The Determinants of Low-Intensity Intergroup Violence: The Case of Northern Ireland

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What accounts for low-intensity intergroup violence? This article explores the determinants of low-intensity sectarian violence in Northern Ireland, which has marked the post-1998 peace agreement period. Low-intensity violence comprises a variety of events from riots to attacks against other civilians as well as against homes and symbolic buildings such as churches. We argue that this violence is more likely and prevalent in interface areas where similarly sized rival communities are geographically in contact with each other. Parity and contact spur intergroup competition and threat perception, and they increase the viability of violence. We use original cross-sectional time series violence data for the 2005-2012 period at a disaggregated sub-national level, the *ward*, and a wide variety of social and economic indicators to test our hypotheses. In particular, we assess the impact of within-ward ethnic composition, on the one hand, and the ethnic composition of neighboring wards, on the other. We find that the number of intergroup violent events peak in wards where there is parity between groups, and in predominantly Catholic (Protestant) wards that border predominantly Protestant (Catholic) wards. The article makes two main contributions: it shows that micro-level dynamics of violence can expand beyond local territorial units, and it suggests that ethnic segregation is unlikely to prevent intergroup violence.

Keywords: sectarian violence, Northern Ireland, parity, segregation.

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Introduction

In July 2013, fifteen years after peace was agreed in Northern Ireland, riots broke out following traditional Protestant parades. Local police could not contain the spiraling violence and Protestants living in predominantly Catholic districts of Belfast said mob violence directed at their area was the worst they had seen since the early 1970s, the most severe years of Northern Ireland's civil war (Rutherford, 2013). In the same year, two Protestant young men were sentenced to life imprisonment for having murdered a teenager, attacked because he was a Catholic (BBC, 2013). Sectarian violence is still an important problem in Northern Ireland. The end of the conflict in 1998 entailed a sharp change in the nature of violence, but did not end it. While paramilitary activities and fatalities mostly ceased, confrontations between Catholics and Protestants persisted and even increased in the first years after the agreement. As one leading expert puts it, 'the end of the Troubles has not led to an end of violence in Northern Ireland', where apart from some residual paramilitary activity, there is 'recurrent low-level sectarian disorder' (Jarman, 2004: 421).

This article analyzes this second type of violence, which we call *low-intensity intergroup violence*. Low-intensity violence is non-militarized, is rarely fatal and, hence, does not reach the levels of lethality that characterize civil wars. Such violence in Northern Ireland comprises attacks against individuals or groups using physical force, threats, verbal abuse, or intimidation; it also includes riots, public disorder, and damage to property. Intergroup (or sectarian) violence consists of violence between members of different ethnic or religious groups. In Northern Ireland, the sectarian cleavage divides Protestants and Catholics.[3] Other cases of low-intensity intergroup violence at the sub-national level include, for example, riots in India (Wilkinson, 2004; Urdal, 2008), armed confrontations in South Africa (Amodio & Chiovelli, 2014), indigenous conflict in Bolivia (Mähler & Pierskalla, 2015), urban violence in the United States (Olzak, Shanahan & McEneaney, 1996), and local violence in Kenya (Kasara, 2015).

Scholarly work on Northern Ireland has mainly concentrated on deaths during the conflict period. Ongoing sectarian violence is oftentimes viewed as just a legacy of the armed conflict or, according to some journalist accounts, the result of a ubiquitous enmity between Catholics and Protestants that periodically erupts into violence (Cage, 2013; Shapiro, 2014).

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[3] Catholics and Protestants have very divergent histories that have shaped each group's political and socio-economic statuses. There is an almost perfect overlap of the religious cleavage with the political cleavage, where Catholics are overwhelmingly (though not exclusively) Irish nationalists, and Protestants are overwhelmingly (though not exclusively) British unionists. There is a large literature that considers that religion is only a label for what should be analyzed as a broader ethnic cleavage (see O'Leary & McGarry, 1993).

However, the current existing violent events do not take place exactly in the same areas where the conflict was prevalent (Poole, 2004), and enmity is endogenous and cannot explain spatial variation in violence levels.

This article explores the micro-level dynamics of low-intensity sectarian violence in order to understand its determinants and spatial distribution. We theorize that ethnic groups use low-intensity violence where they have both *motive* and *opportunity*. Motive arises from threat perceptions, which become more salient in interface areas where groups face each other. Segregation and parity introduce security concerns and increase intergroup competition, which create incentives to exercise and protect control over territory and seek dominance. Opportunities are most prevalent in areas where communities are in contact with each other, making it feasible to attack outgroup's members, homes, or symbolic buildings.

Using new data on sectarian crimes at the ward level and census data from Northern Ireland for the period 2005-2012, we show that understanding the spatial distribution of violence not only requires considering ethnic composition within territorial units but also the influence of neighboring units' composition, something often neglected in sub-national studies of conflict. Areas of intergroup contact can be found both within and across units in Northern Ireland: some territorial units, despite being relatively homogeneous, can experience high violence levels if their neighboring territorial units are also relatively homogeneous but populated by members of the other group.

Understanding the dynamics of low-intensity violence is important because these events prevent the building of interethnic trust, and are socially and economically disruptive. Most importantly, low-level violence retains the potential to escalate into more lethal confrontations, which might increase the incentives for the re-emergence of armed groups.[4] Our article speaks to the literature on ethnic violence, and it has macro-level implications that are relevant beyond the Northern Irish case. For example, segregation and partition are sometimes assumed to be possible solutions for ethnic conflict because they reduce the opportunities for direct intergroup contact (Kaufmann, 1998; Weidmann & Salehyan, 2013; Bhavnani et al., 2014). We show that this is not necessarily the case at the micro-level.[5]

The article is organized as follows: the next section summarizes the conflict in Northern Ireland and the origins of sectarian violence. We then present the theoretical framework and our main hypotheses. Next we introduce the novel dataset we have built with

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[4] For example, in Ivory Coast, low-intensity violence persisting after peace agreements has been an important factor leading to the relapse of civil war (Reno, 2011).
[5] The article makes an effort at generating macro-level implications of micro-level findings (Balcells & Justino, 2014).

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data from police records, censuses, and other sources. We then discuss the main results of our empirical tests and the robustness checks. The final section concludes.

Conflict and post-conflict violence in Northern Ireland

Violence between Catholics and Protestants in Northern Ireland has deep roots in a conflict that has lasted for more than three centuries (Farrell, 2000). The antagonism started with the settlement of British colonists in Northern Ireland, which led to the economic marginalization of the Catholic Irish, who by 1703 held less than 5% of the land (Darby, 1995). An Irish revolt against British rule over Ireland led to independence for the southern part of Ireland in 1921. However, an exception was made for the north-east of the island, where Protestants were a majority. Northern Ireland remained united to the United Kingdom, with its own devolved institutions.

Protestant control of Northern Ireland was marked by sectarian violence against Catholics, notably in 1921, when Irish independence took place, and again during the economic depression of the 1930s. The Protestant majority also maintained political control through gerrymandered electoral boundaries and strong emergency police powers (Darby, 1995). Following the 1921 independence of Ireland, the Irish Republican Army orchestrated recurrent violent campaigns against the British state aimed at ending the separation status for Northern Ireland. Calls against social and political discrimination increased, and a rising Catholic middle class began to press for civil rights, with high-profile marches in 1968. Violence between Protestants and Catholics spiraled. In response to violence local vigilante groups set up, which then became formalized paramilitary groups and the key actors of the conflict (Fitzduff & O'Hagan, 2009). After the UK government sent in the army to regain control, a new insurgent group, the Provisional IRA (PIRA), emerged. The conflict that followed was not only between the PIRA and the UK state, but also between Protestant and Catholic paramilitary groups –and at times between different paramilitary groups within the same ethnicity. The conflict (so-called 'the Troubles') lasted from 1969 to 1998, and resulted in around 3,200 deaths and about 42,000 people injured.[6]

Sectarian violence was an important feature during the Troubles. It motivated the emergence of armed groups, which often chose targets based solely on their membership of the other ethnic group.[7] Sectarian violence was however not limited to actions perpetrated by

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[6] Source: CAIN (http://cain.ulst.ac.uk/ni/security.htm#04). These figures are taken from police records and cover Northern Ireland only. See also Sutton (2010).

[7] Civilian deaths constituted 52% of the deaths, the remainder being paramilitary, military, and police forces.

these groups, and included many incidents carried out by civilians in a highly localized way (Sullivan, Loyle & Davenport, 2012).

In 1994, the PIRA proclaimed a ceasefire, followed shortly afterwards by the Combined Loyalist Military Command, and peace negotiations led to the 1998 Good Friday Agreement, which formally ended the civil conflict. Membership of paramilitary groups is now illegal, and most former armed organizations are committed to peace, which has led to a sharp decrease in the number of deaths.[8] While violence and fatalities driven by armed groups have mostly ceased, low-intensity intergroup violence has persisted in post-conflict Northern Ireland (Jarman, 2005; Shapiro, 2014).[9]

Studies of ethnic violence in Northern Ireland have concentrated on analyzing the Troubles and lethal violence. Existing studies overlook low-intensity violent events, principally due to a lack of systematic data for that period. Spatial variation in levels (and timing) of lethal violence during the Troubles has been attributed to state repression, mixed ethnic settlements, proximity to the border with the Republic of Ireland, and territorial paramilitary control (Kaufmann, 1998; Sullivan, Loyle & Davenport, 2012; Mueller, Rohner & Schoenholzer, 2013). With the peace agreement, most of these factors have however lost explanatory relevance. The (almost total) absence of fatalities and paramilitary activity in the new post-conflict scenario, plus the new availability of data (starting in 2005) on low-intensity sectarian violence at the local level, allow us to investigate the specific determinants of this enduring phenomenon.

Contemporary low-intensity violence comprises a variety of events from riots to attacks on other civilians as well as on homes and symbolic buildings. Specifically, the vast majority (93%) of sectarian crimes are victim-based crimes. Of these, around half the crimes are against the person (45%), while most of the rest are criminal damages (44%), for example against a person's home or significant buildings such as churches. Crimes against society, namely riots and public disorder, are a small part of total sectarian crimes (7%) (PSNI, 2013).

Again, the nature of current sectarian violence is quite different from the violence that characterized the Troubles: as Shirlow and Murtagh state, in Northern Ireland 'the nature of violence has shifted away from paramilitary and state assaults towards a more sectarianized and repetitive violence of interface rioting and attacks upon the symbols of tradition such as

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[8] Violence by dissident republican groups has continued intermittently since 1998; however this violence has not reached the scale of a civil war.
[9] According to the *Northern Ireland Life and Times Survey*, in 2013, 77% disagreed to some extent with the statement that 'Northern Ireland is becoming a place free from sectarian aggression' (http://www.ark.ac.uk/nilt/).

