thesis argues. Empirically, the most likely means by which long civil wars come to an end is through negotiated settlement. Otherwise, they drag on interminably.
From a policy perspective, the duration of civil wars is one feature that is amenable to influence by external actors. Arguably, the number of on-going civil wars and the destructiveness of those wars can be reduced more readily (and cost-effectively) by mediating settlement agreements that shorten protracted civil wars than by programs intended to reduce the probability of new civil war onsets (Hegre 2004, 244). Indeed, the decline in the number of on-going civil wars after 1994 is largely a function of the international community intervening to broker peace settlements to protracted conflicts. Hartzell (2006) reports that while a majority of the civil wars that ended between 1950 and 1990 ended in military victory by either the government or the rebels, three-fourths of those that ended in the 1990s did so by means of some sort of negotiated settlement. Harbom, Högbladh, and Wallensteen (2006: 622) report that between 1989 and 2006, 46 of the 121 conflicts active during that period were brought to an end by peace agreements.

Recent studies on civil war duration usually begin with an inventory of the characteristics of the nation itself that have been identified as predictors of civil war onset: poverty (Fearon 2004), ethnic divisions (Balch-Lindsey and Enterline 2000), the presence of lootable resources (Collier, Hoeffler, and Söderbom 2004), indicators of weak state capacity (DeRouen and Sobek 2004). These factors distinguish those nations that are at risk of experiencing a new civil war onset from those that are not. In addition, external intervention has been implicated in extending the duration of civil wars once they are underway (Balch-Lindsey and Enterline 2000; Collier, Hoeffler and Söderbom 2004; Regan 2002). As noted earlier, research on how civil wars end indicates that the duration of the conflict is strongly related to the outcome of the war: the longer a civil war lasts, the less likely it is to end in victory for either the rebels or the government. That same research
indicates that characteristics of the conflict itself – the military balance between
government and rebels, the casualty rate, as well as the duration of the conflict – predict the
outcome of the conflict. Thus we begin with the proposition that the characteristics of the
civil war that explain how a civil war ends – in a rebel victory, a government victory, or a
negotiated settlement – should be considered as predictors of the duration of the war, along
with those attributes of the nation itself that made it susceptible to civil war onset in the
first place.

There is another reason to model the relationship between civil war outcomes and
duration. Some factors that earlier studies have discounted as predictors of civil war
duration may instead have different effects on conflicts that terminate in different outcomes
(i.e., victory versus settlement); when these effects are pooled across all possible outcomes,
they may produce a statistically non-significant coefficient. DeRouen and Sobek (2004)
recognize this possibility and explore how the effect of some factors varies according to
how the conflict ends. In the analysis that follows, we extend this approach with a
competing risks model of how the duration of civil wars varies according to whether the
conflict ends in a government victory, a rebel victory or a negotiated settlement. Our model
assumes that at any point during a civil war the conflict can either continue or end in a
government victory, a rebel victory or a negotiated settlement. A competing risk model is
the most appropriate way to model civil war duration because it allows us to model 1) the
possible competing outcomes that can end a civil war and 2) the different effects of
variables on the duration of civil wars that end in each of these competing outcomes. It is
the only way that we can model differences in the duration of civil wars that are a function
of the three different types of civil war outcomes. Our results show that modeling the
competing risks rather than pooling the outcomes produces very different interpretations of the factors that affect the duration of civil wars.

We begin by revisiting Mason and Fett’s (1996) model of the decision calculus by which protagonists in a civil war choose between continuing to fight or not. If both government and rebels choose to stop fighting, a truce results, which is the first step toward achieving a negotiated settlement to the conflict. If one or the other protagonist chooses to stop fighting while the other does not, the latter wins. If both choose to continue fighting, the conflict endures. Whether an on-going civil war ends or continues at any given point in the conflict, then, is a function of 1) both sides’ estimate of their prospects for achieving victory (versus suffering defeat), 2) their expected payoffs from victory (versus the costs of defeat), 3) the rate at which they are absorbing the costs of continued conflict, and 4) their estimate of the time it will take them to achieve victory (and, therefore, the time span over which they can expect to accrue additional costs of conflict, which reduce the net payoffs from victory). From this model, we derive a set of hypotheses on the characteristics of civil war nations, the conflict itself and the conflict environment that should affect whether it ends in government victory, rebel victory, or negotiated settlement. Because military victories usually occur early and long wars tend to end in negotiated settlements, the factors that predict the outcome of civil wars should explain a substantial portion of the variation in their duration as well. We test these hypotheses with a competing risk model using Fearon and Laitin’s (2003) data on 124 civil wars that occurred between 1945 and 1997.

**TO END THE WAR OR KEEP FIGHTING?**

At any given point in a civil war, the government (G) and the rebels (R) each must choose between quitting or continuing to fight. This implies four possible outcomes from
their joint decisions at any time $t$: 1) if $R$ continues fighting and $G$ quits, $R$ wins and the government is overthrown; 2) if $G$ continues to fight and $R$ quits, $G$ wins and the revolt is defeated; 3) if both $G$ and $R$ choose to quit at the same time, the civil war ends in a truce or a negotiated settlement; 4) if neither decides to quit, the civil war continues. Following Stam (1996, 34-37), the four outcomes can be represented as an iterated two-person game. Continued fighting is the dominant strategy for both sides (Stam 1996, 353). If one or both parties prefer to continue fighting, it must be the case that they expect either to win at some point in the future or at least achieve more favorable settlement terms. In either case, as long as one or both parties expect that their net benefits from victory (or a future settlement) will exceed the benefits they can get from a settlement now (or from defeat), they have a strong incentive to continue fighting.

