Friends, Enemies, and Rivals:
The Determinants of Organizational Lethality

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Abstract

Some terrorist groups never kill human beings, or kill few, while others consistently carry out attacks that leave corpses strewn across city streets. What explains the variation in terrorist group lethality? What role do relationships between terrorist organizations play in determining their behavior. A few studies have sought to systematically address this question (Asal and Rethemeyer 2008; Piazza 2009; Horowitz and Potter 2013), but questions remain. How do terrorist group ties – cooperative and competitive – affect lethality? This study seeks to address this question, using a new, time-varying dataset on terrorist groups: the Big Allied and Dangerous Version 2.0 (BAAD2) data system. Our findings suggest that (1) alliances are important factor in explaining terrorist lethality, but that (2) rivalries are probably even more important and (3) the count of direct alliance and rivalry ties is a better fit to the data than forms of network centrality that take into account indirect connections.

Some terrorist groups never kill human beings, or kill few, while others consistently carry out attacks that leave corpses strewn across city streets. What explains the variation in terrorist group lethality? What role do relationships between terrorist organizations play in determining their behavior. A few studies have sought to systematically address this question (Asal and Rethemeyer 2008; Piazza 2009; Horowitz and Potter 2013), but questions remain. How do terrorist group ties – cooperative and competitive – affect lethality? This study seeks to address this question, using new time-varying data on terrorist groups, 1998-2007.

The question of terrorist group lethality is important because a number of scholars suggest that the current wave of terrorism is more deadly than previous eras (Laqueur 1999; Neumann 2009). The possibility of "new terrorism" and the "religious era" (Rapoport 2004) of terrorism have been central to theoretical debates about terrorism (Juergensmeyer 1993, 2003; Stern 2003), but the literature suffers from a lack of empirical testing about related notions. Our study does not compare eras, but provides an in-depth analysis of terrorist groups in recent years, showing that interorganizational relationships are crucial to understanding lethality in modern terrorist organizations.

Learning about which terrorist groups kill more people is also important because the extant research on terrorism does not yet provide sufficient answers to this general question. The few studies that have directly sought to explain terrorist group lethality have done so with smaller samples or time-invariant data (Asal and Rethemeyer 2008; Horowitz and Potter 2013), or primarily focused on a single causal factor, such as group ideology (Piazza 2009). Furthermore, there are inconsistent results between these few studies of lethality, demanding more in-depth consideration of the topic. Other research has looked at related questions, such as why some terrorist groups adopt suicide terror (Pape 2003; Bloom 2005), what explains the use

weapons of mass destruction (Ivanova and Sandler 2006; Asal, Ackerman, and Rethemeyer 2012), how terrorist groups learn and innovate (Jackson et al. 2005), and why some groups last longer than others (Blomberg, Gaibulloev, and Sandler 2011; Carter 2012). These questions are important, but it is unlikely that the factors that explain these outcomes also explain group lethality.

While addressing lethality, this study highlights the importance of terrorist group alliances and rivalries. Social network literature tells us that relationships can have substantial effects (McClurg and Young 2011), but terrorism scholars have only recently begun to systematically analyze relationships between terrorist organizations.[1] Several studies have shown that alliances seem to help groups become more lethal and ultimately endure. However, contrasting results have been shown regarding whether a group's count of alliances matters more than to whom it is connected (Asal and Rethemeyer 2008; Horowitz and Potter 2013). Regarding rivalries, a central debate in terrorism studies is whether competition between terrorist groups leads to more deadly terrorism. Bloom's (2005) "outbidding" argument was initially about suicide terror, but the same logic suggests competition should lead to more terrorism, and more lethal terrorism generally. Empirical studies have reached mixed conclusions about this (Findley and Young 2012; Nemeth 2013), and our study contributes further analysis to the important subject.

In the next section we discuss concepts, and then present an argument that terrorist group alliances and rivalry should each be associated with terrorist group lethality. Then we explain our research design, which includes the introduction of new global time-varying data on terrorist organizations. Our analysis shows a number of interesting results. We find that terrorist group

[1] An important and growing literature looks at terrorist groups as networks themselves, studying interactions between individual members (Sageman 2004; Enders and Su 2007; Perliger and Pedahzur 2011; Helfstein and Wright 2011). However, there are far fewer studies on ties between organizations.

alliances are associated with lethality, but we do not find support for the notion that well-connected partners (eigenvector centrality) matter more for lethality. The results suggest that rivalries are associated with lethality, which provides some support for the outbidding hypothesis. We conclude with reflections on terrorist group dynamics, and offer suggestions for related research and policy.

