

Violence “from above” or “from below”? The Role of Ethnicity in Bosnia’s Civil War¹

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The literature is divided as to how ethnicity affects wartime patterns of violence in civil wars. This article conducts an assessment of the relative impact of two competing explanations for violence in Bosnia’s civil war. One account of this conflict attributes violence to the intentions of ethnic groups to create ethnically homogenous territories, thus advocating a macroterritorial explanation where the origin of violence is external to the locations it is perpetrated at. Competing theories, however, describe violence in Bosnia as a result of local ethnic resentment and fear that were activated once the war had started. Results from spatial regression provide evidence for violence “from above” and “from below,” showing that there is evidence for both macro- and microeffects of ethnicity on violence. In addition, I estimate a finite mixture model that is able to tell where and under which conditions the respective mechanisms apply best.

The great majority of the literature on civil war has examined the role of ethnicity as a determinant of conflict onset (see, e.g., Cederman, Wimmer, and Min 2010; Fearon and Laitin 2003; Gurr 1970; Horowitz 1985). However, with the recent increase in microlevel studies of conflict, more attention has been devoted to the influence of ethnicity on wartime dynamics. Examples of this kind of study include the impact of ethnic networks on rebel recruitment (Weinstein 2007) or the effect of counter-insurgent identity on insurgent activity (Lyall 2010). In a similar vein, this article studies how ethnicity affects the spatial distribution of violence in a civil war. Can ethnicity help us understand the significant regional differences in violence we often observe in these conflicts? The existing literature roughly distinguishes between two competing explanations for *how* it does so. Macrolevel explanations see violence as a result of adjustments to the ethnic map, whereas microlevel accounts attribute violence to enmity between neighbors of different ethnic groups.

This, however, raises the question of how to determine the relative importance of the macro- versus the microlevel. How can we know if violence in civil

wars is driven mostly by the opposing parties territorial ambitions or by local feuds that are activated as a result of war? Or to put it differently, is violence “imported” to certain locales by the warring factions, or is the source of it “local”?² Few if any comparisons exist that try to gauge the relative explanatory weight of these competing accounts. Yet, an answer would be incredibly important, both for the scholarly understanding of conflict but also for conflict prevention and mitigation: with a dramatic shift towards the “micro” that is currently taking place in the research community, scholars will want to know to what extent this approach can help us understand broader trends in violence. Practitioners, on the other hand, will be interested in learning more about the sources of violence, since this helps tailor conflict resolution strategies to the appropriate level.

The article uses quantitative techniques to compare micro- and macroexplanations for civil war violence in Bosnia, using municipalities as the unit of observation. After a review of the existing literature, the analysis proceeds in three steps. First, I develop operationalizations for the micro- and the macroeffect of ethnicity on violence. For the former, observing ethnicity at the municipality level is too aggregate a perspective. If

¹An online appendix with supplementary material for this article is available at <http://journals.cambridge.org/JOP>. Data and R code necessary to reproduce the numerical results will be made available at <http://dvn.iq.harvard.edu/dvn/dv/nilsw> on publication of this article.

²The micro-macro distinction about the sources of violence is not unique to the civil war literature; a similar distinction in the context of genocidal violence in Rwanda has been made by Straus (2006, 66f, 92).

personal ethnic antagonism matters, we need to study more carefully the interactions between neighbors, which requires us to move down to the village level. Conversely, in order to find out whether macrolevel territorial ambitions between groups are responsible for wartime patterns of violence in Bosnia, we need to consider the geostrategic position of a municipality within a larger picture. Second, I test how competing processes account for violence in Bosnia, using conventional regression modeling. This analysis shows that both have an independent effect; in other words, there is significant and robust evidence that local ethnic competition mattered and even left a statistical signature that is visible while controlling for the frequently mentioned "territorial" interpretation of the conflict. Third, I extend this regression modeling exercise. A useful and intuitive approach for gauging the relative explanatory impact would be to find out which cases are best explained by either type of process. Finite mixture models provide a way to do exactly this (Imai and Tingley 2010). My analysis reveals that the territorial logic explains violence in the great majority of municipalities across Bosnia, and the microexplanation seems to apply to roughly 15% of all municipalities. In addition, the mixture model allows me to make a first attempt at identifying the conditions under which either process applies best as an explanation for violence.

Ethnicity and Violence in Bosnia

Any theoretical discussion that centers heavily around "ethnicity" first needs to clearly sketch the limitations of this concept. Much of the literature, especially in political science, has had a "tendency to take discrete, bounded groups as basic constituents of social life, chief protagonists of social conflicts and fundamental units of social analysis" (Brubaker 2004, 8). Quite the opposite, Brubaker argues that ethnic boundaries are fluid categories that change over time, which may matter in different ways (or not at all) for the individuals assigned to either side of them by an outside observer. Whereas this criticism is certainly valid for a number of cases, I join O'Loughlin (2010) in adopting an "ethnic-based framework" for my analysis of the Bosnian civil war. I assume that in Bosnia, especially in the years leading up to the conflict, ethnic categories were salient and visible. People were conscious of their own ethnic affiliation and the affiliation of others. Even though it is difficult to show this empirically, some indicators exist that can be interpreted in this direction. For example, intermarriage

between groups was low, and constantly so in the decades before the conflict (Botev 1994), which suggests that there was a certain social distance present between groups (Smits 2010). Also, census figures from Bosnia (which are also used in the analysis presented below) show that the great majority of the population (more than 90%) identified with their ethnic group rather than the national category "Yugoslav" (Kalyvas and Sambanis 2005). The mere salience of ethnic boundaries, however, does not presuppose that interethnic relations become violent, which is what "primordial" explanations typically assume (Kaplan 1993). However, my analysis shows that during the conflict, ethnic categories to some extent determined wartime patterns of violence, and the purpose of this article is to show *how* they did so.