Orange Halls, GAA [Gaelic Athletic Association] property and churches' (2006: 3). Current violence is generally low-intensity and is not carried out by paramilitary groups, but rather is perpetrated in a non-militarized manner by some members of both communities in localized areas, so tensions are not salient beyond these small areas, as segregation hinders the spread of conflict (Klašnja & Novta, 2014). Consequently, violence takes place in areas that do not fully coincide with those where militarized fatal violence took place during the conflict (Jarman, 2004, 2005; Poole, 2004).[10]

Understanding low-intensity intergroup violence
Building on the existing literature on geographical settlements, intergroup contact, and ethnic conflict, we posit that ethnic balance and settlement help us explain spatial variation in local levels of violence in Northern Ireland. In particular, we expect low-intensity sectarian violence to be more likely and prevalent in interface areas where rival communities are geographically in contact with each other. It is in these localized areas, we argue, where *both* motives and opportunities for low-intensity violence exist.

Concerning motive, proximity and geographical contact at the local level breed competition over territory and disputed space which is often viewed as a zero-sum game. Existing studies on ethnic violence posit that group concentration and segregation increase the risk of violence by reducing positive intergroup interactions and, consequently, interethnic trust (Kasara, 2015), while at the same time creating stronger attachment to territory (Toft, 2003). This, in turn, boosts threat perceptions about the ingroup's security and relative status leading to a security dilemma that creates incentives for violence in a context of zero-sum intergroup competition motivated by contested space (Posen, 1993).

Such ethnic competition over territorial control manifests principally at the *local* level (Cunningham & Weidmann, 2010; Klašnja and Novta, 2014). It is within limited interface areas that rival groups resort to violence with the aim of dominating territories demographically, controlling borders, as well as out of fear of losing preeminence to other groups (Lim, Metzler & Bar-Yam, 2007; Smith et al., 2012). Establishing (and asserting) control of contested territory is expected to bring benefits for the ethnic ingroup, which vary across contexts. For example, in some places territorial dominance can imply access to scarce

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[10] Figure A1 (online appendix) shows the number of deaths per ward during the Troubles. Figure A2 shows the correlation between this number of deaths and the average number of sectarian crimes (2005-2012). There is no correlation between the two variables if Belfast and Derry are excluded. Yet, even in the case of Belfast, Cunningham & Gregory (2014) find that fatalities were higher in the heartlands of groups' enclaves than in interface areas.

material benefits such as jobs, housing, or even natural resources, while in others dominance can bring electoral advantage in the long-term, and control of decision-making concerning public budget and policy (Olzak, Shanahan & McEneaney, 1996; Esteban & Ray, 2008; Field et al., 2008; Cunningham & Weidmann, 2010; Amodio & Chiovelli, 2014; Mähler & Pierskalla, 2015). Still in other contexts, such as Northern Ireland, competition over territorial control mostly involves enhancing individual physical safety but also collective security by establishing areas where groups can safely express their identity, symbols, and traditions (Bollens, 2000; Toft, 2003, 2014).

In contexts of ethnic heterogeneity and localized intergroup tensions, violence caused by proximity can take place both within sub-national units and between units. Within territorial units, motives for violence are more forceful in situations of ethnic parity or polarization, that is, when there are two groups with similar sizes (Horowitz, 1985).[11] The literature on ethnic conflict finds a positive relationship between polarization and outbreak and intensity of violence at the country level (Esteban & Ray, 2008; Montalvo & Reynal-Querol, 2010). The mechanisms linking both can be transported to the sub-national level and help us explain spatial variation in levels of local low-intensity violence. Within units, parity deepens threat perceptions in both groups and creates numerous interface areas where territorial disputes concentrate. A bigger presence of outgroup's members and symbolic displays is perceived as more threatening to the ingroup's identity and status. When relative sizes are similar such threat is maximized for both groups as both risk becoming a minority. Violence in this situation is likely to be bidirectional, with both groups becoming more willing to take the gamble of violent confrontations aimed at protecting their status and consolidate borders. Small changes in demographic compositions may result in one of the groups dropping below a tipping point, which in turn leads to this group progressively leaving an area (Card, Mas & Rothstein, 2008). In contrast, when an ethnic group already overwhelmingly dominates an area, threat perceptions are minor and there are fewer reasons for members of that group to perpetrate violence: violence, which is costly, has lower marginal returns for the majority group in terms of territorial control and dominance. Conversely, for the minority group, although threat perceptions are high, violence is less beneficial to them since it is unlikely to generate any significant change in the control of disputed areas. Further, minority status may deter group members from using violence since

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[11] A bipolar distribution implies parity in group size when there are only two groups.

perpetrators are more likely to get caught and any incident may trigger retaliation from the majority group. Thus, violence has a lower expected utility for the minority group too.

Groups might be confronting each other within territorial units and, as said, across units. Local territorial units are not isolated: an ethnically homogeneous area can easily be located next to another homogeneous but rival area. Thus, contested contact spaces between sizable, polarized communities can also be found across units. Again, these are disputed areas, where security and status concerns that motivate violence are extremely salient. Often overlooked in micro-level studies of ethnic violence, we argue that accounting for the composition of neighboring territorial units is essential for capturing segregation and geographical contact and, thus, understanding the spatial distribution of sectarian violence.

These insights and mechanisms are all clearly present in Northern Ireland, where country-level polarization is very high and so is local-level polarization in many areas, while other areas are homogeneous but often in contact with segregated rival communities.[12] Additionally, residential segregation –especially in urban areas– deeply intensified as a result of violence during the Troubles and still continues today (Doherty & Poole, 1997; Jarman, 2004). Proximity and segregation result in the existence of numerous disputed spaces in the interface areas where threat perceptions, status concerns, and competition are particularly salient. Interfaces are 'spaces that lie between highly segregated neighborhoods, which remain sites of contestation antagonism between Catholics and Protestants' (Cunningham & Gregory, 2014: 64). These are spots where the motives above are found and, hence, where most of the violence concentrates. Survey evidence on Northern Ireland confirms that lack of intergroup contact due to segregation leads to low interethnic trust and increases negative outgroup perception (Tam et al., 2009). In turn, distrust and prejudice increase the perception of threat that the other group poses as well as the propensity for violence (Hewstone et al., 2008; Hughes et al., 2008; Schmid et al., 2008). In the Northern Irish context, perceived threats stemming from outgroup close presence normally take the form of fears for personal (and community) security. Importantly, outgroup proximity and size also raise identity-based (or symbolic) threats where outgroup's presence, symbols, and expressions of identity are seen as detrimental and, hence, threatening to the ingroup's status and own identity (Jarman, 2001; Hewstone et al., 2008; Schmid et al., 2008). Territorial control in this zero-sum context implies 'claiming and exercising rights over public space through local demographic dominance and denying, or limiting, those same rights to the "other"' (Bell, Jarman &

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[12] In 2001, the ethnic composition of Northern Ireland was 53.1% Protestant to 43.7% Catholic. In 2011, it was 48.4% Protestant to 45.2% Catholic.

Harvey, 2010: 13). Control of an area entails the ability to block manifestations of the other side's identity, while establishing and preserving one's own, but it can also mean access to immediate material goods, such as a park or more housing for ingroup's members.[13]

Low-intensity violence is an instrument that is actively used to claim control over disputed areas and associated resources in the interface. 'Segregation leads inevitably to contest over access to public space and social resources' (Bell, Jarman & Harvey, 2010: 13). Areas where both communities meet are the place where most violence occurs since 'they continue to operate as the battlegrounds for ongoing, indeed intensifying demographic disputes' (Cunningham & Gregory, 2014: 76). Attacks and intimidation can induce people to move out from specific areas, and are used as a long-term tactic to make people feel threatened and unwanted. Indeed, violence caused profound population changes during the Troubles and deepened segregation; and part of the current violence retains that goal. A significant number of people –a yearly average of almost 1,400 since 1998– still request re-housing in Northern Ireland due to intimidation and threats (Jarman, 2004: 426; Jarman, 2005: 24-25).[14] On the other hand, violence can also be aimed at protecting the status quo and used as a reaction to demographic shifts that create new interfaces and threaten the viability of rituals and other symbolic displays, and so collective identity. Flashpoint events (such as parades) can activate groups' fear of losing territory and power, and make the need of preventing incursions and asserting control of certain areas extremely prominent. 'Many of the disputes over parades are therefore at heart part of the dispute over the nature and identity of territory. They occur in areas that were once Protestant or mixed but are now perceived as Catholic' (Jarman, 2001: 37).[15]

Localized disputes between polarized communities in interface areas in Northern Ireland occur within and across units (i.e., wards). Wards with a high degree of parity show normally a high degree of segregation as well, especially in urban areas. For example, Ballymacarrett, in east Belfast, is the ward that registers the second highest level of sectarian incidents, with 66 incidents in 2011. The ward had a Catholic population of 51% and a Protestant population of 47%, hence one of the highest levels of parity. The two groups are

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[13] 'It was all about housing, they [the Catholic population] are growing, and they needed more, you knew they wanted houses'. Unionist interviewee, quoted in Byrne (2005: 85). Similarly, 'the Protestants say they have been intimidated out by Catholics determined to take over the houses on the Torrens estate' (BBC, 2004).

[14] Both Protestants and Catholics normally abandon areas where they have become small minorities. See BBC (2004).

[15] The decline in Protestant population in some areas is largely explained by higher birth rates among Catholics and Protestant movements to suburban areas (Jarman, 2001; Cunningham & Gregory, 2014).

strongly segregated into separate areas within the ward, kept apart by five peace-lines.[16] Violence takes place in flashpoint areas between the two communities (BBC, 2011). The ward of Water Works, in north Belfast, also presents some of the highest incidence of sectarian violence, reaching 45 incidents in 2008. By contrast with Ballymacarrett, Water Works is very homogeneous, with a Catholic population of 91% and a Protestant population of just 7%. However, the ward is bordered by wards that have a very different hue –Crumlin, which is 94% Protestant, Shankill, also 94% Protestant, and Duncairn, 90% Protestant. The border areas between these neighboring wards are flashpoints for sectarian violence. These two cases match our theory as we predict that, within territorial units, violence will reach a peak in areas where there is parity between ethnic groups, and that between territorial units, violence will also be highest in areas where segregated communities are in contact with each other.