Deadly relationships

Terrorism is the use of violence by individuals or subnational groups to obtain a political or social goal through the intimidation of an audience wider than that of the immediate victims (Enders and Sandler 2012). Terrorist groups are subnational political organizations that use terrorism.[2] Many studies of terrorism since the September 11th attacks have looked at terrorism at the cross-national level, exploring country attributes as explanations for variation in terrorism outcomes (Pape 2003; Li 2005). Other studies have looked at a single terrorist group (Cronin 2006) or individuals (Sageman 2004). In recent years, however, scholars have increasingly sought to understand how organizational behavior affects terrorism (Jones and Libicki 2008; Enders and Sandler 2012, chapter 8; Shapiro 2013).[3]

The heightened focus on terrorist organizations has been an important development in the study of terrorism, but most studies have analyzed terrorist groups in isolation, not taking into consideration group interactions. Terrorist organizations interact in a number of ways, and these interactions likely have important effects for terrorism outcomes. In this study we consider two types of intergroup connections: alliances and rivalry.

[2] This is consistent with the definition used by some other scholars (Jones and Libicki 2008; Carter 2012), but for more discussion see (Asal et al. 2012).

[3] While analyses of global samples of terrorist groups are relatively new, other work in the past has made important contributions to the study of terrorist groups generally (Crenshaw 1985; Weinberg 1991; Eubank and Weinberg 1994; Rapoport 2001).

The first in-depth treatment of terrorist groups alliances was Karmon's (2005) book, which looks at the conditions under which such alliances form.[4] Karmon argues that groups are more likely align when they feel threatened by state security forces. This is essentially a capability aggregation argument, consistent with the literature on inter-state alliances (Walt 1987). Regardless of the reason why alliances might form, we argue that the sharing of resources – intelligence, bomb-making expertise, weapons – that likely occurs between allied groups should overall make them more lethal. In addition to sharing logistical resources, groups sometimes carry out joint attacks together, which also should lead to increased lethality.

Information is crucial for terrorist groups, as they attempt to carry out highly visible attacks while at the same time try to avoid government detection (Jackson et al. 2005). Terrorist organizations update their behavior as new information becomes available (Enders and Sandler 1993). When groups align, they can share knowledge, such as about government operations or weak links in the security apparatus. In addition to sharing information about the government, terrorist groups can also benefit from joint training and imparting knowledge related to more effective tactics. When the FARC in Colombia wanted to shift its attacks from rural to urban areas, it teamed up with groups that had more experience in urban warfare tactics (Seper 2002). Terrorist groups also trade weapons, as can be seen from examples from Western Europe (Globe and Mail 1987) to Southeast Asia (Wigg 1990). Finally, terrorist organizations also team up to carry out joint operations, such as Lashkar-e-Taiba and Lashkar-e-Mohammad's attack on the Indian Parliament in 2001, which killed 12 people (Clarke 2010). Through all of these mechanisms, alliances should help terrorist groups to become more lethal.

[4] Karmon usually uses the term "coalition" instead of alliance, but he explains that this refers to logistical or operation cooperation, which is consistent with our understanding of alliance. We use alliance, coalition, and cooperative tie synonymously.

One study has already found that alliances are associated with lethality (Asal and Retheyemyer 2008). However, a related study suggests that instead of a group's number of alliances, what matters is to whom the groups are connected: groups with ties to important (well-connected) terrorist groups are more likely to be lethal then other terrorist groups, and when this is taken into consideration counts of alliances do not seem to be associated with terrorist group lethality (Horowitz and Potter 2013).[5]

In spite of Horowitz and Potter's findings, we argue that additional relationships should substantially contribute to terrorist group lethality. The benefits such as resource aggregation and risk diversification (Horowitz and Potter 2013, 4-6) likely to occur with each new ally should be valuable, and it is not clear that ties to well-connected groups should be more important. Alliances with important groups could in some cases be harmful, in ways that are comparable to the potential negative consequences of state sponsorship (Carter 2012). A connection to an important terrorist group could indicate an asymmetrical relationship, with the less-connected group dependent and ultimately at risk if the well-connected group changes its preferences or decides to break off the alliance. Consistent with the idea of a lack of overall benefits from these type of relationships, a recent study found that alliances with well-connected groups are not associated with terrorist group longevity – when one also takes into consideration a regular count of alliances (Phillips 2013). Overall, regardless of the alliances with well-connected groups, we argue that in general terrorist organization alliances should help their members become more lethal.

H1: Organizations with more allies are likely to be more lethal.

[5] Technically, the notion of "well-connected" groups refers to the social network measure of eigenvector centrality (Borgatti 2005), but we avoid that term in the text in the interest of clarity to a more general audience.

Another important type of terrorist group interaction is rivalry. Most studies on this subject are related to the "outbidding" framework, which argues that terrorist groups compete for popular support, particularly from the community they claim to represent such as an ethnic group or religion. Bloom (2004, 2005) uses the outbidding argument to explain why some groups adopt suicide terrorism, which has contributed substantially to debates about suicide terror (Brym and Araj 2008).