The decision calculus by which both actors choose between continuing to fight and stopping is a function of the expected payoffs from victory versus defeat versus a negotiated settlement (Mason and Fett 1996; Mason, Weingarten and Fett 1999). The expected payoffs from continuing to fight are a function of: (1) the actor’s subjective estimate of the payoff from victory, (2) that actor’s estimate of the probability of victory, (3) the costs the actor will have to absorb if they continue to fight, (4) their estimate of the amount of additional time needed to achieve victory (and, therefore, the amount of time they will have to absorb costs until they can achieve victory). Mason and Fett (1996) represent the expected utility of continuing to fight as follows

$$EU_C = P_V(U_V) + (1-P_V)(U_D) - \sum_{n=0}^{\nu} C_{ti}$$

(1)
where $EU_C$ is the expected utility of continuing to fight, $U_V$ is the actor’s estimate of the payoff from eventual victory, $P_V$ is the actor’s estimate of the probability of achieving victory, $U_D$ is the actor’s estimate of the cost from defeat, $(1-P_V)$ is the estimated probability of defeat, $C_{ti}$ is the actor’s estimate of the rate at which the costs of conflict will accrue from the present ($t_i = 0$) to that time in the future when the actor estimates victory can be achieved ($t_V$). Generally, a party will continue to fight as long as its expected payoff from victory exceeds the costs it expects to absorb in order to achieve victory (see also Regan 2002).

For a negotiated settlement to be preferred to continued conflict, the expected utility of a negotiated settlement, $EU_S$, must be greater than the expected utility of continuing the conflict, $EU_C$. The expected utility of a negotiated settlement can be represented as follows:

$$EU_S = P_s(U_S) + \left( \sum_{n=0}^{t_V} C_{ni} \right) - \sum_{n=0}^{t_S} C_{ni} - (1-P_s)(U_D) \quad (2)$$

where $U_S$ is the payoff from the terms of the settlement, $P_s$ is the probability of a settlement, and the other terms are the same as those in Equation 1. The expected utility from a negotiated settlement is a function of the benefits an actor will derive from the terms of the settlement plus the costs of continued conflict that actor will avoid by agreeing to a settlement now rather than continuing to fight in anticipation of eventual victory. The payoffs from a negotiated settlement ($U_s$) are presumed to be less than the payoff from victory ($U_V$) because the actor must consider that by negotiating a settlement now, both parties avoid the additional costs of conflict that would have to be absorbed in order to achieve victory at some unknown point in the future ($\sum_{n=0}^{t_V} C_{ni}$). Instead, each actor must
absorb only those additional costs of conflict that will accrue between the present \( (t_i=0) \) and that point in the (much nearer) future when the settlement goes into effect and the fighting stops \( (t_s; \text{we assume } t_s < t_v) \).

This decision calculus implies that any factor that (1) decreases an actor’s estimate of the probability of victory \( (P_v) \), (2) reduces its estimate of the payoff from victory \( (U_v) \), (3) increases the rate at which it absorbs the costs of continued conflict \( (C_n) \), or (4) extends its estimate of the time required to achieve victory \( (t_v) \) should shorten the duration of the war by making that actor more inclined to stop fighting. From this, we can derive some propositions concerning the characteristics of a civil war that affect the duration of the conflict by affecting one or both party’s incentives to continue fighting, capitulate, or enter negotiations for a settlement.

**HYPOTHESES**

The decision calculus presented above allows us to derive a series of hypotheses about the characteristics of the conflict and the conflict environment that should affect the duration of the civil war.

**Outcome of the civil war**

The first implication of the theory is that the duration of a civil war should vary according to whether it ends in a rebel victory, a government victory, or a negotiated settlement. Previous research has established that conflict duration is positively associated with the probability of the war ending in a negotiated settlement and negatively associated with the probability of both government victory and rebel victory (Mason and Fett 1996; Mason, Weingarten and Fett 1999; Fearon 2004). The longer a civil war lasts, the more the protagonists are compelled to adjust their estimates of the probability of victory \( (P_v) \), the
time required to achieve victory ($t_v$), and the accrued costs of achieving victory ($\sum_{t=0}^{t_v} C_{0,t}$).

As victory comes to appear less likely ($P_v$ declines), more costly ($C_{0,t}$ increase), and more distant in the future ($t_v$ increases), the expected payoffs from a negotiated settlement will come to exceed the expected payoffs of continuing to fight ($EU_s > EU_c$).

**H1:** Civil wars that end in negotiated settlements will be of longer duration than those that end in military victory by either the governments or the rebels.

As for the two military outcomes (rebel victory and government victory) the expected utility model suggests the following:

**H2:** Civil wars that end in a government victory will be shorter in duration than those that end in either rebel victory or negotiated settlement.

Rebels start off with a decided military disadvantage: they have to build an army from scratch in the shadow of a government that already has an army. Consequently, they are more likely to lose early than is the government. Given this initial advantage, the government has no incentive to agree to an early negotiated settlement, before the rebels have demonstrated the capacity to sustain the conflict and possibly even prevail. These expectations have been confirmed empirically (Mason, Weingarten, and Fett 1999). The rebels’ hope is to survive long enough to be able to build a force sufficient to defeat the government or force it to agree to a settlement. Thus rebel victories should, on average, take longer to achieve than government victories.

**Costs of conflict**

The expected utility model implies that the more costly the civil war is, the shorter it will be. Balch-Lindsey and Enterline (2000, 624), Regan (2002, 68) and Fearon (2004, 287)
found empirical support for this proposition. Unlike interstate wars, the protagonists in a civil war draw on the same population for recruits and the same economy for the material resources to sustain combat. Thus the higher the rate at which both sides are absorbing costs of continued conflict, the sooner they will exhaust the available resources to sustain military operations and then be compelled to terminate the conflict. Casualties are one indicator of the costs of war. The greater the share of the population being killed by the war, the fewer available recruits there will be and the higher the effective price each side will have to pay to recruit new soldiers. Therefore, we would expect higher casualty rates to reduce the duration of civil wars.