The literature on ethnicity and violence spans multiple scientific disciplines and has led to a vast array of approaches. Psychologists and sociologists have traditionally focused more on the *individual* and his or her immediate social context, whereas political scientists tend to reason about ethnic *groups* and their (sometimes violent) interactions. Hence, it is not surprising that there are different prevalent explanations for intergroup violence across disciplines. In the following, I summarize what seem to be the two predominant perspectives of how ethnic violence is generated. The first is rooted in the political science literature, focusing on groups as the main actors and their territorial ambitions. In essence, according to this "macroterritorial" perspective, the application of violence should reflect the groups' intention to create large, homogenous territories. The second, "microcompetition," perspective is more individualist, arguing that ethnic competition for local resources sparks antagonism at the local level and thus makes people more susceptible to mobilization attempts by leaders. Finally, I discuss if and how these competing perspectives can be applied to the civil war in Bosnia.

Macrolevel: Fighting over Contested Territory

Many theoretical accounts of ethnic conflict rely on ethnic groups as the main actors (see, e.g., Fearon 1998; Gurr 1993; Toft 2003) and describe under which circumstances violence erupts between them. The ethnic security dilemma theory by Posen (1993) shows how once conflict has started, it plays out in particular patterns of violence on the ground. His argument rests on the assumption that during the absence of a state that guarantees peaceful relations between groups, the groups take violent action to establish security for

themselves. In such a situation, ethnic settlement patterns will be key in determining where violence takes place. Essentially, the groups' aim will be to create ethnically homogenous territories and avoid spatially isolated enclaves inside the other group's territory because they are difficult to defend. However, since groups oftentimes do not live in clearly bounded areas, violence will erupt in the process of creating these territories. In particular, the territorial logic predicts less violence in homogenous locations where one group is clearly dominant. On the opposite, ethnically mixed areas that cannot easily be assigned to one group's territory should suffer most. Fighting over these locations can take the form of confrontations between the groups' military factions in an effort to secure control, but will most likely involve violent ethnic cleansing in order to create ethnic homogeneity (Mann 2005). In short, the ethnic composition of an area and its location relative to what is supposed to become a group's territory determine where violence takes place. This perspective on violence in ethnic conflicts is widespread; it is most clearly reflected in Kaufmann's (1996) recommendation to enforce territorial separation between groups in order to prevent mass-scale hostilities.

In the territorial logic of ethnic violence I just described, violence is the result of a top-down process where military decision makers decide to fight over and cleanse a particular area in an effort to create larger territorial entities. In this account, the source of ethnic violence at a particular location is not the location itself; it is the strategic position of that location within a larger territorial struggle between actors at the macrolevel. In other words, violence is external to the location, imposed on it "from above." Analyses of the Bosnian civil war frequently portray the conflict in this way. Dahlman and Ó Tuathail label the conflict as "the pursuit of security through separation" (2005, 574). They argue that political entrepreneurs successfully appealed to the population's desire for security, instilling deep ethnonational resentment. In this vein, ethnic cleansing became a strategy to achieve "national security"; only if national borders coincided with ethnic ones could the threat posed by other groups be eliminated. Gagnon writes about ethnic cleansing as strategic choice by leaders, stating that "violence was imposed on plural communities from outside of those communities by political and military forces from Serbia and Croatia" (2004, xv, quoted in Ó Tuathail 2010, 5). Similarly, Kalyvas and Kocher mention Bosnia to be a case that conforms to what they call the "ethnic war model," in contrast to "ideological wars." According to their ethnic war model, clearly bounded ethnic groups compete

at the national level. Membership in these groups is fixed and exclusive, and violence on the ground is simply a reflection of the struggle at the macrolevel. The patterns of warfare will be determined by the settlement patterns of groups; violence erupts as groups compete over ethnically mixed areas (2007, 211). The territorial logic of ethnic cleansing in Bosnia has been analyzed in detail by Melander (2007). He finds that ethnic cleansing follows a territorial logic, as hypothesized by the security dilemma theory mentioned above. In particular, many of the instances of ethnic cleansing seem to have been conducted in a way to merge territories dominated by the same ethnic group.

What is common to most of the macrolevel explanations for Bosnia is their dismissal of the relevance of the micro. As I have argued above, with violence following a larger territorial logic of creating homogenous group territories, ethnic relationships at the local level do not matter. Gagnon states this explicitly, claiming that violence was "not the expression of grassroots sentiment in the sites of conflict" (2004, xv, quoted in Ó Tuathail 2010, 5), but is rather imported to particular localities by military forces working to create ethnic territories. Dahlman and Ó Tuathail argue along similar lines: "The ethnonationalist vision of 'natural security as national security' contradicted the actually existing fabric of everyday life and ordinary domicile security in a functioning multiethnic Bosnia" (2005, 577). The focus on the macrolevel and the relative importance ascribed to violence "from above" has helped scholars explain a seeming contradiction: how can people that have lived together peacefully for decades all of a sudden descend into violent conflict? Blaming violence on political and military decision makers and their territorial ambitions shifts the locus of explanation to the higher level. With violence imported from outside, people can have peaceful personal relationships with members of other groups, yet being targeted because the ethnic map needs adjustment. Still, this explanation has been criticized as overly simplified. In the following section, I review literature that focuses on microlevel ethnic relationships as a source of violence.