Beyond suicide terror, the outbidding logic has also been applied to terrorism generally, with the notion that group competition should lead to more terrorism (Kydd and Walter 2006). This idea finds mixed empirical support. Of the few global quantitative studies, some papers finds no support for the idea that outbidding leads to suicide terror or more terrorism in general (Piazza 2009; Findley and Young 2012). A different study, however, finds that that competition between groups – particularly ethnic and religious groups – does lead to more terrorism (Nemeth 2013).[6] The contrast between findings is one impetus for our study.

While it is unclear that competition should lead to the specific tactic of suicide terrorism, we argue that it is likely that it should encourage terrorist groups to be more lethal. The systematic use of suicide requires a highly organized terrorist group, and also one with a flow of recruits who are ready to die, usually for some compensation for their family and other incentives (e.g., Moghadam 2003). For increased lethality, however, a terrorist group simply needs to do more of what it already had been doing – carrying out terrorist attacks. In a competitive environment, terrorist groups are likely to try to find ways to stand out from their peers. Increased lethality is a prime way to achieve this goal, as Hoffman (2006, 248-249) notes

[6] Chenoweth (2010) also finds that competition leads to more terrorism, but she analyzes democratic competition generally, including involving non-violent groups.

that the best propaganda for terrorist groups is to carry out more successful attacks. This suggests the following hypothesis:

H2: Organizations with more rivals are likely to be more lethal.

Data

The data for this study was drawn from three sources: the Big Allied and Dangerous Version 2.0 (BAAD2) data system, the Global Terrorism Database (GTD), and the Quality of Government Dataset (QoG). The core organizational variables are draw from BAAD2. BAAD2 was designed to remedy a central problem in the study of terrorist organizations: lack of comprehensive, time-series data on terrorist organizations. The BAAD2 data system is built around three components. First, in order to disentangle the myriad of names and alias related to terrorist entities, the BAAD2 data system includes the Terrorist Organizational ID system (TORG). The TORG system covers nearly 2,600 primary entities and slightly more than 2,900 aliases. For each primary entity the TORG system contains information on the organization's founding or "first known" year, the organization's primary country of residence or "homebase" (rendered in text, as a COW code, and as ISO 3166-1 numeric and 3-letter country codes), and identifiers that match the primary entity to the same entity in data drawn from the GTD, the Uppsala Conflict Data Program (UCDP) data system, the Minorities at Risk (MAR) dataset, the Minorities at Risk Organizational Behavior (MAROB) dataset, and the Profiles of Incidents involving CBRN by Non-state Actors (POICN) dataset. Using the homebase identifier it is possible to link country-level data from the QoG dataset to organizations.

For the purposes of this study, we used a subset of the entities found in the TORG system. Our unit of analysis was defined as any organization that (1) had perpetrated at least one

actor of terrorism as recorded by the Global Terrorism Database between 1998 and 2007 or (2) had appeared in the UCDP Battle-Related Deaths Dataset for the period 1998-2007. Implicitly, then, our operational definition of terrorism is the one used for the GTD: "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (National Consortium for the Study of Terrorism and Responses to Terrorism 2013, see http://www.start-dev.umd.edu/gtd/using-gtd/). Inclusion in the UCDP Battle-Related Deaths Dataset is driven by a different set of criteria:

> The Uppsala Conflict Data Program (UCDP) defines an armed conflict as a contested incompatibility that concerns government and/or territory over which the use of armed force between the military forces of two parties, of which at least one is the government of a state, has resulted in at least 25 battle-related deaths each year (Uppsala Conflict Data Program (UCDP) 2013, 5).

Collectively, these two inclusion criteria created a universe of 580 organizations.

The dependent variable for this study, the number of individuals killed by a terrorist organization in a given year, was calculated from the GTD using the TORG ID mapping noted above. The June 2012 release of the GTD identified 538 organizations that perpetrated at least one terrorist incident between 1998 and 2007. The BAAD2 dataset includes data on all 538 of those organizations.[7]

Using the TORG data we derived three control variables. *Age* is the first. Age matters because over time, groups learn and evolve, particularly as they interact with government security forces (Kenney 2007). Terrorist organizations frequently fail in their attempts, and adjust their behavior accordingly to carry out more effective attacks in the future. Kenney (2007 140-143) details how groups as diverse as the Irish Republican Army and al Qaeda, over the

[7] Because the GTD is continually updated and improved, the number of organizations listed as having perpetrated an attack in a given period of time is subject to change.

years, developed handbooks to pass along collected wisdom to their members. As groups age, they are not only increasingly likely to stay alive, but increasingly equipped to carry out violence.

Using the homebase country code from TORG, we imported two variables from the QoG dataset to characterize the nature of the country context. First, we imported the *Freedom House Imputed POLITY2* (fh_ipolity2) variable to characterize regime type in the homebase, with 0 being least democratic and 10 being most democratic (The Quality of Government Institute 2013, 83). A substantial body of research suggests that terrorism is more likely in democratic countries than it is in non-democratic countries (Chenoweth 2013), and the same logic should apply to terrorist group lethality. Democratic countries, by offering civil liberties to all, including potential terrorists, are simply easier to attack (Eubank and Weinberg 1994). An additional explanation is the notion that democratic governments are perhaps more likely to offer concessions to terrorist groups, because the public is likely to demand that the government do anything it can do stop the terror – and this encourages more terrorism, and more lethal terrorism (Pape 2003).