H3: The higher the casualty rates, the shorter the duration of the war.

**Probability of victory: tactical and institutional capacity**

A number of factors affect both the rebel’s and the government’s estimates of their chances of achieving victory and their willingness to continue fighting. One dimension of the state’s capacity to prevail is the relative size of the government’s army. As noted earlier, the rebels start off with an overwhelming military disadvantage: they have to build an army from scratch and do so in an environment where the government already has an established army. Larger government armies increase the recruitment costs to rebels, first, by absorbing people into the government’s army. Second, the size of the government’s army affects each potential rebel recruit’s estimate of their chances of surviving the conflict, should they enlist with the rebels. Thus, the ability of the rebels to survive their early military disadvantage and build an army capable of challenging the state is inversely related to the relative size of the government’s army. Therefore, we expect the following to hold:
H4: The larger the government’s army (as a proportion of the population), the shorter the duration of the war.

DeRouen and Sobek (2004) found that increases in the size of the government army increase the probability that the war will end but not necessarily that the government will win. Large armies can produce quick government victories. However, they can also serve as a boon to rebel recruitment (and to the prospects for rebel victory) to the extent that their counterinsurgency efforts become indiscriminate in the application of repression (see Mason and Krane 1989).

A second influence on the probability of victory is external intervention. Several studies have found that when third parties intervene on one side or the other in a civil war, the effect is to extend the duration of the conflict (Regan 2002; Balch-Lindsey and Enterline 2000). In the expected utility model, external intervention represents a subsidy to the preferred side’s capacity to sustain its combat operations. Intervention then should increase the favored party’s probability of victory \( P_v \) or, alternatively, reduce its probability of defeat \( 1-P_v \). The consistent finding that intervention extends the duration of civil wars suggests something about the incentives for the intervener and the timing of intervention. Nations with interests at stake in a civil war have an incentive to intervene in order to affect the outcome of the conflict. But intervention also poses domestic risks to the leaders of the intervening nation. Intervention is costly and risky for the intervener, and the payoffs are often not immediately tangible. Domestic constituencies that oppose it may be able to impose political costs on leaders who embark upon such endeavors. We thus would expect government leaders to be more likely to undertake such ventures when the costs to them of not intervening rise to unacceptable levels, such as when that government’s favored side in
the civil war is faced with imminent defeat. Under such circumstances, the domestic costs of intervening may be offset by the costs to national interests of the defeat of the favored party in the civil war. Thus, intervention is more likely to be undertaken to forestall the imminent defeat of a favored party rather than to assure quick victory. This could account for the consistent finding that interventions prolong civil wars.

H5: Third party intervention on the side of the rebels or the governments will extend the duration of a civil war.

A third set of influences on both protagonists’ estimates of their probability of victory concerns the capacity of the rebels to survive their initial military disadvantage. Several studies have found some support for the proposition that rebels are more able to sustain their operations for longer to the extent that the nation has mountainous terrain (Fearon and Laitin 2003; Fearon 2004). Mountainous terrain affords the rebels secure base areas that allow them to avoid (early) defeat. Therefore we would expect the following:

H6: The percentage of mountainous terrain in a nation should be positively related to the duration of the civil war.

Stakes of the conflict: civil war types

The willingness of protagonists to continue fighting or stop is in part a function of the stakes of the conflict (i.e., $U_v$, the payoffs they expect to receive from victory). While the payoffs from victory cannot be easily reduced to a single metric, we can distinguish between different civil war types in terms of the goals of the rebels.

First, there is the distinction between revolutionary and secessionist conflicts (Balch-Lindsey and Enterline 2000; Fearon 2004, 288). In revolutionary civil wars, the goal of the rebels is to overthrow the incumbent regime and establish themselves at the head of a new
regime. In the secessionist conflicts, regionally concentrated ethnic groups wage armed conflict for the purpose of gaining sovereign independence from the target state. So the stakes of secessionist wars are fundamentally different from those of revolutionary civil wars. Because secessionist movements typically arise among geographically concentrated ethnic groups, the rebels have a greater ability to mobilize and sustain military operations longer than revolutionary rebel organizations because secessionists have a secure territorial homeland from which to operate. Moreover, victory or stalemate does not require them to annihilate the incumbent government; they seek only autonomy from that government. So ceteris paribus secessionist rebels are less likely to capitulate than is a comparable rebel movement with revolutionary goals. Governments faced with secessionist challenges are also less likely to concede and more likely to fight because capitulation to one secessionist movement offers encouragement to others (Walter 2003). Walter (2003) notes that rebels seeking territorial goals were 70 percent less likely to initiate peace negotiations than rebels seeking other goals. Bercovitch and DeRouen (2005) found that secessionist rebellions were less likely to seek mediation of their conflict and such conflicts were less likely to experience successful mediation than were non-secessionist rebellions.

H7: Ethnic secessionist wars should be of longer duration than revolutionary civil wars.

A second distinction among civil wars based on the payoffs of victory concerns whether the conflict is ethnically based or ideologically (class) based. Licklider (1995) and others suggest that civil wars over ethnic, religious or identity issues should be more difficult to resolve through negotiated settlements because the stakes are more nearly indivisible, compared to conflicts that are motivated primarily by economic issues such as inequality in
land ownership, income, or wealth. Findings from several studies support this proposition (Collier, Hoeffler, and Söderbom 2004, 262; Fearon 2004, 286). The protagonists in an ethnically or religiously based civil war cannot readily negotiate a compromise on ethnic or religious identity in the same sense that they can negotiate an acceptable division of tangible resources such as land, government offices, and civil service positions. Because identity wars are fought over deeply rooted and largely immutable issues, we would expect protagonists to continue fighting longer than would their counterparts in an ideological war, \textit{ceteris paribus}. Thus, we would expect that ethnic rebels would estimate the costs of defeat to be greater than non-ethnic rebel movements, \textit{ceteris paribus}. Zartman found that less than one-third of ethnic conflicts in the twentieth century led to negotiations.