Again, we argue that low-intensity violence is the product of the conjunction of motive and opportunity. Opportunity influences viability. At the local level, interface areas – both within and between units– not only create incentives for violence, but also ample opportunities for carrying out low-intensity violent acts. First, group concentration facilitates collective action by allowing the existence of denser social networks (Toft, 2003; Weidmann, 2009). Secondly, geographical contact raises the risks of low-intensity violent actions because it increases the prospects of random or even premeditated encounters of individuals or groups belonging to rival communities. In those areas where similarly-sized communities interface, contested areas are more numerous or bigger, and encounters more frequent. At the same time, interface areas lead to an increased visibility and vulnerability of potential (non-human) targets such as homes, symbols, and significant buildings (e.g. churches, clubs, flags, and monuments). Proximity thus increases the viability of attacks by increasing accessibility, as potential targets are located within the reach of members of the rival group and can be more easily attacked. Additionally, costs of violence for perpetrators are lower since proximity allows escaping and finding safety within their own community after committing a violent action (de la Calle, 2007). In Northern Ireland, visual and verbal contact facilitated by proximity may evolve into assaults, riots, and other violent actions. As Jarman & O'Halloran (2001: 2-3) explain, 'violence often begins with little more than abusive banter among relatively young children, but may easily escalate to involve stone throwing and the participation of older youths and adults in more serious full-scale rioting.' Furthermore,

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[16] A careful look at the examples of wards that have high parity and high levels of sectarian violence shows that many of them display a similar profile of internal divisions to this example.

communities closer to interface areas in Northern Ireland are reported to be much more likely to experience stone throwing, paint or petrol bombing, vandalism, and intimidation (Shirlow & Murtagh, 2006). In sum, 'the close physical proximity of opposing areas has meant that at times of intense conflict it has been relatively easy to carry out attacks on the other side' (Jarman, 2001: 36).

Overall, group proximity and similar size create the conditions for both motives and opportunities to work together. It is in these areas where observed violence will be higher both within and across territorial units. Our hypotheses are then:

Hypothesis 1: Incidents of intergroup violence will be more frequent in areas where there is demographic parity between groups.

Hypothesis 2: Incidents of intergroup violence will be more frequent in areas populated by majorities of one group that are neighbored by areas dominated by majorities of the rival group.

Data

In order to test these hypotheses we use an original dataset of incidents of sectarian violence in Northern Ireland from 2005 to 2012.[17] The data is collected by the Police Service for Northern Ireland, which codes as sectarian 'any incident which is perceived to be sectarian by the victim or any other person'.[18] The police define sectarian as 'bigoted dislike or hatred of members of a different religious or political group' (PSNI, 2013: 6). In the context of Northern Ireland this refers to the ethnic groups, i.e. Catholic/Protestant, or political groups, i.e. Nationalist/Unionist or Republican/Loyalist (PSNI, 2013: 6).

The information is collected at the *ward* level, which allows for a fine-grained sub-national analysis given the highly localized nature of intergroup tensions. Wards are an administrative unit comprised of a number of townlands or parts of townlands, themselves a

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[17] Data are from the Northern Ireland Statistics and Research Agency (NISRA): http://www.ninis2.nisra.gov.uk. The publicly available data records wards with only 4 or more incidents for privacy protection. We use the full data and acknowledge the generosity of NISRA in making this data available to us. The data is of recorded crimes, i.e. offences that would be tried by a jury.

[18] The coding procedure is as follows: when reporting a crime, the victim or the police staff dealing with the incident can flag an incident as sectarian-motivated. This is based on United Kingdom guidelines for identifying racial motivation (PSNI, 2013). The category of 'sectarian hate crimes' is added in Northern Ireland only and crimes flagged in this way receive a higher penalty on conviction. Audits and data quality checks are carried out quarterly by the Police Service of Northern Ireland (PSNI) Central Statistics Branch to correct the hate crime coding protocol (PSNI, 2013: 7). Surveys in Northern Ireland suggest that reporting incidents to the police is not conditioned by ethnic background. An October 2004 survey shows that 33% of Catholics contacted the police in order to report a crime, compared to 31% of Protestants (Northern Ireland Policing Board, 2004: 7).

historic form of land division. They are the smallest administrative level for which data is available. Ward boundaries are occasionally reviewed, but the last change took place in 1993, before our period of study. There are a total of 582 wards in Northern Ireland and the time period for which data on sectarian violence is available is 2005-2012, so our balanced dataset consists of 4,656 ward-year observations.

Our dependent variable measures the recorded number of incidents of sectarian violence in a given ward and year. Figure 1 shows the temporal evolution of the total number of incidents in Northern Ireland and the average number of incidents per ward.[19] The incidence of sectarian violence in post-conflict Northern Ireland has decreased about 40% over the period under study. Figure 2 reveals the large existing variation across wards, according to which in some wards violence can reach a maximum of 78 incidents in a year while 7% of wards had no incidents during the time period studied.

[Figures 1 and 2]

We use two sets of independent variables: the first set includes social, economic and ethnic variables at the ward level; the second set includes variables with information of neighboring wards.[20] To measure the ethnic composition of each ward, we use census data, which has two major advantages: the first is that the fully-adjusted counts cover 100% of the population;[21] the second is that responses are self-generated, so we use self-identification into the different ethnic groups and not measures estimated by others.[22] Census data comes with the disadvantage that it is collected every ten years, in 2001 and 2011, so there is little variation over time. Using census information we measure the percentage of Catholics and Protestants for each ward. To test our first hypothesis, we calculate an ethnic parity index, which captures the extent to which there is a balance of power or competition between the two groups in terms of size: $1- [P_i - P_j]^2$, where P is group i and j's relative sizes (Balcells,

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[19] The data is collected from April of one year to April from the next year, not using natural years. We consider the number of incidents collected one year to correspond to the previous year. Considering the year to be the current year does not alter our results.

[20] See Table A1 (online appendix) for descriptive statistics.

[21] Available at the NISRA website, http://www.nisra.gov.uk/Census/2001/background/metadata.html

[22] Ethnicity is captured in the Northern Ireland census by the question 'What religion, religious denomination or body do you belong to?' if the person self-identified as belonging to a religion or 'What religion, religious denomination or body were you brought up in?' if the respondent self-identified as not belonging to a religion. The question therefore captures not the individual's religious beliefs (a separate question), but her community background. There are four possible categories: Catholic, Protestant, other, and none. Most of the people identify as one of the two first traditions: 97% in 2001 and 94% in 2011.

2010). This index takes value 0 when one of the groups represents 100% of a given ward's population, and value 1 when both groups have the same relative size.[23]

We include a number of control variables in the analyses to account for alternative explanations and other confounding factors that might be more prevalent in contact areas. First, we control for the impact of past conflict intensity, measured by the (logged) number of deaths during the Troubles (1969-1998) that took place in each ward.[24] This variable allows us to test if low-intensity violence is a simple legacy or continuation of the civil war at the local level. Secondly, we control for unemployment (percentage of people claiming welfare assistance over the ward's population),[25] which is a proxy for deprivation and lower opportunity costs (Humphreys & Weinstein, 2008; Dancygier 2010), because interface areas are generally more disadvantaged (Jarman & O'Halloran, 2001). We also control for the percentage of men aged between 16 and 39 to test the influence of so-called 'youth bulges' (Urdal, 2006). According to some accounts, young men are mostly responsible for current sectarian violence in Northern Ireland (Jarman, 2004; Shapiro, 2014), while, simultaneously, interface areas are usually frequented by youngsters. The (logged) number of other crimes committed in a ward is also included in some models to account for the possibility of sectarian crimes just being the result of increased crime (Jarman, 2004).

We also control for total population (logged) and geographical size in square km (logged).[26] Finally, we also include the (logged) number of so-called 'peace-lines' existing within or on the border of a given ward in some of our models.[27] Peace-lines are walls, fences, road barriers or other constructions that have been placed to separate or protect the different groups. Peace-lines are a feature of some interface areas. We obtain the information on a total of 53 peace-lines from the UK Ministry of Justice,[28] supplemented by information from the BBC (2009).[29]

To create the second set of variables and test Hypothesis 2, we identified and coded the corresponding neighboring wards for each of the 582 wards. We consider wards as

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[23] An alternative index is *polarization*, which captures the extent to which group distribution approaches bipolarity (Reynal-Querol, 2002). We use *parity* because it better captures competition between groups (Balcells, 2010). Figure A3 (online appendix) shows the correlation between both indexes. Figure A4 shows the relation between the percentage of Catholics and Protestants and parity.

[24] Geographical location is from the *Visualising the Conflict* project run by CAIN (http://cain.ulst.ac.uk). Death data is from Sutton (2010).

[25] Source: NISRA.

[26] Source: NISRA.

[27] Where a peace line is on the boundary between two wards, it is listed in both. Almost half of the peace lines in our list lie on the border of two wards; the rest lie completely within a single ward.

[28] Freedom of Information request FOI\14\51, [email] (Personal communication, 23 April 2014).

[29] Only two of the peace-lines coded in the data were built during the period covered by our data, both in Bellevue (2008).

'neighbors' if contact is possible between their populations. Hence, neighbors must share a border and should not be divided by large bodies of water (unless there is a bridge). We then get relevant information of neighboring wards, in particular: the average percentage of Catholics and Protestants in all neighboring wards; the maximum percentage of Catholics or Protestants among all the neighboring wards, and the number of neighboring wards. Further, to correct for spatial autocorrelation, our models include a spatial lag consisting of the weighted average number of incidents in a given year of a given ward's neighbors, which are identified using a first order queen criterion.

Given the count nature of our dependent variable, the models are estimated using negative binomial regressions with errors clustered at the ward level. To control for unobserved common shocks we include year fixed effects in all our models. Given that our main independent variables (almost) do not vary over time because census data is only collected every ten years (2001 and 2011), we do not use ward-based fixed effects. Yet, in order to control for shared characteristics of wards and mitigate unobserved heterogeneity we do employ local government districts (LGD) fixed-effects. Wards within the same LGD share such characteristics as geography and history, along with economic patterns and level of public services.

Results

In Table I we first report the results of models that focus on wards' internal characteristics. Model 1 shows the effect of the percentage of Catholics, which is negative and significant. The percentage of Protestants has the opposite impact (Model 2). Yet, after including the percentage of population of each group squared, the effect of the percentage of both groups is actually curvilinear (Models 3-4). According to this, more ethnically homogeneous wards are more peaceful.

[Table I]

Model 5 presents the results using the parity index and shows that its impact on the number of violent events is positive and significant, which supports our first hypothesis.[30]

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[30] Further, Model 1 (Table A3, online appendix) reports the results using polarization instead of parity with extremely similar results. Further, this parity model has been re-run at the LGD level (Table A8). The impact of parity is still positive but weaker and only significant if year-fixed effects are included. This indicates that competition for territorial control occurs at a more localized scale in areas where both communities are in contact.

Figure 3 plots the simulated impact of parity on the number of incidents using the estimates in Model 5 (and 95% confidence intervals). A ward with maximum levels of parity is predicted to experience more than four violent incidents in one year.

The control variables perform generally as expected. More populated wards experience more sectarian incidents; so do smaller (in square km) wards. Unemployment has a strong and positive impact on violence. This suggests that sectarian violence is mostly an urban phenomenon, tending to concentrate in denser and poorer urban wards. Interestingly, the percentage of young males does not have a robust effect.[31] The number of deaths during the Troubles has a positive and significant effect. The fact that the inclusion of this variable and LGD fixed-effects does not alter our findings constitutes strong evidence that there is not an omitted variable bias connected to past violence.