Second, we imported the Penn World Table (PWT) *Real GDP* variable (pwt_rgdp) to capture the level of wealth in the country. In order to avoid loss of observations for countries not covered by PWT, we secured data from the World Bank and tradingeconomics.com for Myanmar, Serbia, and East Timor. While not a perfect match to the PWT data, we feel the estimates are sufficiently similar to warrant their use to fill in the missing values. Real GDP acts as a proxy for state capacity to confront terrorist organizations. By capacity we generally mean a state's capacity to conduct counterterrorism, which can be seen as a combination of military

capacity and bureaucratic/administrative capacity as defined by Hendrix and Young (2012).[8] Dissident groups are limited by what the state will permit; in weak states the groups can be unchecked by the state, while in highly functional states groups are more likely to be pressured, put on the defensive, and perhaps eventually destroyed. Some studies find that terrorist groups are less likely to survive in more capable states (Carter 2012). As a result of the challenges terrorist groups face in more capable states, their ability to be especially lethal should be restricted as well.

The second component of the BAAD2 system is the BAAD2 Organizational Data. The organizational data is constructed as an unbalanced panel. The unit of analysis is the organizational-year. Coding for each organization began either in 1998 or on the first year the organization was known to exist if that was later than 1998. Organizations were retained in the dataset until either the panel expired or the organization was known to have been disbanded, destroyed, or otherwise ceased operation. For each organization, we coded a range of variables that describe the nature of the organization, including its size, ideological commitments, internal structure, leadership, sources of material support, territorial control, political activity, social support activity, and degree of attention from counterterrorism agencies domestic and international. Coding was done by hand from a wide variety of primary sources, including (but not limited to) organizational websites, newspapers, magazines, academic books and articles, web reports, blog reports, and government documents. After initial training, each coder prepared an initial assessment of the variables for each year for the organizations to which they were assigned. The preliminary coding was then passed to a coding editor who reviewed the work for consistency and conducted "spot-checks" on the initial coding. When primary coding was

[8] Terrorist groups are more often defeated by policing than military action (Jones and Libicki 2008), so we suggest bureaucratic/administrative capacity matters more than military capacity.

completed, the research team then conducted multiple rounds of quality control checks. One of the primary authors reviewed every variable for consistency across panels; any inconsistencies were returned to the editor for re-coding. This process was repeated four times. Additionally, the 100 most active organizations were all subject to thorough analysis by the coding editor and most experienced coder to assure that active organizations were properly represented in the data. Randomly selected "spot-checks" were also conducted on smaller organizations. Finally, for some variables where there was reason to believe the value should be consistent over time (for instance, there is little change in ideology over time for organizations) if the coders were unable to definitively assign a value for a given year we interpolated the value frin confirmed values in years before and after the focal year.

For the purpose of this study, we created several control variables from the base BAAD2 organizational data. Turning first to ideology, the BAAD2 coding allows each organization to be coded into one or more of 11 categories: left, right, religious, ethnonationalist, separatist, environmentalist, supremacist, anarchist, anti-globalizationist, vigilante, and criminal. Thus an organization may be coded as having complex ideological compounds: right-religious, left-anti-globalization, religious-ethnonationalist, etc. For the purposes of this study, we aggregated these categories into five "only" categories, where "only" means that the organization can only be coded a as adhering to this ideology if it is *not* compounded with other ideologies: *Religious ideology only*, *Ethnonationalist ideology only*, *Leftist ideology only*, and *Rightist ideology only*. We then created one compound: *Religious-ethnonationalist ideology*. That is, this variable is "1" only for those organizations that are both religious and ethnonationalist. Some scholars suggest that the fundamental explanation of terrorist group lethality in recent years is religion (Piazza

2009; Juergensmeyer 2003; Hoffman 2006, chapter 4; Berman 2009; Hoffman 1995).[9] Berman (2009, 8) finds that of the groups on the U.S. State Department's Foreign Terrorist Organization list, religious groups killed more than 5 people per attack, while secular groups had a kill rate of 1.3 per attack.

Religion is important to terrorist violence, but we suggest it should be especially deadly when a group also has nationalist claims. Asal and Rethemeyer (2008) argue that terrorist organizations that are both religious *and* ethnonationalist should be more deadly than other types of groups. Groups that invoke religion as a motivation, for reasons discussed above, should have advantages in deadliness. However, when a group also claims to represent an ethnic community, this should lead to further dynamics of violence: direct inter-group violence, and violence to send messages to other ethnic groups, or to other terrorist groups claiming to represent the broader ethnic collective – as opposed to the divine audience or the government. Additionally, ethnonationalist groups should ex ante be capable of substantial violence because ethnic identity and its visibility make it easier for terrorist groups to monitor members and enforce organizational rules (Lichbach 1995, 214). Left-wing and environmental groups, for example, are comparatively disadvantaged.