Microlevel: Ethnic Competition and Violence

Microlevel explanations of ethnic antagonism have mostly been proposed in sociology and center around the key concept of ethnic competition. Ethnic competition arises when groups participate in shared economic or political spheres, as for example the labor

market or in multiethnic political administrations. The assumption is that fear of being disadvantaged by another group drives feelings of antagonism against that group and ultimately makes individuals more willing to participate in group-related collective action (Olzak 1983, 1992). Typically, this is done in response to mobilization attempts by ethnic entrepreneurs and elites, the important role of which has been widely recognized (Gagnon 2004; Kaufman 2001). However, entrepreneurs alone are not sufficient to cause large-scale participation (Lake and Rothchild 1996), but are only successful if their attempts resonate within the population. Entrepreneurial mobilization often appeals to emotions such as fear or resentment (O'Loughlin 2010; Petersen 2002) and is thus assumed to be more effective where (mostly latent) feelings of competition and fear are already present. In the context of violent interethnic violence, fear can drive individuals to defend themselves violently against a perceived imminent threat posed by the other group. This self-defense at the local level features prominently in many accounts of the Bosnian conflict (see the extended bibliography available as part of the online appendix).

Interethnic competition in Bosnia spanned different domains. In the political domain, counter to the strong centralized tendency of the Communist Party, the level of autonomy of local government was high. As Rogan notes, "Yugoslav municipalities collected taxes, received a portion of the revenue from their local economic enterprises and appointed directors of 'socially' owned enterprises, schools, hospitals, post offices, utilities and transportation" (2000, 189). Thus, the potential for ingroup bias and competition for public goods was high at the local level and was not simply dealt with at higher (republic- or national) levels. Similar tendencies may have existed in the labor market, with practices of "discriminatory hiring and firing" (Pickering 2006, 84). Social organizations, which in many contexts have been known to promote interethnic cooperation, did exist in Bosnia, for example for sports or culture. However, since many of these organizations did not come into existence until the early 1990s, the rising significance of ethnic cleavages caused individuals to join those organizations dominated by their own group, making them essentially monoethnic (Pickering 2006).

While the above example indicates the presence of competition across different domains, to my knowledge there are no domain-specific studies examining its effects on ethnic relations. Instead, most analyses rely on demographic indicators. In focusing on the local level, Slack and Doyon (2001) argue that changes in local group population shares helped create a

perception of threat in groups that become demographically disadvantaged. In particular, this applies to the Bosnian Serbs, which lost their status as the majority group in Bosnia after 1961, at different rates of decline across the country. Using census figures from 1961 to 1991 and event data on violence, they find some support for the hypothesis that areas with a high loss of Serb population experienced more violence. Other research has examined how competition in the economic, political, and demographic domain is related to ethnic prejudice and tolerance. Kunovich and Hodson (2002) present a test of this relationship in the former Yugoslavia, focusing on the impact on structural factors on ethnic prejudice. Their analysis uses survey data collected immediately before the outbreak of the war to explain the causes of ethnic prejudice. Employing a multilevel design, an individual's level of ethnic prejudice is modeled as the result of both individual-level covariates, but also structural variables measured at the county level. The results show that in line with ethnic competition theory, occupational segregation reduces ethnic tensions, but also that prejudice increases with perceived economic domination of one group. Massey, Hodson, and Sekulic (1999) also provide evidence supporting the claim that structural factors such as the ethnic composition of a location affects ethnic relations (see also Hodson, Sekulic, and Massey, 1994). In particular, fear in territorially enclaved majorities is shown to be related to particularly high levels of intolerance. Ethnic competition also seems to manifest itself in voting patterns. For the 1997 municipal elections, Pugh and Cobble (2001) show that cities with a "dyadic" population distribution (two strong ethnic groups) generally exhibit low levels of nonnationalist voting, indicating an ingroup bias and a lack of support for a multiethnic Bosnia. Since this finding is based on a postwar election, however, its applicability to prewar ethnic relations merits some caution.

The previous paragraph describes just a few examples of how local-level interactions influence ethnic perceptions and thus the susceptibility of the population for mobilization attempts. Other scholars share the focus on the local, although to a lesser extent. For example, Somer (2001) describes the ethnic mobilization process in Yugoslavia as a sequence of polarization "cascades," where the interpersonal networks played a key role in inducing behavioral shifts in individuals. Similarly, Oberschall explains these shifts as a switch between two "cognitive frames" held by individuals; the "normal" frame of peaceful interethnic relations, and the "crisis" frame rooted in historical memories of the groups' violent past. Even

though the switch between the two frames (from “normal” to “crisis”) is primarily induced by leaders seeking mobilization around ethnic issues, interpersonal networks play into the success of these attempts to instill fear of domination by other groups (2000, 991).

In contrast to the macroexplanation of ethnic violence I presented above, the approaches sketched here emphasize the significance of ethnicity at the microlevel. Even though they assume that local ethnic divisions alone are not sufficient in causing violence, these ultimately determine the success of mobilization from above and can thus contribute to understanding spatial variation in violence during the war. Common to all these approaches is the assumption that ethnic boundaries were visible in people’s everyday lives, an assumption that is plausible in Bosnia as argued above. Under certain conditions, these local tensions between groups fostered ethnic prejudice, feelings of competition, and fear of domination. Once leaders engaged in ethnic mobilization for political gains, these attempts were on fertile ground to trigger collective action and interethnic violence.

Bosnia: Violence “from above” or “from below”?