H8: The higher the degree of ethnic fractionalization, the longer the duration of the civil war.

H9: The higher the degree of religious fractionalization, the longer the duration of the civil war.

\textbf{Control variables}

A number of other variables have been employed in models of civil war duration, and we include them here as controls. Among these are the level of economic development (Collier, et al. 2004), the presence of oil as a source of export revenues (Collier and Hoeffler 1998, 2004; Collier et al. 2004; DeRouen and Sobek 2004; de Soysa 2002; Fearon and Laitin 2004; Ross 2004), regime type — democracy, autocracy or “anocracy” — (Hegre \textit{et al.} 2001; Henderson and Singer 2000; Krain and Myers 1997), and political instability.
DATA

To test our hypotheses we employ the civil war dataset described in Fearon and Laitin (2003). This dataset includes country-year observations from 1945-1999 on each nation in international system with a population of at least 500,000. The dataset also includes measures of most of the relevant covariates for our hypotheses and the start and end dates of the civil wars. We augmented these data with civil war outcome data for each year from Doyle and Sambanis (2000), Sambanis (2004), Sambanis (2004), the Correlates of War 2 (COW2) (Sarkees 2000), and Quinn, Mason and Gurses (2007). Each country-year was coded as either an ongoing war, a war won by the government, a war won by the rebels, or a war that ended in a negotiated settlement. Besides outcome and war-type descriptors, the hypotheses specify a set of national attributes and conflict characteristics that influence each side’s estimate of the expected costs of war, the payoffs of victory versus settlement or defeat, and the probability of victory. The full list of covariates is:

1. **Deaths** is the percentage of a country’s population that died over the course of the conflict from COW2 (Sarkees 2000) and Doyle and Sambanis (2000). Since death counts are only available at the conclusion of the conflict, we chose to include this as a percentage of each country’s annual population.

2. **Military size** is the percentage of a country’s population in the military in a given year based on the military personnel and population data in COW2 National Material Capabilities Data Set.

3. **Intervention** is a dichotomous variable measuring whether an external actor intervenes in the civil war, based on Regan (2002). All interventions, regardless of
the side on which the third party intervened, are coded as “1” in the civil war year and civil war years with no intervention are coded zero.iii

4. *Mountain terrain* is an estimate of the percentage of mountainous terrain in a country, based on Fearon and Laitin (2003).

5. *Ethnic fractionalization percentage* is 100 times the ethnic fractionalization proportion measure reported in Fearon (2002) and Fearon and Laitin (2003).

6. *Religious fractionalization percentage* is a measure of the religious fragmentation in each country. This is 100 times the religious fractionalization proportion in Fearon and Laitin (2003).

7. *Secession* is a binary variable that indicates whether or not the rebel’s goal is secession.

8. *GDP per capita* is in thousands of U.S. dollars, lagged one year, from Fearon and Laitin (2003).

9. *Oil* is a dichotomous variable that measures whether a country earns at least one-third of its export revenues from petroleum, based on Fearon and Laitin (2003).

10. *Anocracy* is a dichotomous variable measuring whether a country’s political regime is autocratic or democratic. All countries with a POLITY score greater than –6 and less than 6 are considered anocracies. As in Fearon and Laitin (2003) this variable is lagged one year.

11. *Instability* is a dichotomous variable that measures the change in a country’s POLITY score. If a country’s POLITY score changes by 2 or more points in a three-year period, it is coded as unstable (Fearon and Laitin 2003).
12. *Democracy* is a dichotomous variable measuring whether a country is democratic. All countries with a POLITY score of 6 or greater are democracies. As in Fearon and Laitin (2003) this variable is lagged one year.

Our dataset consists of 1008 nation-war years in 109 conflict spells that occurred between 1945 and 1999. Of these conflicts, 35 ended in government victory with an average duration of 6.4 years, twenty ended in rebel victory with an average duration of 7.9 years, and 34 ended in settlements or truces with an average duration of eleven years. The remaining cases in the dataset were ongoing as of 1999.\textsuperscript{iv}

**ANALYSIS AND FINDINGS**

Hypotheses 1 and 2 concern the relationship between two interrelated attributes of civil war: its outcome (i.e., whether it ends in government victory, rebel victory, or settlement) and its duration. By estimating a competing risks duration model, we can analyze both the relative odds of a war continuing versus ending in one of the three outcomes as well as the differences (if any) in the duration of wars that end in each of the three possible outcomes. The question of the likelihood of a particular outcome is simplified by the fact that the three possible outcomes are mutually exclusive and that they compete to end the war. Once we have observed a civil war ending in a particular outcome, it is no longer possible to observe it ending in either of the other two outcomes for the same conflict spell. It is possible that the duration or the risk of war termination is unrelated to the outcome of the war, meaning that the risk of a war ending in a given outcome does not compete with the other possible outcomes. In that case, we would expect the durations (and therefore the risk of war termination) to be indistinguishable across the outcome categories. As noted above, the war durations do vary as a function of the outcome: wars won by the government are
shorter than wars that end in rebel victory, and both rebel and government victories are shorter than wars that end in a settlement. An analysis of variance (ANOVA) of war duration as a function of the outcomes is statistically significant ($F(2,2)=3.56$, p-value = 0.03). This supports H1 and H2: there are significant differences in duration across the three outcomes and these differences are consistent with the first two hypotheses.