Next, we included a control for organizational membership titled *Size*. Data on organizational size was also modified from the original coding in BAAD2. For this study, organizations were coded as falling into four orders of magnitude: 0-99, 100-999, 1,000 – 9,999, and greater than or equal to 10,000. In instances where no data was available in the original coding on size, we assumed that those organizations were small and recoded their value from

[9] Some scholars (and the conventional wisdom) suggest that Islamist terrorist in particular is especially violent (Rapoport 1998; Hoffman 2006, 89-97), but Piazza (2009) shows that when one takes into consideration al-Qaeda-affiliated groups, Islamist groups are no more lethal than other terrorist groups.

"missing" to 0-99 members. . Carrying out high-lethality attacks can be costly, in terms of logistics chains, training and equipping members in explosives or special tactics, and raising funds to pay for these activities. For example, suicide attacks are especially costly and labor-intensive, but are far more deadly than the typical terrorist attack (Pape 2003, 346). Groups with more members are better equipped for such operations, and can more easily bear the cost of members arrested or killed – so that the remaining group can continue to carry out deadly attacks. The benefits of group size have been shown in a few studies of lethality (Asal and Rethemeyer 2008), and studies of terrorist group longevity (Blomberg, Gaibulloev, and Sandler 2011).

Our control for *Territorial control* is directly captured in BAAD2's basic coding. The standard for finding that an organization controls territory is that an organization must be able to (a) control movement into, out of, or with a given territory, (b) perform functions or provide services that are similar to legitimate governments, (c) and enforced control through the threat or actual use of force. Territorial control may be granted by a government to an organization (that is, grants of control would still be coded "1" in the data). The effective area of control must be substantial (subareas in large cities, cities, regions, etc.) and *not* just occupation of a building or land area that would be indistinguishable from ownership under the aegis of a legitimate government. The data was coded yearly; organizations could switch statuses from year to year. Exercising control over land can be highly beneficial to terrorist groups, allowing them to train, store weapons, and set up communications facilities without state interference (Takeyh and Gvosdev 2002). This can be crucial in helping the groups to carry out more lethal attacks. Existing in a weak state, where the government can lose power over square miles of land,

enables groups to thrive in a way that other groups – hiding in the shadows, constantly evading security forces agents – cannot. Overall, this should contribute to a group's lethality.

Finally, for this study we extracted two control variables that capture how behavior and resource generation may be related. Specifically, from the BAAD2 base coding we used variables that capture whether an organization enjoyed state sponsorship or engaged in smuggling. Both forms of resource generation were represented as qualitative variables that were allowed to vary from year to year.

Smuggling is a dichotomous variable coded 1 for groups engaged in trafficking illicit materials, such as cocaine, cigarettes, ivory, etc. These types of groups are likely to be especially lethal for several reasons. First, smuggling is lucrative. Terrorist groups in this business are especially able to pay members, purchase weapons, and therefore can carry out more injurious attacks. Involvement in smuggling should indicate a greater propensity for lethality for another reason. Participation in a business that is shunned in many societies, the drug trade, not to mention trafficking in humans or endangered species, indicates a rejection of societal norms in cultures across the globe (Gaylord and Traver 2004). This is noteworthy even for terrorist groups.[10] Such groups are unlikely to be careful about excessive fatalities. Finally, involvement in smuggling can lead to greater lethality as groups might use violence to gain control of new markets, discipline members, and generally regulate their business.

S*tate sponsorship* was also created as a dichotomous variable that takes a "1" in the years in which the organization received support (financial, materials, personnel, informational, etc.). State sponsorship can provide substantial funds for terrorist groups, but it comes with drawbacks that are not as apparent with other funding sources. Sponsorship can restrict recipient groups'

[10] For example, terrorist groups fear cooperating with criminal organizations because they do not want to be branded "simply" criminals, as this could affect their political goals (Dishman 2001, 46).

actions, and bring about particular negative consequences. In many instances, states that provide resources to terrorist groups do so in exchange for particular behavior or carrying out specific attacks. Byman (2008, 18) notes that when Syria sponsors a terrorist group, it tries to not only foster and exploit them, but at the same time limit them. Furthermore, a sponsor could eventually turn on the group, giving information about it to a state that seeks to destroy the group (Carter 2012). For these reasons, we expect that overall sponsorship should constrain groups from being especially lethal. This is consistent with empirical studies, which have found that state sponsorship is either negatively associated with lethality (Asal and Rethemeyer 2008) or not associated (Piazza 2009).