As the above literature review shows, despite the fact that ethnicity played a key role in Bosnia’s conflict, there exist competing explanations for how it did so. On the one hand, there is a strong tendency to emphasize violence “from above” caused by aims to separate groups territorially. However, other accounts challenge this claim and argue that local ethnic relationships under certain conditions turn violent, thus advocating an explanation of violence “from below.” For example, Ó Tuathail (2010) challenges the externalization of violence and shows various examples illustrating the local nature of the violence-generating processes. He quotes the anthropologist Tone Bringa’s (1995) depiction of the Bosnian war:

Starting out as a war waged by outsiders it developed into one where neighbor was pitted against neighbor after the familiar person next door had been made into a depersonalized alien, a member of the enemy ranks. (2010, xvii)

As further illustration of the competing accounts of violence in the Bosnian conflict, an extended bibliography for this article has been compiled based on a JSTOR search and is available as part of the online appendix. The excerpts show once again the different ways in which violence in the Bosnian war was framed. Still, few of these are based on rigorous

testing, and most rely on anecdotal accounts. Therefore, what remains to be done is a systematic test of the relative importance of micro- and macrolevel relationships between ethnicity and violence. Can local ethnic cleavages help us explain patterns of wartime violence, even in the Bosnia war that is oftentimes portrayed as having followed larger territorial aims between groups? In the remainder of this article, I address this question using new operationalizations and different statistical methods.

Data

Testing the relative impact of micro- versus macrolevel processes on wartime patterns of violence in Bosnia poses multiple challenges. First, the level of measurement is important, and we need to incorporate the fundamentally different resolutions at which these mechanisms operate. Second, we need statistical methods that are able to incorporate these different levels and give us an estimate of their relative applicability. In this section, I describe the empirical data used to measure wartime violence as well as ethnicity at the macro- and microlevel.

Data on the spatial distribution of wartime violence is notoriously difficult to get. Different approaches exist; one is to count the number of violent encounters between conflict parties, as for example provided by the ACLED project (Raleigh et al. 2010). ACLED lists violent confrontations between conflict parties and also covers the civil war in Bosnia. However, ACLED is not an optimal choice for two reasons. First, it contains little information about the severity of an event, so a simple event count would hide large-scale events such as massacres. Second, ACLED relies exclusively on media accounts, which are known to have limitations (Davenport and Ball 2002). Another approach to measure violence during conflicts is to rely directly on casualty numbers. For Bosnia, there exists a detailed database on war casualties, collected by the *Research and Documentation Center Sarajevo* in years of extensive fieldwork.³ For each of the 109 (prewar) municipalities (“opštinas”) in Bosnia, the project reports the number of confirmed killings and of missing persons, pooling military and civilian casualties. I use the per capita casualty rate (confirmed killings) at the municipality level as an estimate for the intensity of violence, but repeat all analyses also with the total number of killed

³The data are available online at http://www.idc.org.ba/index.php?option=com_content&view=section&id=35&Itemid=126.

and missing persons as a robustness check (see online appendix).

I develop indicators that capture the micro- and macrolevel impact of ethnicity as described above using data from the last census in the Republic of Yugoslavia in 1991 (Petrovic 1992), which recorded (self-assigned) ethnic identities of respondents (Bosniak or Bosnian Muslim, Croat, and Serb). Although the municipality level gives us a reasonably fine-grained perspective on violence, it is unlikely to be a good choice for capturing both the macroterritorial and microcompetition effects. As I have argued above, the territorial logic of violence "from above" places a municipality into a larger context, so we need to gauge the extent to which multiple groups consider a municipality to be part of the territory they claim to be theirs. This requires us to look beyond municipality borders. Conversely, municipalities are too large for a detailed analysis of personal interactions that bring about the effect of microlevel ethnic cleavages on violence. Extending (on average) over more than 400 square kilometers, it is well beyond what we would assume to be the extent of an individual's network. Therefore, we need to get a finer perspective below the municipality level. The following sections discuss how I incorporate these different perspectives into my analysis.

Territorial Ethnic Contestation

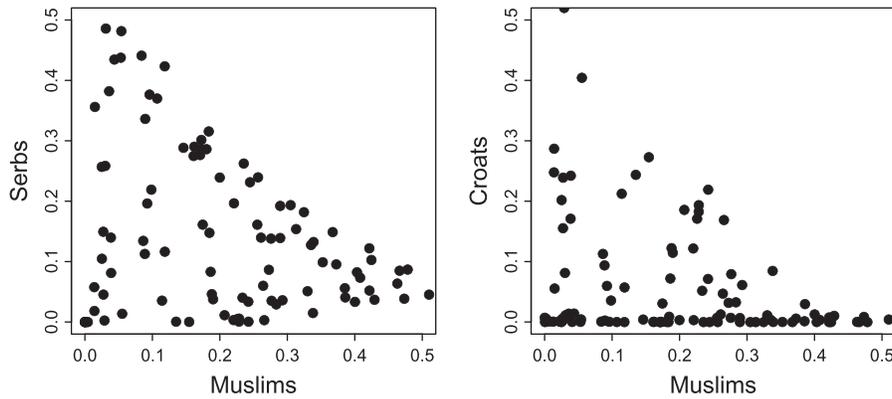
As argued above, territorial ethnic contestation arises if two ethnic groups lay claim to a region because they consider it to be part of their greater territory. Thus, I proceed in two steps to create an indicator for ethnic contestation: First, we need to measure the "strategic importance" of a unit for each of the ethnic groups. This number indicates how well the given unit fits into the larger territory of the group, based on the group population in that unit but also in the neighboring ones. Second, I combine the measures of the importance to individual groups into a single indicator for strategic ethnic contestation in a unit. This indicator should detect if group demands clash, i.e., if more than one group claim this unit.