Since the durations and the outcome of the war vary together, we jointly model the two phenomena. To ignore the relationship between duration and civil war outcomes is to assume that the impact of other variables on the duration of civil war is the same across all possible ways that the conflict can end. This is the assumption implicit in Fearon (2004), Balch-Lindsey and Enterline (2000), and Collier, Hoeffler, and Söderbom (2004). However, as DeRouen and Sobek (2004, 304) note, this strategy wastes important information and may lead to misleading conclusions, especially when the variables that increase the duration of one outcome have a different effect on the duration of another outcome. Previous research suggests that pooling the civil war outcomes in a duration model – treating all of the outcomes that end civil wars as the same – masks important differences in the factors that predict the duration of civil wars that end in each of three competing outcomes (see, for instance, Mason, Weingarten and Fett 1999; DeRouen and Sobek 2004). For this reason we estimate a competing risks Cox regression model. This competing risks model is a duration or event history model where the analysis focuses on the time it takes to observe one of several mutually exclusive outcomes that compete as events that end the duration (Box-Steffensmeier and Jones 2004, 166). For each of the possible exclusive and competing outcomes, one models the hazard rate for seeing the first occurrence of one of the possible civil war outcomes. As with a standard Cox regression
model, the competing risks model analyzes the hazard of some terminal event (a war outcome) but also distinguishes among the three possible outcomes (failures) that end a civil war (government victory, rebel victory, settlement). The model allows us to determine if each of the covariates has a different impact on the duration of civil wars depending on the outcome of the wars (Thomas 1996). The competing risks Cox model estimates a duration model for each of the three possible outcomes, treating the other two as censored cases and allowing us to estimate separately the impact of each covariate on the risk of each of the three possible outcomes.

DeRouen and Sobek (2004) also present a competing risks model of civil war outcomes. They report the results from a multinomial logit model and suggestive results from a series of competing risks parametric duration models. Here we reject the parametric approach since we have no \textit{a priori} basis to assume the shape of the baseline hazard function, and we have strong reasons to believe that the baseline hazard is not monotonically increasing or decreasing. The multinomial logit model has two additional drawbacks for our theory. First, all of the results must be interpreted relative to a baseline category (in this case, the war continues). Given our hypotheses, we are interested in estimating the impact of the explanatory variables on the duration of each possible outcome, provided that \textit{none of the other outcomes have been observed}. That is, to fully assess the impact of outcome on duration, we need to compare simultaneously the chances of a government victory to the chances of either war continuation or rebel victory or a settlement. Second, in the multinomial logit model it is difficult to examine and correct for the possibility that some variables have non-proportionate or time-varying effects on the baseline risk of observing each of the civil war outcomes. This problem of non-
proportionate hazards leads to biased results and requires the inclusion of interactions between the covariates and some function of time (Box-Steffensmeier and Zorn 2001). Testing and correcting for non-proportionate hazards is straightforward in the Cox regression competing risks model. Moreover, we have theoretical reasons (supported by prior findings; see Mason, Weingarten and Fett 1999) to expect that the hazard of each outcome does vary over time and the Cox model allows us to model this directly. For these two reasons we prefer the Cox regression formulation of the model to a multinomial logit version.

The first three columns of Table 1 present hazard rate estimates for the Cox competing risks regression. For comparison, the fourth column presents a pooled Cox regression model in which all of the war outcomes other than “ongoing” are pooled as “ended”. Comparing the two specifications allows us to identify which covariates have different effects on the duration of civil wars that end in each of the three outcomes and, more importantly, to identify those effects that might disappear when effects are pooled across all three outcomes. For each of the first three columns, hazard values greater (less) than one indicate that the covariate increases (decreases) the chance of the war ending in that outcome relative to the other outcomes or the war continuing. This is a critical distinction: in a multinomial logit model, the comparison is to the omitted category: ongoing war. The Cox competing risks model looks at the comparison between a civil war outcome and all other possible outcomes, including war continuation. A series of proportionate hazards tests applied to each of the Cox competing risks models (Box-Steffensmeier and Zorn 2001; Grambsch and Therneau 1994) did reveal that, consistent with previous findings (Mason, Weingarten and Fett 1999), the hazard of each outcome does vary over time. Accordingly,
we have included a series of interaction terms with the natural logarithm of time to control for the non-proportionate hazards.

With respect to the first two hypotheses, Figure 1 presents the estimated cumulative hazard of each possible civil war outcome based on the competing risks model and the cumulative hazard from the pooled model. The cumulative hazard is the total probability that a war will end in that outcome at time \( t \), given that the war has lasted until time \( t \). Here we see that the pooled model results in an overly optimistic assessment of the likelihood that a civil war will end. The most likely outcome initially is a government victory. Government and rebel victories are nearly equally as likely for wars lasting less than five years. For wars that last from five to seven years, the most likely outcome is a government victory. After about seven years, the most likely outcome is a negotiated settlement. Rebel victories are the least likely outcome. The implication of these results is clear: if a government does not win a civil war in the short term, one should look for the possibilities of a negotiated settlement.

[Figure 1 about here]

We note that the pooled model is plagued with non-proportionality in several of the variables. A test for non-proportionality for the pooled model (without the log time interaction terms) has a chi-squared value of 61.9, (p-value < 0.001). The competing risks model has fewer variables with non-proportionate hazard effects for each civil war outcome. Figure 2 presents the changes in the odds for a one-unit change in each of the covariates that interact with time.

[Table 1 about here]

[Figure 2 about here]
The Cox competing risks regression results indicate that secessionist aims, per capita GDP, oil exports, mountainous terrain percentage, the percentage of the population in the military, the war deadliness, religious fractionalization, and external intervention affect the duration of wars ending in government victory. Only GDP per capita, oil exports, and ethnic and religious fractionalization substantially affect the duration of wars ending in rebel victories. The duration of wars ending in negotiated settlements is predicted by secession, GDP per capita, and anocracy.