Finally, in Model 6 four additional controls are added: other crimes, peace-lines, sectarian incidents in neighboring wards, and the number of neighboring wards. The number of other crimes has a positive and significant effect. The average number of incidents in neighboring wards (our spatial lag) has a positive and significant impact, which suggests that violence tends to cluster geographically, due to spillover effects. We also find that peace-lines are positively correlated with sectarian violence, which is unsurprising given that peace-lines were installed in interface areas where violence was perceived as likely. The effect of parity is still strong and significant. The inclusion of these controls alters the effects of other variables: population and, notably, conflict deaths are no longer significant.

Diverse wards with high parity are usually highly segregated in most parts of Northern Ireland (especially urban centers). To capture within-ward interfaces and test that parity and segregation increase incentives for violence, we include an interaction between parity and two proxies of internal segregation: the number of peace-lines existing in a ward and the number of deaths during the Troubles. Peace-lines are thus a proxy for interfaces and, hence, for more intense segregation. The same is true for conflict deaths. Lethal violence during the conflict caused deep population changes and segregation with more violence leading to further segregation. The coefficients of the interactions are positive in both cases (see Table A4).

[Figure 3]

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[31] The impact of parity increases with unemployment, but not significantly with the percentage of young males (Models 2 and 3, Table A3).

According to these results, one could argue that homogeneous wards are more peaceful. However, contested interface areas between segregated communities can also be found where homogeneous wards neighbor homogeneous but rival wards, as stated in Hypothesis 2. Table II reports the models testing our second hypothesis. Model 1 includes an interaction between the percentage of Catholics in a ward and the average percentage of Protestants in neighboring wards. Even controlling for the number of incidents in neighboring wards, the interaction term is positive and highly significant, while the components are both negative and significant. This result confirms that predominantly Catholic wards experience more violent incidents when they are alongside predominantly Protestant wards and so there are interface areas. The opposite is true as well: results are nearly identical if we use the percentage of Protestants in a ward and interact it with the average percentage of Catholics in neighboring wards.[32] In Model 2 we control for the number of other crimes. Again, the coefficients of population size and conflict deaths become insignificant.

[Table II]

Figures 4 and 5 illustrate the impact of inter-ward segregation on sectarian violence using the results in Model 1. Figure 4 shows how the marginal effect (and 95% CI) of the average percentage of Protestants in neighboring wards changes with the percentage of Catholics in a given ward. The marginal effect becomes positive as Catholics come close to being majoritarian: as the percentage of Catholics grows, the marginal effect on violence intensity of an increase in the percentage of Protestants in neighboring wards becomes stronger. Conversely, the smaller the percentage of Catholics, the stronger the negative effect of the average percentage of Protestants is. In those wards where Catholics represent about half of the population the ethnic composition of neighboring wards has a negligible impact. In this situation violence levels may be mainly occurring due to intra-ward parity and segregation, proving the existence of inter-ward dynamics as well as intra-ward dynamics.

[Figures 4 and 5]

Figure 5 shows the predicted number of violent events as a function of the two variables interacted in Model 1. The darker contours on the upper-right and lower-left areas

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[32] See Model 7 (Table A3).

clearly reveal that more violent events are predicted to occur where an overwhelmingly Catholic ward has neighboring wards that are overwhelmingly Protestant–and vice versa. Conversely, the lowest predicted number of incidents is found in homogeneous Catholic (Protestant) wards surrounded by homogeneous Catholic (Protestant) wards (upper-left and lower-right areas). The evidence in Figure 5 manifests that inter-ward tensions have the potential for generating more predicted violent events than within ward parity since they better capture segregation.

To further probe Hypothesis 2, we use two alternative measures of neighboring wards' ethnic composition. First, we use the maximum observed percentage of Protestants among all the neighboring wards instead of the average percentage of Protestants in neighboring wards (Model 3). Hence, if a ward has two neighbors and one has 60% Protestants and the other has 40% Protestants, here we take 60% (instead of the average, 50%). The results are consistent with those in Model 1 though weaker. Second, we run a model in which the number of neighboring wards with a majority of Protestants is interacted with a dummy that indicates whether a ward has a Catholic majority (Model 4). A ward is considered to be mostly Catholic or Protestant if the percentage of Catholics is higher than 50%. This gives us a proxy for the number of interface areas. The results are consistent with our expectations: the number of incidents increases in wards that are mostly Catholic and that have a higher number of neighboring wards that are mostly Protestant.[33]

Model 5 adds the parity index to the model. Parity is still positive and significant, and so is the interaction between the percentage of Catholics and average percentage of Protestants in neighboring wards, which suggests that both dynamics (intra-ward and inter-ward) are explaining sectarian violence. However, the coefficients are much smaller than in previous models due to the correlation existing between parity and the percentage of Catholics, as the latter is used to compute the former.

We control for the number of peace-lines in a ward in Model 6. After controlling for neighbors' characteristics, the coefficient for peace-lines becomes insignificant. To further test if peace-lines reduce the number of incidents, in Model 7 we include a three-way interaction between percentage of Catholics, average percentage of Protestants in neighboring wards, and the number of peace-lines in a ward. Earlier on, we observed that peace-lines are related to more violence in wards with ethnic parity. Peace-lines might also serve to separate segregated rival wards thereby decreasing or hindering intergroup negative contact and

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[33] Results are stronger if we use 60% as threshold (Model 6, Table A3).

establishing clear (physical) territorial borders. The results in Model 7 suggest this might be the case. The coefficient of the triple interaction is negative and significant. These results should be interpreted with caution though; since the number of wards with peace-lines is small (29), peace-lines are endogenous to past violence, and most of them are in Belfast.[34]

Our main findings were subjected to multiple robustness checks (reported in the online appendix). Checks include: i) models that exclude all controls and (year and LGD) fixed-effects; ii) the inclusion of additional control variables (namely, a urban ward dummy, the percentage of people claiming assistance for housing, a dummy for wards that border the Republic of Ireland, and the electoral results of sectarian parties); iii) the exclusion of potentially influential cases (i.e., Belfast and Derry); iv) re-estimating our baseline models using zero-inflated negative binomial regression; and v) running our baseline models using negative binomial models for panel data with *ward* random-, fixed-effects, and with ward dummies.

Conclusions

Violence in Northern Ireland has not ended after the 1998 peace agreement. This article explores the local determinants of low-intensity intergroup violence in post-conflict Northern Ireland. Interface areas are contested and outgroup's presence and identity displays are perceived as threatening. In these local contexts, groups have incentives to compete for territory, maintain an area cleansed, and consolidate borders, which may lead to intentional violence against symbols and individuals from the other group. Proximity also makes perpetrating violent acts less costly, that is, it creates opportunities. We find that violence is more frequent in wards where there is ethnic parity between groups and in homogeneous wards that border wards with a large proportion of members of the rival community.

This article shows that the link between ethnic settlement patterns and violence can be extended beyond civil war settings. We develop a theoretical framework of low-intensity intergroup conflict, where threat perception breeds on segregation, proximity, and group size, which can be applied to other cases where groups are in contact and compete for local dominance. In the case of Northern Ireland, violence is low-intensity because armed groups have agreed to peace and violence is not perpetrated by militarized actors but rather by individuals or small groups that act in a decentralized fashion. These conflicts are very

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[34] The impact of peace-lines requires further research that is beyond the scope of this article. A careful examination of the marginal effects of the peace-lines reveals that they only have a significant negative effect in wards with a Catholic population of more than 70% whose neighboring wards have an average percentage of Protestants of more than 70%.

localized, so they are generally not salient beyond limited areas. As in other cases, a peace agreement has not ended all violence. Low-intensity violence not only persists but implies the constant risk of escalation, since it could give incentives for paramilitary groups to step in to protect their communities again, opening the possibility of a civil war relapse.

Recent scholarly work on ethnic and political violence is focusing on the sub-national level to identify more accurately the conditions under which violence occurs. In the case of Northern Ireland, our data reveals that there is much spatial variation in the incidence of low-intensity sectarian violence. However, analyzing violence at the ward level without taking into account the interaction between different units would miss half the story. A key contribution of this article is showing that neighboring dynamics are a critical determinant in explaining this variation.

Our results have some noteworthy policy implications: there is a commonplace perception that relocation and segregation are ways to prevent intergroup violence. Yet, Northern Ireland is a clear case of widespread and persisting segregation as a response to violence. We observe that segregation may reduce spread but does not solve the problem of intergroup violence if communities are still in contact with one another in localized areas. On the contrary, lack of interpersonal positive contact strengthens ingroup bias and perceptions of the outgroup as a threat. In fact, our findings suggest that sectarian violence reaches higher levels when it takes place across segregated units; thus, segregation could be perpetuating mistrust and sectarian violence rather than promoting collective safety.