I first turn to the question of how to measure the strategic importance of a unit to a particular group. A unit has strategic importance to group A if it can easily be added to A's larger group territory. This is only the case if (1) there are other significant populations of A living nearby to which the respective unit can be added, and (2) if the unit itself has a sufficiently large population of A. On the contrary, the unit should have lower importance to A if it is primarily surrounded by populations of some other

group B or the unit itself has a high share of B. I therefore measure the strategic importance of a unit to A by the multiplication of two factors: First, the average of A's shares in the unit's neighbors, and second, the share of A in the unit itself. This measure is computed for each unit and each of the three ethnic groups in the sample. As we would have expected, the priority levels we obtain for the three groups are negatively correlated. For example, Muslim and Croat claims at -0.38, and Serb and Muslim claims at -0.48. These correlations indicate that on average, the claims of groups do not correspond: if a unit has a high priority for one group, it gets a low priority for another. The scatter plots in Figure 1 show the relationship of the importance scores. Municipalities that get high scores for two groups indicate clashing territorial claims. The plots reveal that the number of contested provinces varies for different group constellations: Whereas there are many units with mutual claims by Serbs and Muslims (left panel), this number is much smaller for Croats and Muslims (and even smaller for Croats and Serbs, not shown here). These figures suggest that, at least initially, most conflict potential was present between Serbs and Muslims.

I now proceed to the calculation of an aggregate indicator measuring the degree to which groups claims clash. A unit should be under dispute if it has a high importance to more than one group. For that reason, I select the two highest importance scores for a unit across all ethnic groups and use the product of these two scores as my indicator of territorial ethnic contestation. High values of this variable suggest that there are two ethnic groups that consider the respective unit to be part of their territory. A short example illustrates the logic behind the territorial contestation indicator. The municipality of Zvornik in Eastern Bosnia was one of the first locations to see violence between Serbs and Muslims during the Bosnia war in early April 1992 (Burg and Shoup 1999, 129). Zvornik has eight neighboring municipalities in Bosnia (see Figure 2). Since some of these have high population shares of Serbs (e.g., Bijelina and Sekovici), and Zvornik itself has a Serb share of almost 0.5, the municipality is of high importance to the Serbs (importance score 0.19). At the same time, Zvornik also borders some Muslim-dominated municipalities (e.g., Kalesija and Bratunac) and has a high share of Muslims (slightly more than 0.5). For that reason, it is likely to be claimed also by this ethnic group (importance score 0.29). The multiplication of the Serb and Muslim importance scores for Zvornik results in an ethnic contestation value of 0.056 and is among the ten highest scores in the sample.

FIGURE 1 Strategic Importance Scores of the Municipalities for 1991



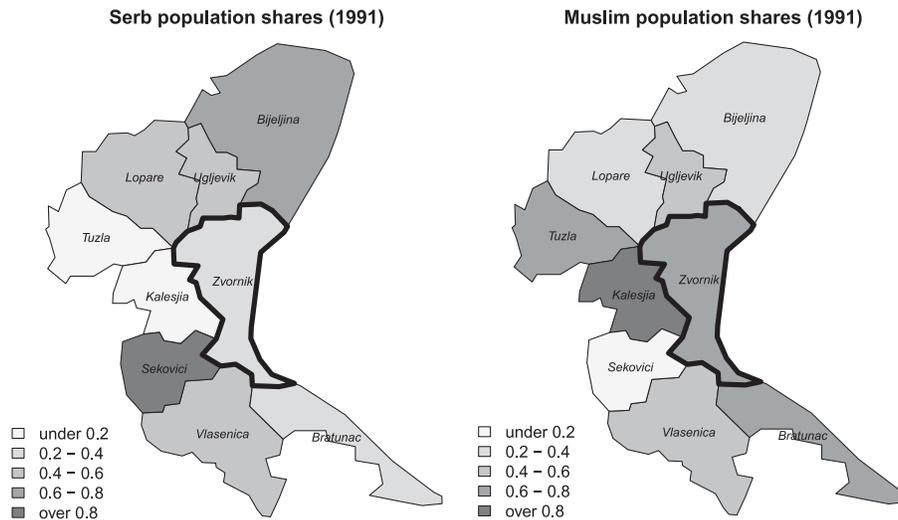
Notes: Plots truncated at 0.5. Dots toward the center of the coordinate system indicate the unit has high importance to two groups and is territorially contested.

Local Ethnic Polarization

Whereas for an assessment of the macroterritorial logic it is necessary to adopt a perspective above the municipality level, the analysis of the microlevel must assume a finer perspective to get close to individuals' personal networks. Spatial proximity is one of the most determinants of social interaction even when controlling for other factors (Bakke et al. 2009), so it is reasonable to focus on villages or cities and how ethnic relations play out in these microenvironments of social interaction. Theories of ethnic competition

as discussed above rely on the assumption that certain social environments are more susceptible for mobilization than others. In particular, they argue that mobilization will be especially high where the leaders' appeals to fear and resentment of other groups appear credible. Ethnically polarized environments, i.e., those that have two almost equally strong groups, are particularly prone to this: Since each group perceives the other to be a strong and credible contender both in the political and the economic sphere, these environments are more conducive to the emergence of ethnic fear and resentment. If one

FIGURE 2 Computation of the Territorial Contestation Indicator



Notes: The color shading indicates the proportion of the respective group in a municipality, for Serbs (left) and Muslims (right).

group has a smaller demographic share of the population, local interactions will be clearly dominated by the larger group, making it less responsive to claims of threat communicated from above. According to this logic, intergroup contact has negative effects in wartime, and exposure to other groups makes intragroup mobilization more likely (Hodson, Sekulic, and Massey 1994, 1554). Recently, polarization has been shown to have a positive effect on the number of civilian killings in the Spanish Civil War (Balcells 2010).