The variable that measures the costs of conflict – the percentage of the population killed in the conflict – increases the length of civil wars won by the government (the hazards are less than one), contrary to H3. This suggests that casualty rates may affect duration by intensifying hostilities between protagonists and hardening conflictual identities, making it less likely that either side will choose to capitulate or agree to a settlement. Walter (2004) found a similar effect for the impact of casualties on the likelihood of civil war recurrence, and Bercovitch and DeRouen (2005) found a similar effect for the likelihood of protagonists in ethnic conflicts agreeing to mediation. The percentage of the population that dies in the war has no discernible effect on the duration of wars ending in a rebel victory or a negotiated settlement.

For the variables that affect protagonists’ estimate of their probability of victory — state coercive capacity (the percentage of the population in the military), the percent of mountainous terrain in the country, and third party intervention — there is only an effect on the duration of conflicts that end in government victory but no significant effect on the duration of conflicts that end in rebel victory or negotiated settlement. Mountainous terrain actually reduces the duration of conflicts ending in government victory (but only first five
years of the conflict; see Figure 2). It has no significant effect on the duration of either rebel victory or negotiated settlement. These findings are contrary to H6.

The size of the government’s military force as a proportion of the population does reduce the duration of civil wars that end in government victory, as expected in H4. The government’s chances of winning increase over 550% for each one percentage point increase the proportion of the population in the military. Note also that pooling the outcomes masks the effect of military size, which is significant in the pooled model, but only affects the government victories; the size of the military has no effect on the duration of conflicts that end in rebel victory or negotiated settlement.

The predictions that third-party interventions increase the duration of civil wars overall (H5) is supported by the results for conflicts ending in government victory. Pooling the results across all three outcomes makes interventions appear to be more effective than they really are, since they do not affect the durations of rebel victories or negotiated settlements. Although this variable does not have a non-proportionate hazard, we present the change in the odds of each outcome as a function of the civil war duration in the last panel of Figure 2. The results show that for all outcomes, intervention lengthens the war.

The variables that describe the stakes of the war – secession, and ethnic and religious fractionalization – also are important. Contrary to H8, in the competing risks and pooled models, a one-percentage point increase in ethnic fractionalization initially increases the odds of a war ending in each of the outcomes by 3-4% (p-values<0.01). But this impact is short lived. Over longer periods of time higher degrees of ethnic fractionalization decrease the odds of a war ending in any of the possible outcomes, as seen in Figure 2. This should be interpreted as evidence that higher ethnic fractionalization leads to a delayed effect but
in wars that last at least five years its effect is to increase the duration of civil wars and lower the odds of a negotiated settlement or a victory by either side by up to 4%. Ethnic fractionalization simply increases the odds that the conflict will endure. Higher religious fractionalization increases the amount of time to a rebel victory and by nearly the same amount that it reduces the amount of time to a government victory (consistent with H9 for the rebels, but not the government). This difference is not present in the pooled model, where the religious fractionalization coefficient is insignificant.

Secession increases the time until a government victory in the competing risks model. In the first two years of the war, secessionist aims lead to shorter war durations for wars ending in a negotiated settlement. However, as noted earlier, this outcome is rare in secessionist conflicts. If the wars have not ended within their first two years, secessionist aims increase the duration of these wars consistent with H7. Secession is an important predictor of negotiated settlement, initially increasing the odds of this outcome by over 300%, but this advantage decays within three years so that the effect on wars that do not end quickly is to extend the duration of wars that end in negotiated settlement. Secessionist aims have no significant effect on conflict duration in the pooled model – yet another instance where pooling hides important information.

Several of the control variables have significant effects on the duration of civil wars ending in different outcomes. The effect on the change in the odds of each outcome vary over time. Here we see that a $1000 increase in GDP per capita depresses the odds of a government victory by about 50% and that this impact is largely constant over time, implying a longer duration of wars ending in government victory. By contrast, GDP per capita has a time-varying effect on the odds of both a rebel victory and a negotiated
settlement. In the first two war years, higher levels of GDP per capita shorten the duration of wars ending in rebel victory, and in the first five war years higher levels of GDP per capita shorten the duration of wars ending in a negotiated settlement. These initial odds of around 2 imply about a 100% increase in the chances of a war ending in one of these outcomes versus the others. Pooling the outcomes masks this distinction (the dot-dashed line) by effectively averaging together the differing effects of this variable on the odds of each of the three possible outcomes. In the pooled model a $1000 increase in GDP per capita initially increases the odds of the war ending (likelihood ratio test p-value < 0.001).viii

A nation’s dependence on oil exports has varied effects across the different outcomes. Dependence on oil exports has a large effect on the chances of a war ending in a government victory, but shortens rather than extends the duration of wars ending in this outcome. Countries that derive one-third or more of their export revenues from oil are over 6900% more likely to see civil wars end in quick government victories. This suggests that oil exports provide the government with revenues to build a strong military that makes it more difficult for the rebels to prevail. It takes longer for rebels to win in nations that derive at least one-third of their export revenues from oil. Thus, oil revenues do enhance the state’s tactical capacity, but the effect is not to lengthen civil wars but to shorten them through quick government victory. As Figure 2 shows, these impacts decay after the first few years of the war. Again, the pooled model provides the wrong conclusion, since it predicts that oil exports have no effect on the duration of the war.

With respect to regime type – anocracy, democracy and instability (measured as change in POLITY scores) – only anocracy affects the duration of wars ending in negotiated
settlements (likelihood ratio test p-value = 0.01). If a regime is anocratic, the duration of civil wars ending in a negotiated settlement tends to be shorter for wars that last at most five years. But this effect declines rapidly in the first five years of a conflict.