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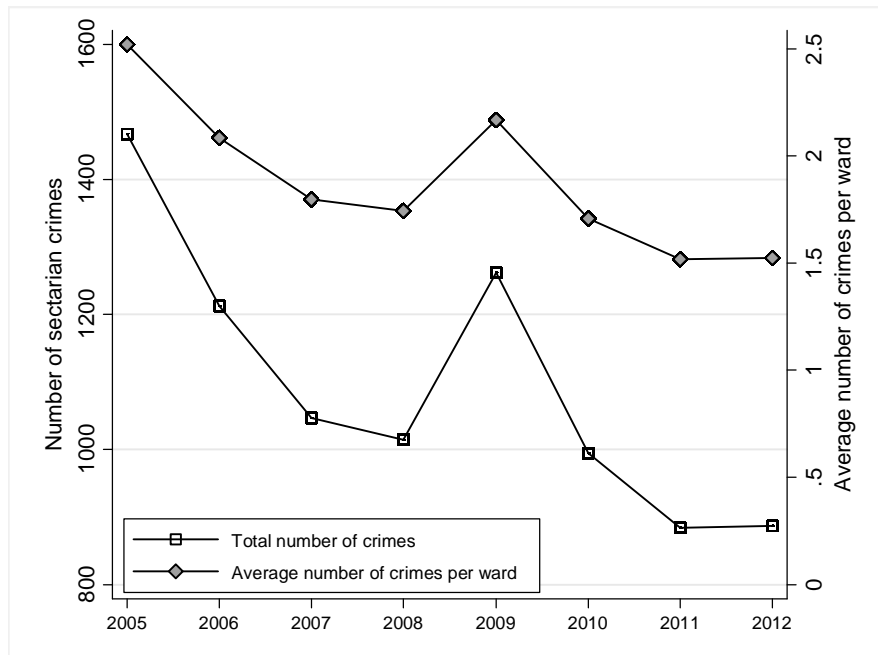
Figure 1. Sectarian violence in Northern Ireland (2005-2012)
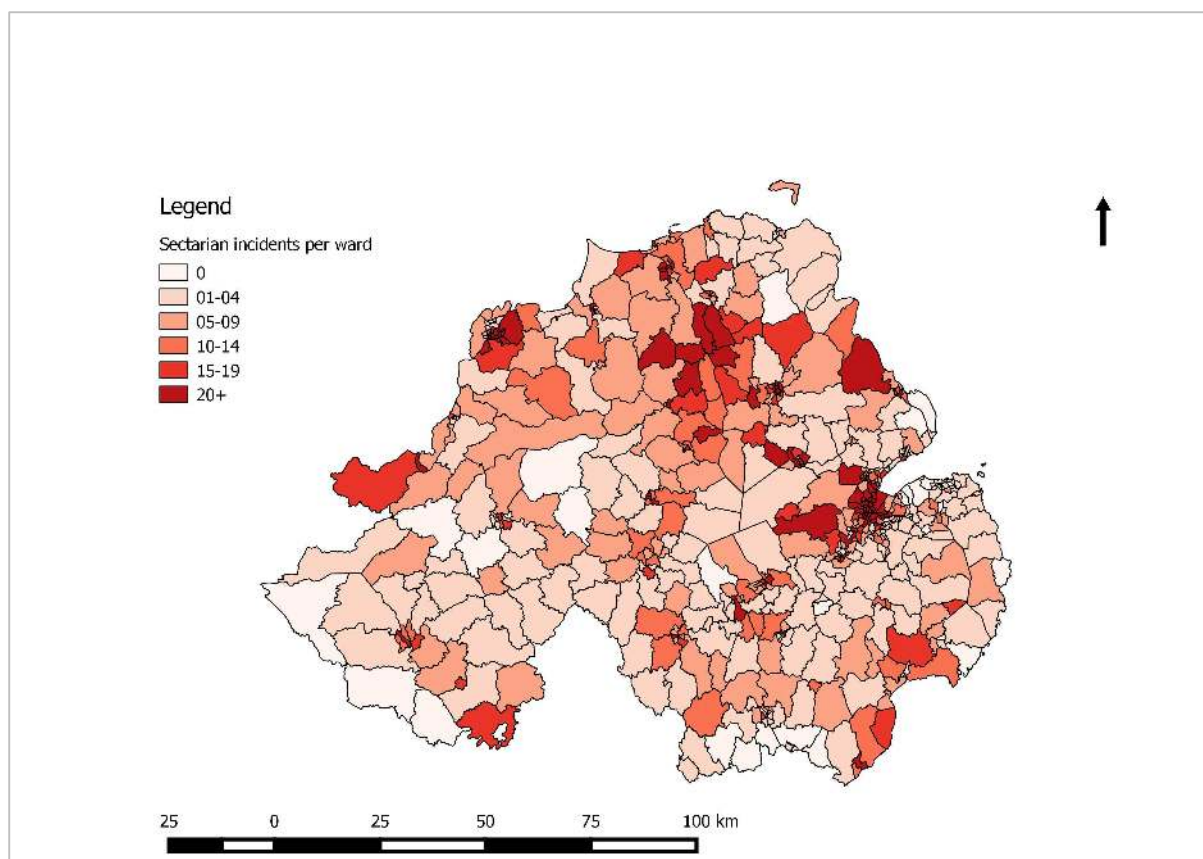
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Figure 2. Distribution of sectarian violence in Northern Ireland (2005-2012)
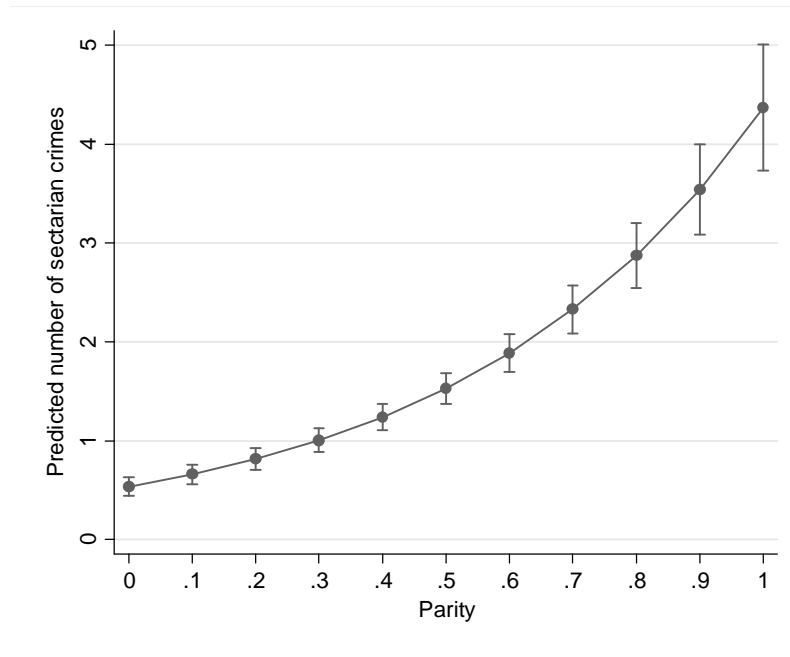
Figure 3. The impact of parity on the predicted number of incidents
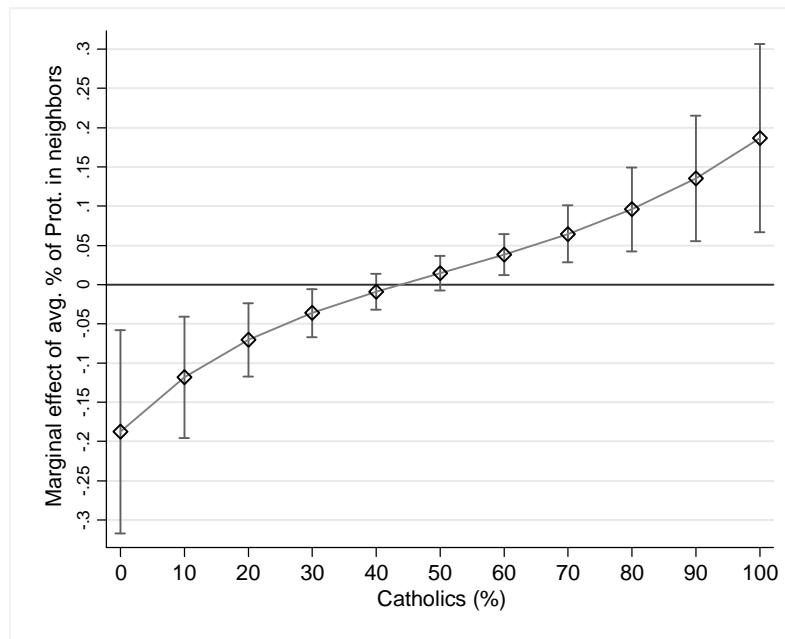
Figure 4. Marginal effect of the average percentage of Protestants in neighboring wards
conditional on the percentage of Catholics in a given ward
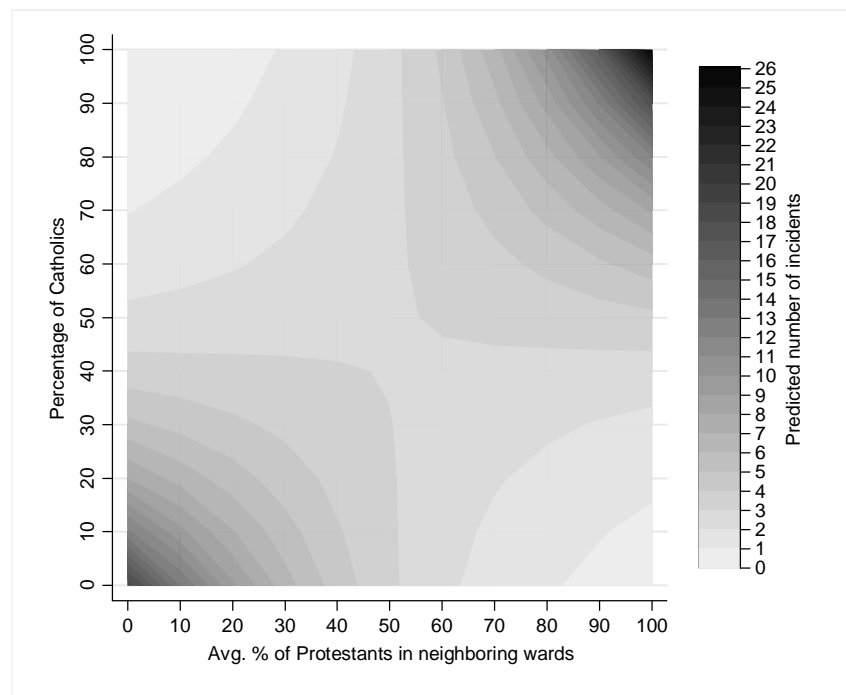
Figure 5. Predicted number of sectarian incidents: the effect of ward ethnic composition and neighboring wards' composition

Table I. Intra-ward dynamics: sectarian incidents (2005-2012) and wards' characteristics

	DV: Incidents of sectarian violence					
	(1)	(2)	(3)	(4)	(5)	(6)
Sq. Km. (log)	-0.217**	-0.219**	-0.205**	-0.205**	-0.198**	-0.068+
	(0.035)	(0.035)	(0.029)	(0.029)	(0.028)	(0.036)
Population (log)	0.475*	0.478*	0.783**	0.808**	0.678**	0.181
	(0.203)	(0.203)	(0.157)	(0.158)	(0.156)	(0.157)
Males 16-39 (%)	0.033+	0.035+	-0.019	-0.018	-0.025	-0.014
	(0.019)	(0.019)	(0.017)	(0.015)	(0.016)	(0.016)
Unemployment (%)	0.152**	0.151**	0.248**	0.250**	0.238**	0.113**
	(0.026)	(0.026)	(0.022)	(0.022)	(0.022)	(0.020)
Conflict deaths (log)	0.197**	0.196**	0.230**	0.234**	0.191**	0.033
	(0.063)	(0.063)	(0.047)	(0.048)	(0.047)	(0.047)
Catholics (%)	-0.005*		0.074**			
	(0.002)		(0.005)			
Protestants (%)		0.005*		0.089**		
		(0.002)		(0.005)		
Catholics (%)^2			-0.0008**			
			(0.0000)			
Protestants (%)^2				-0.0009**		
				(0.0001)		
Parity					2.100**	1.703**
					(0.125)	(0.115)
Other crimes (log)						0.496**
						(0.065)
Peace-lines (log)						0.448**
						(0.108)
Incidents in neighbors (avg.)						0.079**
						(0.011)
Neighbors (nº)						0.005
						(0.020)
Constant	-2.999*	-3.519*	-6.161**	-7.001**	-5.601**	-4.430**
	(1.495)	(1.576)	(1.186)	(1.245)	(1.183)	(1.074)
Log(dispersion)	0.272**	0.271**	-0.095	-0.080	-0.076	-0.267**
	(0.062)	(0.062)	(0.061)	(0.061)	(0.062)	(0.069)
LGD fixed-effects	Y	Y	Y	Y	Y	Y
Year fixed-effects	Y	Y	Y	Y	Y	Y
N	4,656	4,656	4,656	4,656	4,656	4,656
Log-likelihood	-7153.482	-7153.051	-6837.630	-6849.829	-6855.416	-6701.575