I use data on the ethnic composition of 2,213 villages and cities in Bosnia, also from the 1991 census. These villages are located in 107 municipalities,⁴ and on average have a population of about 2,000. The polarization of each village is computed according to the formula presented in Montalvo and Reynal-Querol (2005). The resulting (village level) indicator ranges from 0 to 1: high values of polarization indicate the presence of two almost equally strong groups. In order to use this indicator in my analysis, I compute the average of the village-level values by municipality. The values of this “residential polarization” indicator range from 0 to 0.81, with a mean of 0.43.

Results

We are now ready to test the explanatory impact of both indicators on wartime patterns of violence in Bosnia. I proceed in three steps. First, I present bivariate comparisons, comparing territorial contestation and residential polarization to the observed levels of violence. Second, I conduct a more thorough test using spatial regression modeling. Third, I conduct an exploratory analysis using finite mixture models. These models have recently been applied by Imai and Tingley (2010) to distinguish between competing explanations. In the present application, I show how mixture models can help us determine the relative applicability of the macrolevel versus the microlevel explanation across the set of municipalities, but also the conditions that affect this applicability.

Bivariate Comparisons

According to the theoretical discussion presented above, we should see more violence both in territorially contested and polarized municipalities. As expected, contestation is positively correlated with violence ($r =$

0.59, $p = 0.00$), and similarly for polarization ($r = 0.41$, $p = 0.00$). For a first visual inspection, Figure 3 shows the geographic distribution of the contestation (left) and polarization (right) scores, with darker colors corresponding to higher values. Black dots indicate the observed level of violence; their size is proportional to the per capita number of casualties at the respective location. The maps show again the high level of correlation between both indicators and violence. The largest deviations exist in the center of the country, where polarization seems to be more closely related to violence than contestation. However, a relative assessment of their explanatory impact is difficult and needs more thorough approaches, such as spatial regression presented in the next section.

Spatial Regression Modeling

In order to provide a more thorough test of H1, I employ regression analysis with per capita casualties as the dependent variable. Observations of the dependent variable are likely to be spatially correlated, as violence in one municipality is likely to spill over to proximate ones. A Moran test for spatial autocorrelation confirms this (Moran's $I = 0.53$, $p = 0.00$). One way to deal with this is to estimate a spatial lag model that can deal with geographically dependent observations (Ward and Gleditsch 2008). A model of this kind captures the similarity of proximate observations by adding a spatial lag \tilde{y} , i.e., the value of the dependent variable in a unit's neighbors, to the equation. The model is specified as

$$y = \mathbf{X}\beta + \rho\tilde{y}$$

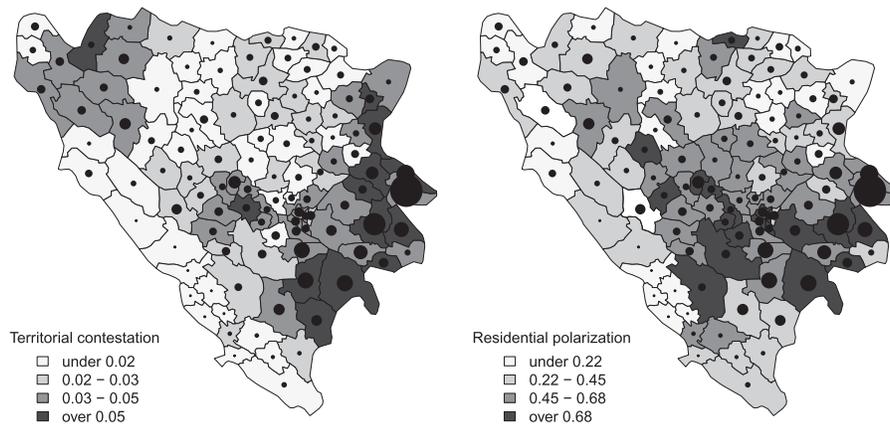
where \mathbf{X} is matrix of independent variables, β a vector of coefficients and ρ the coefficient of the spatially lagged independent variable \tilde{y} .⁵ Following standard procedures, the spatial lag of the dependent variable is computed as the average per capita casualties in the neighboring municipalities. In addition to the main independent variables territorial contestation and residential polarization, I include three types of control variables. First, I control for strategic value of a municipality. Violence at a location may be high simply because it is located close to a border or has important transportation routes. For that reason, I include the (logged) distance from the closest international border, as well as the road density for each municipality, the latter computed using road data from the *Digital Chart of the World* database.⁶ The

⁵Models estimated using R 2.11.0 and the *spdep* package.

⁶See <http://www.maproom.psu.edu/dcw/>.

⁴Data are missing for two municipalities.