The third component of the BAAD2 data system is the BAAD2 Network Data, which provides the information necessary for our key independent variables. Like the organizational characteristics data, the network data is organized yearly. The membership of a given social network depends on which organizations were known to exist in that time period. Thus the size of a given year's network will vary. The networks constructed are complete networks in that the nodes are all other terrorist organizations known to exist in a given year. Network data was coded from the same set of textual sources and using the same procedures used to secure the organizational data. The network coding was also subject to two rounds of quality control by one of the authors in cooperation with the editor and coders. Our coding stance was conservative: without clear evidence that a relationship exists our assumption is that a relationship *does not* exist. During the quality control process each yearly network was examined for year-to-year patterns of relationships appearing, disappearing, and then reappearing in the next year or two (what we came to term "strobing"). However, we found little evidence for strobing in the data

and thus did not choose to interpolate network data from surrounding years as we did in some instances for the organizational data.

The original network coding scheme included 23 types of relationships which allowed us to capture multiplex relationships. That is, organizations could be simultaneously coded as "ally", "shared members", and "supported cause." For the purposes of this study, we recoded our network data into two relationships: alliance and rivalry – see Table 1 for the types of relationships included in the two categories.

Across the 10 years of data, we coded a total of 4,427 dyads, with 3,702 being alliance relationships and 725 being rivalrous relationships.

Table 1: Types of relationships counted as Alliances or Rivalries

Alliances	**Rivalries**
Ally	Rival
Suspected ally	Target
Shared members	Enemy
Faction	Competing faction
Supported cause	
Umbrella organization	
Suspected umbrella Organization	
Terrorist for hire	
Armed wing	
Joint claim of responsibility	
Other affiliation	

In the alliance category, the most prevalent form is alliance (54%) followed by suspected alliance (14%) – the two being differentiated by the (1) number of sources, (2) quality of sourses, or (3) level of certainty sources expressed by the sources. More than 85% of all alliance relationships are accounted for by six types: alliance, suspected alliance, umbrella, suspected umbrella, supported cause, and joint claims for attacks.

Turning to rivalry, more than 98% of these relationships fall into two categories: (1) organizations that view each other as rivals for the affections of the group or groups that they purport to represent and (2) those that are enemies – that is, organizations that are not only rivals for the affections of the same groups but view each other as worthy of attack.

For each year we constructed a series of centrality measures for each organization. Because there has been a controversy in the literature over which form of centrality is most closely related to lethality – degree (that is, counts of alliance or rivalry connections) versus eigenvector (that is, a measure that accounts for whether one's connections are themselves well connected to others in the network – which conceptually is close to the concept of "embeddedness" (Granovetter 1985)). As a result we created four network measures: *Alliance: degree, Alliance: eigenvector, Rivalry: degree, and Rivalry: eigenvector.* In the models that follow we will explore both concepts with respect to model fit.

Method

As noted above, the unit of analysis is the organization-year and the dependent variable is a count of fatalities perpetrated by the organization in a given year. To estimate these models we explored both Poisson and negative binomial techniques for panel estimation. However, because there is clear overdispersion in the data, we settled on use of the negative binomial. In order to retain covariates that are constant through time, we opted for a random effects specification, though we did include year dummies in order to account for year effects. With 1998 as the base case, two year dummies came up consistently significant: 2000 and 2001. No other year dummy had a p value lower than 0.216. To conserve space we did not report the values for the year dummies. For all models the likelihood ratio test that compared the panel model versus the

pooled model generated χ^2 statistics in excess of 250 and p values that were zero to three digits. That is, there is strong evidence that the panel model is the correct choice for this data. We used Stata 11.2's (Stata Corporation 2009) *xtnbreg* command to execute our estimations.

Table 2 contains the results of our modeling. In order to fully explore the two centrality concepts that have been used in past work (that is, degree and eigenvector) we regressed six models. Models 1 and 2 replicate past work: Model 1 includes the degree measure for alliances and Model 2 includes the eigenvector measure for alliances. Model 3 include degree measures for both alliances and rivalries. Model 4 includes eigenvector measures for both types of networks. Models 5 and 6 test to see if a better fitting model could be constructed by varying centrality measure by network type.

Findings

As Table 2 suggests, there is strong evidence to suggest that Hypotheses 1 and 2 are both correct: the number of alliances and the number of rivalries both strongly influence the propensity for terrorist organizations to kill. However, we use the term "number" of alliances and rivalries advisedly because the modeling clearly suggests that alliance eigenvector centrality is not statistically significant when it is included in the model (See Models 2, 4, and 5) while the degree count is statistically significant at the 0.001 level in all three models where it is included (see Models 1,3, and 6). With respect to rivalry, both degree and eigenvector measures are statistically significant at the 0.01 or 0.001 levels.