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table II. Inter-ward dynamics: sectarian incidents (2005-2012), wards' and neighboring wards' characteristics

	DV: Number of incidents of sectarian violence						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sq. Km. (log)	-0.246**	-0.079+	-0.237**	-0.246**	-0.212**	-0.252**	-0.254**
	(0.035)	(0.041)	(0.036)	(0.040)	(0.033)	(0.035)	(0.034)
Population (log)	0.657**	0.162	0.570**	0.468*	0.769**	0.627**	0.682**
	(0.167)	(0.168)	(0.182)	(0.192)	(0.151)	(0.166)	(0.167)
Males 16-39 (%)	0.015	-0.008	0.022	0.041*	-0.007	0.020	0.013
	(0.018)	(0.018)	(0.018)	(0.020)	(0.016)	(0.018)	(0.018)
Unemployment (%)	0.173**	0.104**	0.151**	0.122**	0.214**	0.156**	0.157**
	(0.026)	(0.022)	(0.025)	(0.028)	(0.022)	(0.023)	(0.022)
Conflict deaths (log)	0.149**	0.065	0.169**	0.142*	0.157**	0.137**	0.138**
	(0.050)	(0.048)	(0.055)	(0.058)	(0.047)	(0.050)	(0.050)
Incidents in neighbors (avg.)	0.057**	0.061**	0.083**	0.100**	0.070**	0.053**	0.052**
	(0.014)	(0.014)	(0.015)	(0.015)	(0.012)	(0.014)	(0.013)
Neighbors (nº)	0.045+	0.017	0.047+	0.064+	0.027	0.046*	0.049*
	(0.023)	(0.023)	(0.025)	(0.036)	(0.020)	(0.023)	(0.022)
Other crimes (log)		0.583**					
		(0.069)					
Parity					1.513**		
					(0.170)		
Catholics (%)	-0.042**	-0.038**	-0.055**		-0.019**	-0.041**	-0.046**
	(0.004)	(0.004)	(0.006)		(0.004)	(0.004)	(0.004)
Avg. % Protestants in neighboring wards	-0.035**	-0.033**			-0.013**	-0.035**	-0.038**
	(0.005)	(0.004)			(0.005)	(0.005)	(0.005)
Catholics (%)*Avg. Prot.	0.0008**	0.0007**			0.0003**	0.0008**	0.0009**
	(0.0001)	(0.0001)			(0.0001)	(0.0001)	(0.0001)
Max. % of Prot. in neighbors			-0.038**				
			(0.006)				
Catholics (%)*Max. % Prot.			0.0007**				
			(0.0001)				
Catholic ward (>50%)				-0.961**			
				(0.170)			
Nº Prot. neighbors (>50%)				-0.097*			
				(0.039)			
Catholic*Prot. neighbors				0.344**			
				(0.056)			
Peace-lines (log)						0.221	-1.857**
						(0.178)	(0.555)
Catholics(%)*Peace-lines							0.036**
							(0.010)
Av. Prot.*Peace-lines							0.042**
							(0.015)
Catholics*Avg. Prot.*Peace-lines							-0.0008**
							(0.0002)
Constant	-2.820*	-1.730	-1.162	-3.444*	-5.673**	-2.642*	-2.873*
	(1.182)	(1.088)	(1.353)	(1.421)	(1.118)	(1.183)	(1.189)
Log(dispersion)	-0.062	-0.170*	0.017	0.105	-0.200**	-0.068	-0.122+
	(0.068)	(0.070)	(0.069)	(0.069)	(0.068)	(0.068)	(0.072)
LGD fixed-effects	Y	Y	Y	Y	Y	Y	Y
Year fixed-effects	Y	Y	Y	Y	Y	Y	Y
N	4,656	4,656	4,656	4,656	4,656	4,656	4,656
Log-likelihood	-6841.365	-6749.205	-6899.490	-7001.586	-6754.151	-6837.937	-6805.642

Clustered standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

The Determinants of Low-Intensity Intergroup Violence: The Case of Northern Ireland

Online Appendix

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Table A1. *Descriptive statistics of core variables in the models (2005-2012)*

Variable	Observations	Mean	Std. deviation	Min.	Max.
Sectarian Violence	4656	1.88	4.67	0	78
Log square kilometers	4656	2.21	1.49	0.17	5.33
Log population	4656	7.95	0.37	6.57	9.19
Urban ward	4656	0.52	0.49	0	1
Border with Rep. of Ireland	4656	0.05	0.21	0	1
Males 16-39 (%)	4656	16.38	2.66	9	37.07
Unemployment (%)	4656	3.72	2.53	0.3	17.1
Housing benefits (%)	4656	7.87	5.99	0.28	35.28
Conflict deaths (log)	4656	1.14	1.09	0	5.03
Parity	4656	0.60	0.30	0.03	1
Polarization	4656	0.61	0.28	0.04	0.99
Catholics (%)	4656	43.35	31.93	0.90	99.04
Protestants (%)	4656	52.98	30.32	0.66	97.05
Catholic ward (>50%)	4656	0.39	0.49	0	1
Nº of Prot. (>50%) neighboring wards	4656	3.03	2.18	0	11
Catholic ward (>60%)	4656	0.33	0.47	0	1
Nº of Prot. (>60%) neighboring wards	4656	2.57	2.21	0	11
Avg. % of Prot. in neighboring wards	4656	53.49	24.13	1.54	94.72
Avg. % of Cath. in neighboring wards	4656	42.85	25.77	2.53	98.04
Max % of Prot. in neighboring wards	4656	73.05	22.72	2.11	97.05
Avg. nº of incidents in neighboring wards	4656	1.86	3.02	0	44
Number of neighboring wards	4656	5.23	1.74	1	11
Log peace lines	4656	0.06	0.28	0	2.08
Log other crimes (not sectarian)	4656	4.83	0.82	1.79	8.45
% of seats Republican parties (LGD)	4656	39.05	24.56	0	80
% of seats Loyalist parties (LGD)	4656	51.67	19.90	13.33	83.33

Robustness checks

The main findings from our baseline models (Table I Model 5 and Table II Model 3) are robust to a number of changes to the specification which we briefly described in the paper but that we report and further discuss in this Appendix.

First, to ensure that our results are not dependent on the specific model specifications reported in the paper, we estimate our baseline models without control variables and year and LGD fixed-effects. The results are shown in Table A2 and reveal that the main findings are not dependent on the inclusion of any specific control or fixed-effects. Models 1-3 report the results for parity (Table I column 5) without controls and fixed-effects, without controls but including year and LGD fixed-effects, and with controls but without year and LGD fixed-effects. Models 4-6 do the same for the model testing inter-ward dynamics (Table II column 3).

Second, in Table A3 we report a series of models with some additional control variables and additional specifications. First, the positive impact of intra-ward parity is robust to the inclusion of two extra control variables. The first is a dummy variable indicating wards that are 'urban' (compared to 'rural' or 'mixed'). The second is an alternative measure of economic scarcity, namely, the number of people claiming welfare assistance for housing (as a percentage of a ward's population).[1] Our main results remain unchanged (see Model 4 of Table A3). The 'urban' dummy is highly correlated with the size of wards in square kilometers (ρ = -0.87) and it is not significant. When the latter is excluded from the model, the 'urban' dummy is positive and significant. The impact of the alternative poverty measure is positive and significant. However, the 'housing benefits' variable is highly correlated with unemployment (ρ = 0.77), and that is why we exclude it from the main models.

The baseline model testing the existence of segregation and cross-ward violence (Table II column 3) is also robust to the inclusion of these two extra controls (urban dummy and housing benefits claimants) plus a dummy variable indicating if a ward borders with the Republic of Ireland to capture the possibility of cross-border group activity (Model 5 Table A3). Bordering the Republic of Ireland has been pinpointed as an explanatory factor of violence during 'the Troubles' (Mueller, Rohner & Schoenholzer, 2013) as British

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[1] Both variables are obtained from the NISRA.

forces were attacked in border control points. Interestingly, this variable has no significant effect for the post-conflict period under study which confirm that the spatial distribution of violence has somewhat changed. The inclusion of these three controls does not alter our main result. Further, Model 8 (Table A3) reports the results of this same baseline model including two control variables capturing sectarian parties' electoral results at the LGD level. Concretely, we include the percentage of seats won by nationalist parties (i.e., Sinn Féin (SF), and Social Democratic and Labour Party (SDLP)) and the percentage won by unionist parties (i.e., Democratic Unionist Party (DUP), Ulster Unionist Party (UUP), Progressive Unionist Party (PUP), Ulster Democratic Party (UDP), United Kingdom Unionist Party (UKUP), and United Unionist Assembly Party (UUAP)). The inclusion of these controls does not affect our main result and suggests that political representation does not reduce violence at the ward level.[2]

Some additional specifications and results mentioned in the paper are reported in Table A3. In Model 1 we use the polarization index instead of parity. Both are highly correlated in two-group contexts and, so, the results are extremely similar. Model 2 includes an interaction between parity and the percentage of young males to test the impact of youth unemployed bulges and shows that the impact of parity does not significantly increase as the percentage of young males increases in a ward. Model 3 includes an interaction between parity and unemployment. The results show that the impact of parity increases with unemployment, which increases the stakes of competition and reduces the opportunity costs of violence. Model 6 shows the stronger result obtained if we use a 60% threshold to identify and code mostly Catholic and Protestant wards instead of 50% (as we did in Model 5 in Table II). In Model 7 we use the percentage of Protestants in a ward and interact it with the average percentage of Catholics in the neighboring wards to show that the effect of neighbors' ethnic composition is also present in Protestant areas surrounded by mostly Catholic wards. In other words, we show that the effects are symmetric to those presented in the paper and explained by the existence of interface areas. Finally, Model 9 shows the inter-ward effect by including also the interaction between the percentage of

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[2] The impact of these electoral variables should however be interpreted with caution due to potential reversed causality.

Protestants in neighboring wards and the squared percentage of Catholics in a ward, to capture non-linearity.

Additionally, Table A4 reports models that show the impact of the interaction between parity and two rough proxies for segregation at the ward level: the number of peace-lines and the number of deaths occurred during the Troubles. Segregation exists at the within-ward level but it is difficult to capture. A ward can be diverse but still highly segregated internally. The results indicate that parity and segregation contribute to more violence at the ward level. The coefficients of the interactions are positive and significant.

Third, we show that our findings are not driven by a few influential cases. In particular, we have re-run our baseline models excluding Derry and Belfast, which are the two most populated cities in Northern Ireland and where sectarian violence has been traditionally higher. Table A5 reports the results and shows that the main findings are robust to the exclusion of these cases from the sample.