FIGURE 3 Municipality Level Values of Territorial Contestation and Residential Polarization



Notes: Darker colors correspond to higher values. The black dots indicate the level of violence at a particular location, with their size proportional to the number of casualties.

database was developed in 1991 and thus reflects Bosnia's road network before the war. Second, I control for the level of urbanization. Urban environments can affect violence in two ways; they can either cause more casualties because of higher population density, but—at the microlevel—make ethnic relationships more peaceful because of increased group exposure to each other. The level of urbanization is measured as a Herfindahl concentration index on the village population figures; it ranges from 0 to 1, with higher values corresponding to more urban environments.⁷ Lastly, I include an indicator of economic performance, since ethnic competition in particular has been shown to be affected by wealth of individuals. The corresponding control variable is per capita income, obtained from the 1991 Statistical Yearbook of Yugoslavia (Federal Statistical Office of Yugoslavia, 1991). Table 1 reports the results of the regression analysis.

Models 1 and 2 test the micro- and macrolevel effects on violence independently. Model 1 includes only residential polarization and the control variables. Polarization has the expected positive effect on violence, even when controlling for strategic features and urbanization of a municipality. The spatial lag is positive and strongly significant. In Model 2, I test the impact of territorial contestation. Its impact is positive and strongly significant, while none of the controls have a discernible effect. Most relevant for

⁷To be precise, the index gives the probability that two randomly selected individuals from the municipality come from the same village/city.

the purpose of this article however is Model 3, where I include both polarization and contestation. Both variables remain positive and significant, which indicates that both have an independent effect in explaining wartime violence in Bosnia.

What can we learn from these regression results? Even in the presence of strong territorial strategies that according to many accounts of the Bosnia conflict were responsible for much of the violence during the war, there is evidence that local ethnic polarization had an independent effect. Given the results shown above, there is some tentative evidence that the territorial contestation model explains the patterns of violence better, since its AIC is slightly lower. Including both contestation and polarization leads to a further decrease in AIC, so that based on the above results, we would conclude that a combined macro- and microlevel model is more adequate for explaining violence in the Bosnia war. However, this finding leaves much to be desired. First, we do not know which cases (municipalities) are better explained by microcompetition between groups or macroterritorial ambitions of groups. With more information about where a particular process applies, one could perform a systematic evaluation of whether the statistical relationships bear out in practice. Second, assuming that a particular explanation applies better to the observed outcome at a certain location, we would want to know what determines this applicability. In other words, what are conditions under which either process results in violence? In the next section, I present an extended modeling exercise using finite mixture models that addresses these issues.

TABLE 1 Linear spatial lag models

	Model 1	Model 2	Model 3
	coef. (s.e.)	coef. (s.e.)	coef. (s.e.)
Residential polarization	0.019* (0.005)		0.013* (0.005)
Territorial contestation		0.262* (0.063)	0.195* (0.069)
Border distance	-0.004 (0.003)	-0.000 (0.002)	-0.003 (0.003)
Road density	-0.020 (0.027)	-0.017 (0.027)	-0.024 (0.027)
Urbanization	0.008 (0.008)	0.006 (0.008)	0.008 (0.008)
Per capita income	-0.003 (0.004)	-0.002 (0.004)	-0.008 (0.008)
Spatial lag ρ	0.681* (0.079)	0.614* (0.087)	0.579* (0.090)
(Intercept)	0.012 (0.012)	-0.003 (0.012)	0.008 (0.013)
N	107	107	107
AIC	-667.69	-669.41	-673.05

Note: Dependent variable: number of casualties per capita. Standard errors in parentheses. * indicates significance at $p = 0.05$.

Finite Mixture Modeling

Though rarely applied to social science problems, finite mixture models have been extensively researched in other disciplines such as finance or computational biology. The basic idea of a mixture model is simple. Rather than modeling the dependent variable as a single linear combination of independent variables (or a transformation of this linear combination), a mixture model assumes that each outcome is generated by one out of a set of $N > 1$ different regression equations. Inductive applications typically estimate the number of component models and their specification from the data, but Imai and Tingley (2010) recently proposed a variant of these mixture models for the purpose of testing competing theories. Their approach requires the prior specification of a set of component models, each of which corresponds to a particular theory to be tested. For purpose of comparing the relative importance of the macro- and the microlevel, I will therefore specify two components, a macro- and a micromodel.

In addition to specifying the two components, it is necessary to add a model of their relative applicability. More precisely, rather than inferring from the

TABLE 2 Results from the Mixture Model

Models	Variables	Mixture model	
		coef.	s.e.
Macro	Territorial contestation (Intercept)	0.309*	0.042
Micro	Residential polarization (Intercept)	0.078*	0.028
Mixture probability	Border dist. from Serbia (log) (Intercept)	-6.025 ⁺	3.146
		25.515 ⁺	14.314

Note: Each component (macro and micro) is a linear regression with the number of casualties per capita as dependent variable. Standard errors in parentheses. * indicates significance at $p = 0.05$, ⁺ at $p = 0.1$. The mixture probability is a logistic equation modeling the probability that a municipality is consistent with the micromodel.

data which component explains which case (as standard mixture models do), a so-called concomitant equation is defined. This equation essentially models the probability that a particular observation is generated by one of the (in our case, two) component equations. The macro- and microlevel models are straightforward to specify based on the above developed indicators of contestation and fractionalization, but what determines their relative applicability? Again, a careful look at existing case research on Bosnia is helpful. Citing evidence from different cases, Kalyvas and Kocher (2007) observe that ethnic hatred surfaces as a result of conflict, so it is rather a consequence than a cause of the war. The article also draws on Bringa's (1995) rich case study of a Bosnian village, who describes in detail how ethnic polarization emerged once hostilities between the groups had started. This anecdotal evidence is consistent with the literature on genocide that has frequently mentioned the profound changes in human behavior triggered after initial violent actions (Staub 2000, 370). In the context of the framework presented above, we can assume that local ethnic antagonism was activated as a result of violence. Consequently, microlevel ethnic polarization should explain violence better in locations that were affected early during the war. I will thus use a simple proxy for early violence, distance from the Serb border, as concomitant variable that distinguishes between the two components. As already mentioned above, municipalities at Bosnia's eastern border were among the first ones to experience violence in the conflict. If our assumption that early violence activates ethnic enmity at the microlevel is true, we should see