CONCLUSIONS

The competing risks analysis of civil war duration shows that the duration of civil wars is in part a function of whether they end in a government victory, a rebel victory, or a negotiated settlement. Many of the variables that have been identified (or discounted) in previous studies as predictors of civil war duration have different effects on the duration of conflicts that end in these three possible outcomes. Pooling civil war outcomes masks the variation in which factors predict (different) civil war outcomes, and how each of these factors' impact the duration of civil war varies depending on whether it ends in government victory, rebel victory or settlement.

The variables that previous research identifies as predictors of civil war duration do a much better job of predicting the duration of government victories than of the other two outcomes. The picture that emerges is one of governments that are well endowed with coercive resources (or the means to acquire them) winning early, as do governments presiding over a society marked by high degrees of religious fractionalization. Governments that face rebels motivated by secessionist goals take longer to prevail. Ethnic fractionalization on the other hand has a small initial benefit for all outcomes, but in the long term it promotes protracted conflict, since the odds of any outcome other than continuing war decline over time. Finally, external intervention extends the duration of civil wars that end in government victory, refining the findings of Balch-Lindsey and Enterline (2000) and Regan (2002) on the effect of external intervention by specifying this effect as
holding for government victory but not for the other two outcomes. This could be a matter of external powers being more likely to intervene on the side of the government only when the defeat of that government appears imminent. After all, intervention is costly and risky to the intervener and external powers may be more willing to take on these risks when the costs to them of doing nothing – the defeat of a government they favor – are greater than the expected costs of intervening. Without the intervention, the war may have ended sooner, but not in a government victory. Note that intervention has no effect on the duration of civil wars that end in rebel victory or negotiated settlement, suggesting that the effect in the pooled model is largely a result of the effect of intervention on government victories.

Of the variables hypothesized to predict the duration of wars won by rebels or concluded by peace agreements, we see that few achieve statistical significance. In societies marked by high degrees of religious fractionalization, rebels take longer to win. Surprisingly, higher levels of GDP per capita shorten the time to rebel victories and negotiated settlements. The latter effect may be a matter of opportunity costs: governments that preside over more prosperous societies may face more pressure to settle conflicts more quickly rather than allow protracted conflict to jeopardize that prosperity. And perhaps a more prosperous society provides a deeper resource pool from which rebels can extract the resources they need to achieve victory or at least sustain their operations. Given that previous research and our ANOVA findings indicate that rebels win early if they win at all, our suspicion is that rebel victories are more a matter of state weakness. More specifically, rebels prevail early against governments that are so corrupt and incompetent that the large segments of the population view them as predatory. At the first sign of a viable alternative, the population abandons the incumbent regime and it implodes as a result of its own
corruption rather than as a function of the rebels’ military competence. The collapse of the Somoza regime in Nicaragua, the Mobutu regime in Zaire/Congo, and the Lon Nol regime in Cambodia are examples of this effect. Not surprisingly, all of these regimes collapsed soon after external sponsors withdrew their support. Indeed, much of the theoretical literature on civil wars points to “neo-patrimonial” or “sultanistic” regimes as being the type of state most likely to experience revolutionary challenges (see Goodwin 1997).

An additional conclusion can be drawn about how theory and analysis should be done on civil war duration and outcomes. The results here suggest that the durations of various wars are tied to their likely outcomes. Pooling all civil wars and ignoring the outcome types masks the important and differential effects that secessionist aims, GDP per capita, oil exports, mountain terrain, deaths and intervention have on each of the different possible outcomes. The impacts are not the same across the various risks. To a large degree it is reflected in a basic fact about civil wars that we noted earlier: government victories happen earlier than rebel victories, victories by either side occur sooner than negotiated settlements. This basic fact means that we need to consider factors that drive both the duration and outcomes of civil war simultaneously.

From a policy perspective, the findings suggest several things. First, contrary to Luttwak’s (1999) “give war a chance” thesis, civil wars that do not result in an early decisive victory do not burn themselves out; they simply continue on as mutually hurting stalemates. The cumulative hazards (Figure 1) show that, first, at no time is rebel victory the most likely outcome, but government victory does become the most likely outcome from about the fourth year through the eighth year. After that, the most likely outcome is a negotiated settlement. Otherwise, the conflict simply drags on. Given the fact that the
decline in the number of ongoing civil wars over the last decade has been largely the result of the international community brokering settlements to protracted conflicts, this appears to be a more productive strategy for reducing the number and cumulative destructiveness of civil wars. Moreover, allowing civil wars to burn themselves out simply magnifies the cumulative human and economic destruction of these conflicts, exacerbating the very conditions that made that nation susceptible to civil war in the first place. Thus, we would expect that, even if “giving war a chance” does eventually result in the war dissipating, the additional destructiveness simply makes that nation a candidate for a recurrence of civil war (see Walter 2004).
REFERENCES


Thomas, J. 1996. On the interpretation of covariate estimates in independent competing-


Table 1: Hazard Estimates for Competing Risks and Pooled Cox Regression Models of the Duration of Civil Wars