Fourth, the likelihood ratio tests of the models in the paper show that the over-dispersion parameter is non-zero, which clearly indicate that the negative binomial model is more appropriate than the Poisson model. Given that standard negative binomial regression models already account for overdispersion and that we do not consider zero counts to be caused by a separate process, we do not use zero-inflated models in our main estimations. However, to check the robustness of our results, Table A6 reports our main models estimated using zero-inflated negative binomial regression. Again, our main findings remain largely unaltered.

Fifth, we report models estimated using negative binomial models for panel data with *ward* random- and fixed-effects. Further, the baseline models have been also re-run using ward dummies instead of LGD fixed-effects.[3] These models are however highly problematic in dealing with unit effects because our main independent variables barely vary over time.[4] Nonetheless, we report these models in the Appendix to prove that the main findings are not model dependent. Indeed, the reported results in Table A7 show that, despite these caveats, the impact of parity and the interaction between the percentage of

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[3] Besides, in these models (3 and 6), errors are clustered at ward level.
[4] Recall that census data is only collected every 10 years (2001 and 2011 within the period for which sectarian violence data is available).

Catholics in a ward and the average percentage of Protestants in neighboring wards are both positive and significant. As expected, the estimated effects are smaller though.

Finally, Table A8 shows the results for parity at a more aggregated level of analysis, namely the Local Government District (LGD). Model 1 does not include year fixed-effects while Model 2 does. The results reveal that the impact of parity is still strong and positive at the LGD level, especially if year fixed-effects that control for temporal and common shocks are included. The estimated coefficient is significant (at the 0.05 level) when the year fixed-effects are included and very similar in size to that estimated in Model 5 (Table I). This result indicates that group parity is also associated with more violent incidents at the LGD level.

Table A2. *Robustness tests: Excluding controls as well as year and LGD fixed-effects*

	DV: Number of incidents of sectarian violence					
	(1)	(2)	(3)	(4)	(5)	(6)
Sq. Km. (log)			-0.33**			-0.23**
			(0.030)			(0.036)
Population (log)			0.31*			0.083
			(0.14)			(0.14)
Males 16-39 (%)			0.032			0.060**
			(0.020)			(0.022)
Unemployment (%)			0.085**			0.066**
			(0.016)			(0.016)
Conflict deaths (log)			0.35**			0.11*
			(0.047)			(0.050)
Parity	0.91**	1.54**	1.85**			
	(0.28)	(0.15)	(0.16)			
Incidents in neighbors (avg.)						0.15**
						(0.018)
Neighbors (nº)						0.033
						(0.028)
Catholics (%)				-0.034**	-0.035**	-0.033**
				(0.0057)	(0.0038)	(0.0036)
Avg. % of Protestants in neighboring wards				-0.037**	-0.034**	-0.027**
				(0.0052)	(0.0047)	(0.0041)
Catholics(%)*Avg. Prot.				0.00078**	0.00079**	0.00067**
				(0.00010)	(0.000071)	(0.000066)
Constant	0.046	-0.19	-3.91**	2.60**	2.59**	-0.11
	(0.21)	(0.23)	(1.09)	(0.40)	(0.37)	(1.03)
Log(dispersion)	1.03**	0.35**	0.42**	0.90**	0.30**	0.23**
	(0.075)	(0.064)	(0.060)	(0.085)	(0.070)	(0.069)
LGD fixed-effects	N	Y	N	N	Y	N
Year fixed-effects	N	Y	N	N	Y	N
N	4656	4656	4656	4656	4656	4656
Log-likelihood	-7997.9	-7218.7	-7343.2	-7834.3	-7185.1	-7120.5

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table A3. *Robustness tests: Alternative specifications*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				DV: Number of incidents of sectarian violence					
Sq. Km. (log)	-0.21**	-0.20**	-0.19**	-0.12*	-0.20**	-0.21**	-0.25**	-0.25**	-0.23**
	(0.028)	(0.028)	(0.028)	(0.050)	(0.066)	(0.038)	(0.035)	(0.035)	(0.034)
Population (log)	0.71**	0.68**	0.70**	0.82**	0.71**	0.50**	0.65**	0.62**	0.75**
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.19)	(0.17)	(0.17)	(0.15)
Males 16-39 (%)	-0.023	-0.040	-0.026	-0.016	0.015	0.036*	0.015	0.021	-0.0057
	(0.015)	(0.039)	(0.016)	(0.016)	(0.018)	(0.018)	(0.019)	(0.018)	(0.017)
Unemployment (%)	0.24**	0.24**	0.18**	0.068*	0.074*	0.14**	0.17**	0.15**	0.21**
	(0.021)	(0.022)	(0.027)	(0.029)	(0.031)	(0.027)	(0.025)	(0.023)	(0.021)
Conflict deaths (log)	0.20**	0.19**	0.20**	0.15**	0.12*	0.16**	0.15**	0.14**	0.16**
	(0.047)	(0.047)	(0.048)	(0.045)	(0.050)	(0.059)	(0.050)	(0.050)	(0.047)
Polarization	2.30**								
	(0.14)								
Parity		1.76*	1.59**	2.11**					
		(0.82)	(0.19)	(0.12)					
Parity*Males 16-39		0.020							
		(0.049)							
Parity*Unemployment			0.12**						
			(0.038)						
Urban ward				0.011	0.024				
				(0.14)	(0.16)				
Housing benefits (%)				0.077**	0.044**				
				(0.011)	(0.011)				
Border with Rep. of Ireland					-0.083				
					(0.21)				
Peace-lines (log)								0.23	
								(0.18)	
Incidents in neighbors (avg.)					0.053**	0.10**	0.057**	0.052**	0.068**
					(0.014)	(0.016)	(0.014)	(0.014)	(0.012)
Neighbors (nº)					0.045+	0.073*	0.045*	0.046*	0.034+
					(0.024)	(0.033)	(0.023)	(0.023)	(0.020)
Catholics (%)					-0.040**			-0.042**	0.075**
					(0.0036)			(0.0037)	(0.016)
Avg. % of Prot. in neighboring wards					-0.035**			-0.035**	-0.0048
					(0.0047)			(0.0047)	(0.0052)
Catholics*Avg. Prot.					0.00079**			0.00079**	-0.00038
					(0.000065)			(0.000065)	(0.00025)
Catholics(%) ^2									-0.00093**
									(0.00014)
Catholics^2*Avg. Prot.									0.0000069**
									(0.0000024)
Catholic ward (>60%)						-1.05**			
						(0.13)			
Nº Prot. neighbors (>60%)						-0.10**			
						(0.034)			
Catholic ward*Prot. neighbors						0.37**			
						(0.079)			
Protestants (%)							-0.036**		
							(0.0041)		
Avg. % of Catholics in neighboring wards							-0.042**		
							(0.0049)		
Protestants*Avg. Cath.							0.00081**		
							(0.000065)		
Republican parties seats (%)								0.019	
								(0.014)	
Loyalist parties seats (%)								0.027*	
								(0.012)	
Constant	-5.98**	-5.39**	-5.46**	-7.20**	-3.45**	-3.81**	-2.71*	-4.76**	-5.84**
	(1.18)	(1.27)	(1.18)	(1.22)	(1.20)	(1.41)	(1.29)	(1.62)	(1.15)
Log(dispersion)	-0.085	-0.076	-0.091	-0.14*	-0.075	0.081	-0.066	-0.070	-0.21**
	(0.061)	(0.062)	(0.062)	(0.062)	(0.071)	(0.067)	(0.068)	(0.068)	(0.070)
LGD fixed-effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed-effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	4656	4656	4656	4656	4656	4656	4656	4656	4656
Log-likelihood	-6848.4	-6855.2	-6845.9	-6800.5	-6826.4	-6978.8	-6837.1	-6835.6	-6741.4

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table A4. *Parity and internal segregation proxies*

	DV: Number of incidents of sectarian violence	
	(1)	(2)
Sq. Km. (log)	-0.069+	-0.072*
	(0.036)	(0.036)
Population (log)	0.18	0.20
	(0.15)	(0.16)
Males 16-39 (%)	-0.014	-0.015
	(0.016)	(0.017)
Unemployment (%)	0.11**	0.12**
	(0.020)	(0.021)
Conflict deaths (log)	0.036	-0.061
	(0.047)	(0.067)
Parity	1.63**	1.48**
	(0.12)	(0.16)
Parity*Conflict deaths		0.15+
		(0.082)
Peace-lines (log)	0.25+	0.47**
	(0.15)	(0.11)
Parity*Peace-lines	0.45+	
	(0.27)	
Other crimes (log)	0.50**	0.49**
	(0.065)	(0.066)
Incidents in neighbors (avg.)	0.082**	0.081**
	(0.011)	(0.011)
Neighbors (nº)	0.0057	0.0046
	(0.020)	(0.020)
Constant	-4.35**	-4.36**
	(1.06)	(1.07)
Log(dispersion)	-0.27**	-0.27**
	(0.068)	(0.068)
LGD fixed-effects	Y	Y
Year fixed-effects	Y	Y
N	4656	4656
Log-likelihood	-6698.4	-6698.4

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table A5. *Robustness tests: Excluding Belfast and Derry*

	DV: Number of incidents of sectarian violence	
	(1)	(2)
Sq. Km. (log)	-0.22**	-0.25**
	(0.030)	(0.036)
Population (log)	0.56**	0.65**
	(0.17)	(0.18)
Males 16-39 (%)	0.016	0.036
	(0.022)	(0.024)
Unemployment (%)	0.18**	0.18**
	(0.025)	(0.026)
Conflict deaths (log)	0.099+	0.14**
	(0.052)	(0.053)
Parity	1.88**	
	(0.13)	
Incidents in neighbors (avg.)		0.100**
		(0.020)
Neighbors (nº)		0.052*
		(0.024)
Catholics (%)		-0.047**
		(0.0042)
Average % of Protestants in neighboring wards		-0.041**
		(0.0048)
Catholics*Avg. Prot.		0.00087**
		(0.000079)
Constant	-4.99**	-2.94*
	(1.23)	(1.31)
Log(dispersion)	-0.042	-0.072
	(0.068)	(0.075)
LGD fixed-effects	Y	Y
Year fixed-effects	Y	Y
Sample	Excluding Belfast and Derry	Excluding Belfast and Derry
N	4008	4008
Log-likelihood	-5243.2	-5221.2

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table A6. *Robustness tests: Zero-inflated negative binomial regression models*