Table 2: Negative bionomial regression of fatality counts by year

	(1) DV: Fatalities	(2) DV: Fatalities	(3) DV: Fatalities	(4) DV: Fatalities	(5) DV: Fatalities	(6) DV: Fatalities
Alliances: degree	0.0778***		0.0740***			0.0772***
	(0.00891)		(0.00915)			(0.00892)
Alliance: eigenvector		-0.609		-0.629	-0.690	
		(0.512)		(0.511)	(0.496)	
Rivalry: degree			0.243***		0.304***	
			(0.0582)		(0.0592)	
Rivalry: eigenvector				5.005**		4.522**
				(1.675)		(1.697)
Size	0.152**	0.192**	0.118*	0.195***	0.142*	0.154**
	(0.0587)	(0.0583)	(0.0592)	(0.0584)	(0.0591)	(0.0588)
Religious ideology only	-0.119	0.132	-0.0774	0.132	0.159	-0.118
	(0.202)	(0.198)	(0.200)	(0.198)	(0.196)	(0.202)
Ethnonationalist ideology only	0.0437	-0.00168	0.0542	-0.00302	0.0181	0.0412
	(0.177)	(0.179)	(0.176)	(0.180)	(0.178)	(0.178)
Leftist ideology only	0.269	0.271	0.249	0.278	0.237	0.275
	(0.206)	(0.209)	(0.204)	(0.209)	(0.206)	(0.207)
Rightist ideology only	-0.178	-0.217	-0.210	-0.213	-0.265	-0.174
	(0.383)	(0.391)	(0.377)	(0.392)	(0.384)	(0.384)
Religious & ethno-nationalist ideology	0.757***	0.747***	0.745***	0.745***	0.732***	0.754***
	(0.183)	(0.184)	(0.182)	(0.184)	(0.183)	(0.183)
Organizational age	0.0124**	0.0131**	0.0112**	0.0130**	0.0116**	0.0123**
	(0.00432)	(0.00437)	(0.00430)	(0.00440)	(0.00434)	(0.00436)
Freedom House Imputed POLITY2	0.0422*	0.0442*	0.0362	0.0432*	0.0374	0.0413
	(0.0212)	(0.0212)	(0.0210)	(0.0212)	(0.0210)	(0.0212)
State sponsorship	-0.263	-0.0218	-0.259	-0.0204	-0.0237	-0.261
	(0.144)	(0.138)	(0.143)	(0.138)	(0.136)	(0.144)
Smuggling	0.463***	0.527***	0.395**	0.524***	0.446**	0.459***
	(0.137)	(0.141)	(0.138)	(0.141)	(0.141)	(0.137)
Territorial control	0.158	0.125	0.114	0.119	0.0779	0.153
	(0.137)	(0.138)	(0.136)	(0.138)	(0.137)	(0.137)
Real GDP (in 1000s)	-0.026***	-0.024***	-0.028***	-0.024***	-0.027***	-0.026***
	(0.00709)	(0.00716)	(0.00701)	(0.00724)	(0.00706)	(0.00717)
Constant	-3.153***	-3.181***	-3.153***	-3.245***	-3.182***	-3.211***
	(0.264)	(0.262)	(0.262)	(0.266)	(0.260)	(0.267)
ln_R	-0.790***	-0.824***	-0.758***	-0.826***	-0.787***	-0.794***
	(0.0861)	(0.0818)	(0.0887)	(0.0816)	(0.0844)	(0.0857)
ln_S	0.112	-0.0689	0.244	-0.0795	0.0882	0.0938
	(0.213)	(0.187)	(0.227)	(0.186)	(0.203)	(0.210)
N	3404	3404	3404	3404	3404	3404
Log-likelihood	-3998.1	-4025.7	-3990.3	-4022.9	-4014.0	-3995.7
χ^2	188.6	113.0	209.6	120.6	144.0	194.8
AIC	8046.3	8101.5	8032.5	8097.7	8080.0	8043.5
BIC	8199.6	8254.8	8192.0	8257.2	8239.5	8202.9

Standard error in parenthesis. Year dummies included but not reported.
* p<0.05, ** p<0.01, *** p<0.001

So which of the six models is the best representation of the data? To answer this question, we turned to four measures of model fit: log-likelihood, χ^2, AIC, and BIC. Here, the measures are unanimous: Model 3. Model 3 has the lowest AIC and BIC measure and the highest χ^2 and log-likelihood. Model 3 uses degree centrality for both alliances and rivalries rather than eigenvector centrality. Moreover, the findings for other control variables are quite consistent across all six models (excepting the *Freedom House Imputed POLITY2* variable, which is consistently positive and of similar magnitude but not always statistically significant), suggesting that final model selection based on fit will not introduce bias.

We would also hasten to note that the findings from this new and much more extensive dataset are also consistent with previous work: size, greater age, the intersection of religious and ethnonationalist ideology, and smuggling all increase the propensity of organizations to kill prolifically. Operating from a wealthier "homebase" tends to decrease lethality. State sponsorship and territorial control have no statistically significant relationship to lethality. And as noted before, there is inconsistent evidence regarding the importance of regime type.