<table>
<thead>
<tr>
<th>Variables</th>
<th>Government</th>
<th>Rebels</th>
<th>Negotiated Settlement</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secession</td>
<td>0.294</td>
<td>0.918</td>
<td>4.693</td>
<td>1.093</td>
</tr>
<tr>
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<td>(-1.934)</td>
<td>(-0.083)</td>
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<td>(0.182)</td>
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<td>GDP per capita</td>
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<td>2.141</td>
<td>1.765</td>
<td>1.167</td>
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<td>(-2.461)</td>
<td>(3.308)</td>
<td>(2.046)</td>
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<td>Oil exports</td>
<td>70.248</td>
<td>0.114</td>
<td>0.275</td>
<td>2.030</td>
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<td>(3.502)</td>
<td>(-2.491)</td>
<td>(-0.675)</td>
<td>(0.971)</td>
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<tr>
<td>Mountain terrain</td>
<td>1.049</td>
<td>0.985</td>
<td>1.021</td>
<td>1.024</td>
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<tr>
<td></td>
<td>(2.327)</td>
<td>(-0.66)</td>
<td>(0.996)</td>
<td>(1.999)</td>
</tr>
<tr>
<td>Military percentage</td>
<td>6.556</td>
<td>1.014</td>
<td>1.122</td>
<td>1.695</td>
</tr>
<tr>
<td></td>
<td>(3.756)</td>
<td>(0.032)</td>
<td>(0.208)</td>
<td>(2.138)</td>
</tr>
<tr>
<td>Deaths percentage</td>
<td>2.32x10^-4</td>
<td>0.497</td>
<td>1.018</td>
<td>0.533</td>
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<tr>
<td></td>
<td>(-2.712)</td>
<td>(-1.414)</td>
<td>(0.049)</td>
<td>(-1.260)</td>
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<tr>
<td>Ethnic fractionalization percentage</td>
<td>1.027</td>
<td>1.036</td>
<td>1.042</td>
<td>1.039</td>
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<tr>
<td></td>
<td>(1.637)</td>
<td>(2.202)</td>
<td>(1.701)</td>
<td>(3.868)</td>
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<tr>
<td>Religious fractionalization percentage</td>
<td>1.043</td>
<td>0.962</td>
<td>1.017</td>
<td>1.002</td>
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<td>(2.540)</td>
<td>(-2.863)</td>
<td>(0.862)</td>
<td>(0.246)</td>
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<td>Anocracy</td>
<td>0.372</td>
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<td>52.257</td>
<td>1.618</td>
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<td>(-1.644)</td>
<td>(0.307)</td>
<td>(1.996)</td>
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<td>Instability</td>
<td>0.585</td>
<td>1.724</td>
<td>1.096</td>
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<td>(-0.713)</td>
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<td>Democracy</td>
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<td>3.043</td>
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<td>(-0.179)</td>
<td>(-1.221)</td>
<td>(1.066)</td>
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<td>Intervention</td>
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<td>(-0.807)</td>
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<tr>
<td>Secession x log(T)</td>
<td>0.857</td>
<td>0.260</td>
<td>0.280</td>
<td>0.506</td>
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<tr>
<td></td>
<td>(-0.439)</td>
<td>(-1.747)</td>
<td>(-2.456)</td>
<td>(-2.366)</td>
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<td>GDP per capita x log(T)</td>
<td>1.154</td>
<td>0.36</td>
<td>0.733</td>
<td>0.918</td>
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<td></td>
<td>(1.393)</td>
<td>(-2.204)</td>
<td>(-2.198)</td>
<td>(-1.252)</td>
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<tr>
<td>Oil exports x log(T)</td>
<td>0.353</td>
<td>1.605</td>
<td>1.551</td>
<td>0.775</td>
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<tr>
<td></td>
<td>(-1.867)</td>
<td>(0.908)</td>
<td>(0.634)</td>
<td>(-0.732)</td>
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<td>Mountain terrain x log(T)</td>
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<td>(-2.023)</td>
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<td>Ethnic fractionalization x log(T)</td>
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<td>(-4.335)</td>
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<td>Anocracy x log(T)</td>
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<td>(-0.681)</td>
<td>(0.063)</td>
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<td>Log likelihood</td>
<td>-149.84</td>
<td>-76.95</td>
<td>-107.44</td>
<td>-404.96</td>
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</table>

Entries are hazard ratios. Z-scores for each parameter in parentheses.
Figure 1: Cumulative Hazards of Different Civil War Outcomes. Solid line is the government victory outcome, dashed line is rebel victory outcome, dotted line is the negotiated settlement outcome, and the dot-dashed line is the pooled outcome model. See text for details.
Figure 2: Odds Ratios for Competing Risks and Pooled Cox Regression Models. In each graph, the y-axis is the change in the odds of the outcomes for a one-unit change in the explanatory variable and the x-axis is the number of civil war years. Solid line is change in the odds of a government victory; dashed line, is rebel victory; dotted line, is a negotiated settlement; and the dot-dashed line, is the pooled outcome model. See text for details.
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ENDNOTES

i We combined negotiated settlements and truces from Doyle and Sambanis (2000). Otherwise the estimation of the models would be complicated by small numbers of those two outcomes.

ii Missing values for the military size or population variables were replaced with their most recently measured value for each missing civil war-year.

iii We initially tried to separate out the interventions as pro-government, pro-rebel and neutral. However there is not enough variation in the intervention types across the war outcomes to make this strategy feasible in the analysis.

iv These ongoing civil war cases are treated as right censored in the event history models.

v We estimated a multinomial (conditional) logit model with a log time variable for our data (not reported here) and it produces qualitatively similar results to the Cox regressions presented here.

vi While not a proper test for the pooling, the fact that sum of the log-likelihoods for each of the outcomes is more than that for the pooled model suggests that the competing risks model is preferable.

vii The odds or odds ratio is the percentage change in the hazard for a one-unit change in the covariates. It is computed by taking the base e exponent of the Cox regression model coefficients or from the hazard ratios. An odds ratio of 0 means that there is a -100% change in the hazard; 1, means that there is no effect; 2 is a 100% increases in the hazard.

viii For the variables with interaction coefficients, the significance is based on a likelihood ratio test for the joint significance of the coefficient and its time interaction.