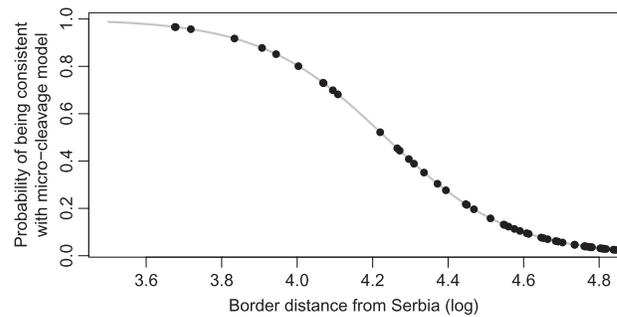
that the microcomponent in the mixture model is more likely to apply to municipalities closer to the Serb border.

Maximum likelihood estimation using the EM algorithm can be used to obtain estimates for the parameters of the model.⁸ The basic idea is to introduce a latent variable that captures which model an observation is consistent with. The expectation (E) step computes the expected value of this latent variable, conditional on the data and the model parameters obtained in the previous step. In the maximization (M) step, the ML estimates of the model parameters are obtained, conditional on the values of the latent variable. I refrain from a more technical discussion in the context of this article and refer the reader to Imai and Tingley (2010) for an introduction to finite mixture models within the context of a Political Science application and to Grün and Leisch (2007) for details on model estimation in the R statistical package. Table 2 reports the results of the mixture model, using the simplest possible specification with the components including only variable each (plus an intercept): territorial contestation in the macrocomponent and residential polarization in the microcomponent.

The modeling results show again that there is evidence in favor of a macro- and a microlevel model operating independently. In both components, the respective indicators show up as positive and significant. Most importantly, however, the border to Serbia emerges as a significant predictor of which component applies: The (logged) border distance has a negative impact on the probability of whether the microlevel component applies. In other words, violence we observe in Bosnia is more likely to be due to microlevel ethnic competition the closer a municipality is located to the Serb border. This effect is further illustrated in Figure 4 (black dots indicate the actual values of the municipalities). If we are willing to accept the proximity of the Serb border as an (imperfect) indicator for violence early in the conflict, the mixture model provides some evidence that supports the violence and polarization story presented in anecdotal accounts of the war. However, the impact of local ethnic competition is small as compared to the territorial contestation explanation for violence: if we analyze the applicability of components to cases (as given by the latent variable), results from the mixture model show only 15 out of 107 cases to be consistent with the microcomponent of the model. This indicates that overall, accounts framing the Bosnian conflict as one over ethnic territories are

⁸Alternatively, mixture models can be implemented within a Bayesian framework.

FIGURE 4 Effect of the Border Distance Variable in the Mixture Model



right—but even in the presence of this explanation, there is evidence that the “local” level matters.

Conclusion

The recent shift in the civil war literature towards the microlevel calls for a rigorous assessment of the degree to which the “micro” explains broader outcomes (Kalyvas 2003; Sambanis 2004). This article aims to provide an assessment of the relative impact of ethnicity at different levels on wartime patterns of violence. Using Bosnia’s civil war as a case study, I distinguish between two explanations for violence: a macroterritorial interpretation, attributing violence to the intentions of hostile ethnic groups to create homogenous group territories, and a microcompetition interpretation, arguing that violence is a result of grassroots ethnic enmity. There is a significant lack of agreement in the literature on the extent to which these two explanations mattered in Bosnia, and more systematic work needs to be done. Using two novel indicators to distinguish between effects of ethnicity at different levels, I find evidence for both micro- and macrolevel effects. Going beyond a normal regression framework, results from a finite mixture model show that the microlevel model is more likely to apply to locations that saw violence early in the war, and thus provide preliminary evidence for the activation of ethnic enmity by violence. Overall, however, the macroterritorial explanation seems to apply to the great majority of localities in Bosnia, which lends support to accounts that emphasize the ethnic territorial consolidation during the war.

These results, however, come with some important caveats. First, the empirical data may be insufficiently detailed for the analysis. All variables are aggregated to

the municipality level, and thus cannot capture, for example, varying intensities of polarization and violence within the municipality. Second, as I have mentioned above, my ethnic polarization indicator is based purely on demographic data and therefore runs a risk of being an inadequate proxy for the true level of ethnic antagonism. Third, as with many empirical studies, imperfect measurement could allow for alternative interpretations of the relationships found. Despite all these shortcomings, an empirical test of the type presented in this article tells us something about the relative importance of the macro- and the microlevel, which would be difficult when relying on individual case studies only. In summary, neither approach alone—qualitative or quantitative—is fully satisfying, and only an integration of multiple methods can ultimately be successful. The present article aims to be a first step in this direction: the research question providing the motivation for this work is one that emerged out of detailed case study research on civil war. The statistical analysis submits these numerous accounts to a more general test, but at the same time, does not end here. Taking the result from the mixture model, it becomes possible for example to identify those cases where ethnic competition at the microlevel should matter most. Process tracing for these cases can then reveal whether and how microdynamics affect violence in civil war.

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