The finding regarding the nature of alliance relationships and the proper way to think about their representation in models is new. Our data strongly suggests that the outbidding hypothesis is correct: organizations that face competition – but especially violent competition – are more likely to kill prolifically. Previous work has not had access to data on rivalry between organizations. Thus we suspect that the larger effect found from alliances in previous work may have been partially a question of omitted variable bias. There is a fair degree of positive correlation between the alliance and rivalry measures (0.2803), so it is likely that previous models that only included alliance connections were picking up both the rivalry and alliance effect in one coefficient. However, our results also suggest that rivalry ties, while not as

prevalent as alliance ties (mean count of alliances: 1.11; mean count of rivalries: 0.266; 90th percentile of alliances: 3; 90th percentile of rivalries: 1), have an effect on lethality that is more than three times larger (see the coefficients on *Alliance: degree* and *Rivalry: degree*). Earlier work concluded that networked organizations are more dangerous. That is still true. But we would now contend that having friends is helpful while having enemies is motivational. The two together are lethal.

This finding also provides another data point in the debate regarding the type of ties that matter most to organizational lethality. Fundamentally, degree centrality captures only the effect of direct ties while eigenvector centrality tries to capture the effect of both direct *and* indirect ties. Here, our data strongly suggests that direct ties are far more important to understanding lethality. From the alliance perspective, when organizations kill, they gain more from having direct connections – from organizations that can transfer weapons, knowledge, access, and members in one step. From the rivalry perspective, the key issue is direct enmity between actors. Being seated in the midst of a "nest" of rivals matters less than being in direct competition with one or more organizations.

Conclusion

What are the consequences of relationships between terrorist groups? Research on terrorism has only recently begun to systematically analyze terrorist interorganizational ties and this study sought to contribute to the discussion by considering debates about two types of relationship. The results of the analysis suggest that terrorist group alliances should contribute to group lethality. We do not find support for the notion that alliances with "important" (highly-connected) groups are especially important for group deadliness. The paper also contributed to

the study of terrorist group rivalry, usually discussed in the outbidding context, showing that competition between groups is associated with increased fatalities. The paper offers important contributions to future research on terrorism and to those thinking about best practices for policy.

There are a number of possible extensions to this work. In general, the study hopefully offers impetus to scholars to analyze interactions between terrorist organizations, instead of considering them to act independently. More specifically, scholars could analyze consequences of terrorist group alliances and rivalry. For example, important research analyzes bargaining between terrorists and the state, but generally considers terrorists to be unitary actors (Bapat 2006).[11] Interesting questions arise. When terrorist group ally does this increase or decrease the likelihood of a deal with the government? On the one hand, fewer actors could make negotiation easier. On the other hand, the aggregated capabilities could embolden the terrorists to keep attacking instead of negotiating. Rivalry is also an under-studied phenomenon in research on terrorist bargaining. Scholars have shown the importance of "spoilers" (Kydd and Walter 2002), but under what conditions are rivals spoilers? One would assume that rivalry would increase the odds of spoiler behavior, but this has not been empirically shown.

Given the important consequences of terrorist alliances and rivalry, future research would benefit from understanding the conditions under which these relationships emerge. Some studies have examined this question in the context of rebel group alliances during civil wars (Bapat and Bond 2012), but it is unclear to what extent these findings apply groups not engaged in civil war. Karmon (2005) provides some answers for why terrorist groups align, but he primarily studied European and Middle Eastern Groups during the Cold War. Have alliance explanations and

[11] The literature on spoilers (Kydd and Walter 2002; Kydd and Walter 2006) and concessions (Bueno de Mesquita 2005) somewhat gets at rivalry dynamics. However, these studies usually only consider competition between moderates and extremists, when there are other types of terrorist group competition that could have important effects.

patterns changed with time? Beyond alliances, terrorism researchers have said little about when and why terrorist groups might become rivals. The outbidding literature is one starting point, but this generally only speaks to terrorist groups competing for support from a wider community, such as an ethnic group.

Policymakers can draw several important lessons from this research. Some governments are concerned about terrorist groups alliances because anecdotally these relationships seem to help the groups, and our research adds serious evidence to the claim. Furthermore, some policymakers might only be concerned about ties to powerful groups such as al Qaeda, but the results presented here suggest alliances with any type of group can make a terrorist organization more lethal. Governments should therefore focus on identifying and disrupting any type of terrorist alliance, and not concentrate excessively on alliances with highly-connected groups.

Regarding rivalry, governments sometimes turn a blind eye when terrorist groups attack each other, perhaps hoping that it weakens or destroys these groups. In some cases, government agents support one of the feuding terrorist groups. However, our study shows that rivalries are associated with increased group lethality. It seems likely that this increased lethality stems not only from fatalities of the involved groups, but civilians and others caught in the crossfire or used as victims to send messages. Security forces should therefore not ignore or contribute to these rivalries, but instead think of them like alliances – sources of increased violence that should be discouraged and disrupted if possible. Both alliances and rivalries can serve as indicators of terrorist organizations particularly worthy of government counterterrorism efforts, due to the highly lethal nature of these types of groups.

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