	DV: Number of incidents of sectarian violence		
	(1)	(2)	(3)
Sq. Km. (log)	-0.33**	-0.22**	-0.21**
	(0.030)	(0.049)	(0.042)
Population (log)	0.29*	0.060	0.42+
	(0.14)	(0.16)	(0.22)
Males 16-39 (%)	0.034+	0.039	0.014
	(0.021)	(0.026)	(0.017)
Unemployment (%)	0.086**	0.048**	0.18**
	(0.016)	(0.017)	(0.026)
Conflict deaths (log)	0.36**	0.12*	0.10+
	(0.047)	(0.061)	(0.053)
Parity	1.75**		
	(0.17)		
Incidents in neighbors (avg.)		0.13**	0.049**
		(0.017)	(0.014)
Neighbors (nº)		0.026	0.046*
		(0.034)	(0.023)
Catholics (%)		-0.025**	-0.034**
		(0.0051)	(0.0050)
Average % of Protestants in neighboring wards		-0.020**	-0.032**
		(0.0045)	(0.0049)
Catholics*Avg. Prot.		0.00053**	0.00069**
		(0.000092)	(0.000080)
Constant	-3.69**	0.23	-1.17
	(1.10)	(1.17)	(1.59)
Inflate equation			
Conflict deaths (log)	-0.24	0.0028	-1.00*
	(0.16)	(0.23)	(0.45)
Parity	-27.7**		
	(8.04)		
Sq. Km. (log)		0.073	0.82*
		(0.20)	(0.37)
Population (log)		-0.30	-5.32
		(0.42)	(4.57)
Males 16-39 (%)		-0.19	
		(0.17)	
Unemployment (%)		-0.23*	0.088
		(0.10)	(0.18)
Incidents in neighbors (avg.)		-1.13**	-0.42**
		(0.32)	(0.15)
Neighbors (nº)		0.0019	
		(0.090)	
Catholics (%)		0.049+	0.12*
		(0.026)	(0.053)
Average % of Protestants in neighboring wards		0.040*	0.068
		(0.019)	(0.050)
Catholics*Avg. Prot.		-0.00077*	-0.0015**
		(0.00033)	(0.00043)
Constant	1.67+	2.20	17.2
	(0.94)	(3.49)	(37.0)
Log(dispersion)	0.39**	0.032	-0.21*
	(0.060)	(0.092)	(0.080)
LGD fixed-effects	N	N	Y
Year fixed-effects	N	N	Y
N	4656	4656	4656
Log-likelihood	-7333.6	-7078.6	-6779.4

Clustered standard errors in parentheses. $+ p < 0.10$, $* p < 0.05$, $** p < 0.01$.

Table A7. *Robustness tests: Ward Random- and Fixed-effects*

	DV: Number of incidents of sectarian violence					
	(1)	(2)	(3)	(4)	(5)	(6)
Sq. Km. (log)	-0.22**	-0.15**	-0.73**	-0.21**	-0.14**	-1.02**
	(0.025)	(0.048)	(0.081)	(0.026)	(0.052)	(0.24)
Population (log)	0.34**	0.15	0.43	0.23*	0.051	0.16
	(0.099)	(0.17)	(0.48)	(0.096)	(0.17)	(0.47)
Males 16-39 (%)	0.0044	0.0076	-0.016	0.015	0.0099	0.00080
	(0.012)	(0.016)	(0.027)	(0.011)	(0.016)	(0.024)
Unemployment (%)	0.13**	0.094**	0.085**	0.13**	0.086**	0.099**
	(0.015)	(0.019)	(0.029)	(0.015)	(0.019)	(0.025)
Conflict deaths (log)	0.15**	0.047	0.74+	0.028	-0.099	1.87+
	(0.036)	(0.059)	(0.39)	(0.036)	(0.065)	(1.00)
Parity	1.43**	0.67**	1.21**			
	(0.11)	(0.19)	(0.39)			
Incidents in neighbors (avg.)				0.059**	0.057**	0.083**
				(0.0054)	(0.0062)	(0.014)
Neighbors (nº)				0.048*	0.016	-0.16
				(0.020)	(0.041)	(0.16)
Catholics (%)				-0.036**	-0.019**	-0.038*
				(0.0029)	(0.0053)	(0.015)
Avg. % of Prot. in neighboring wards				-0.033**	-0.023**	-0.021
				(0.0032)	(0.0056)	(0.015)
Catholics*Avg. Prot.				0.00068**	0.00037**	0.00041+
				(0.000047)	(0.000086)	(0.00022)
Constant	-3.10**	-0.99	-2.88	0.26	1.50	2.75
	(0.78)	(1.30)	(3.88)	(0.75)	(1.33)	(4.21)
Log(dispersion)			-1.11**			-1.20**
			(0.086)			(0.094)
Unit effects	RE	FE	FE (ward dummies)	RE	FE	FE (ward dummies)
Year fixed-effects	Y	Y	Y	Y	Y	Y
N	4656	4344	4656	4656	4344	4656
Log-likelihood	-6810.0	-4861.5	-6038.8	-6710.8	-4814.0	-5991.9

Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$. In Models 3 and 6 errors are clustered at ward level.

Table A8. *Sectarian incidents and parity at LGD level*

	DV: Number of incidents of sectarian violence at LGD level	
	(1)	(2)
Sq. Km (log)	-0.081	-0.058
	(0.22)	(0.18)
Population (log)	1.36**	1.40**
	(0.48)	(0.43)
Males 16-39 (%)	0.17	0.085
	(0.12)	(0.11)
Unemployment (%)	0.066	0.33**
	(0.049)	(0.12)
Conflict deaths (log)	-0.20	-0.30
	(0.23)	(0.20)
Parity (LGD level)	1.31	2.04*
	(1.03)	(0.80)
Constant	-14.4**	-14.2**
	(5.45)	(4.98)
Log(dispersion)	-0.67**	-0.89**
	(0.17)	(0.16)
Year fixed-effects	N	Y
N	208	208
Log-likelihood	-898.3	-874.9

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$. Standard errors clustered on LGD in parentheses. Year fixed-effects included but not reported in Model 2.
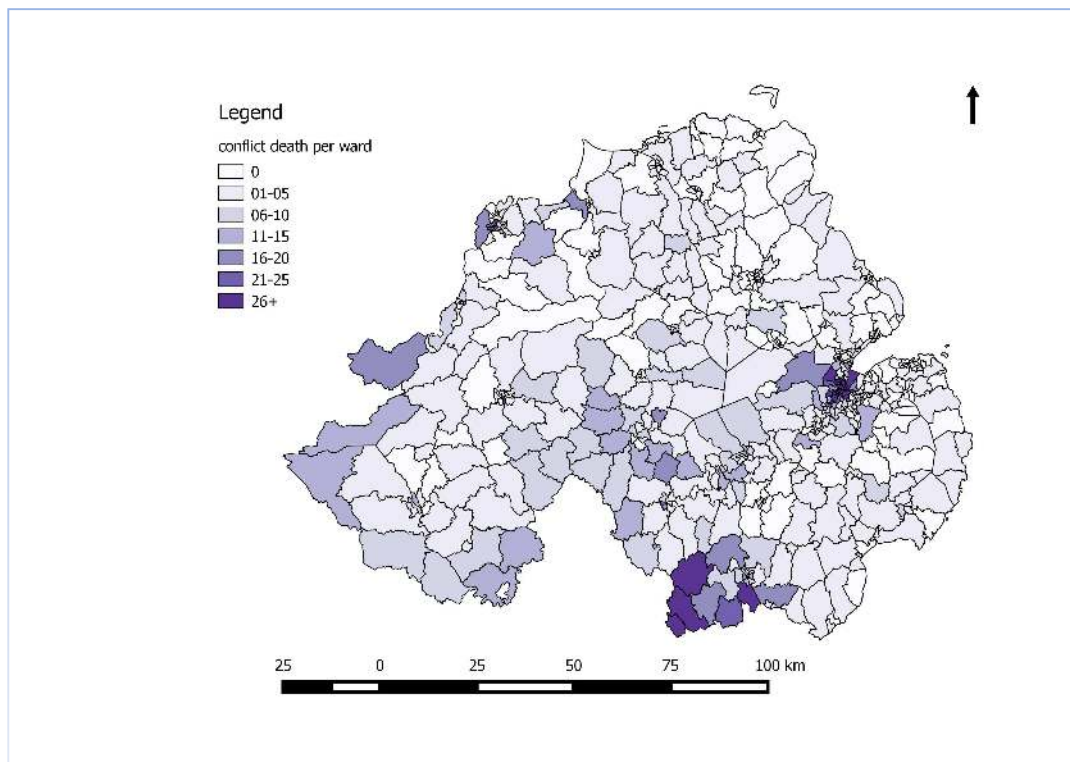
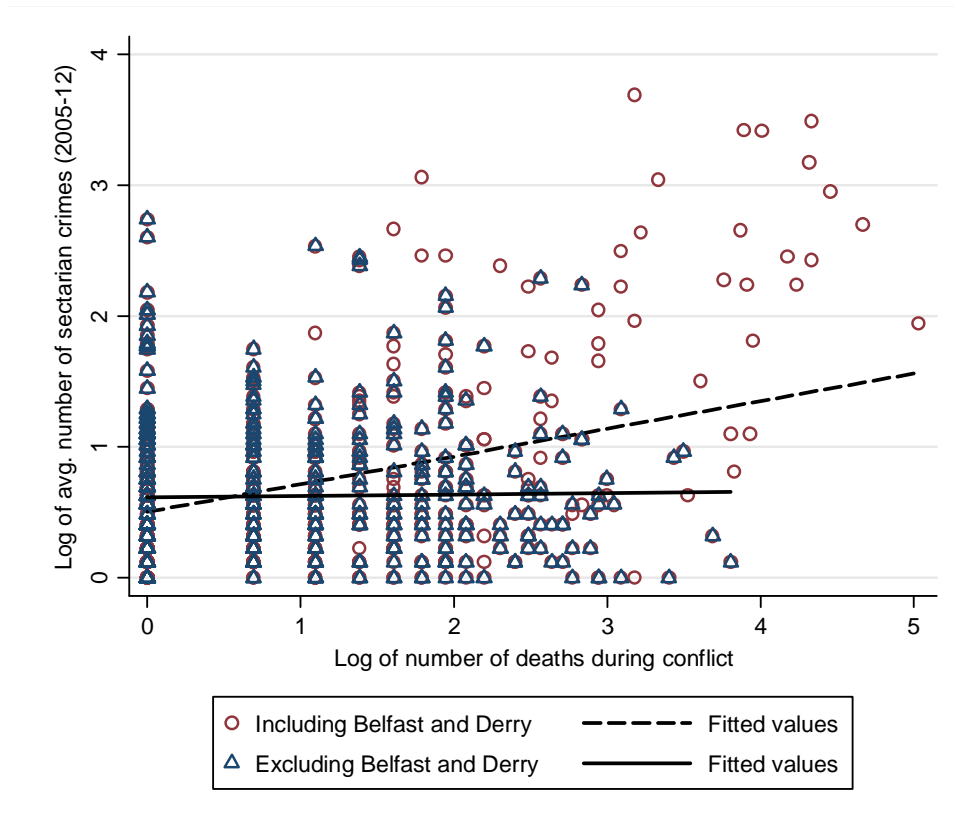Figure A1. *Number of deaths during the Troubles at the ward level (1969-1998)*

Figure A2. *Past deaths and current sectarian crimes: The figure shows the relationship between the (logged) number of deaths during the conflict and the (logged) average number of sectarian crimes for all wards both including and excluding Belfast and Derry's wards from the sample.*
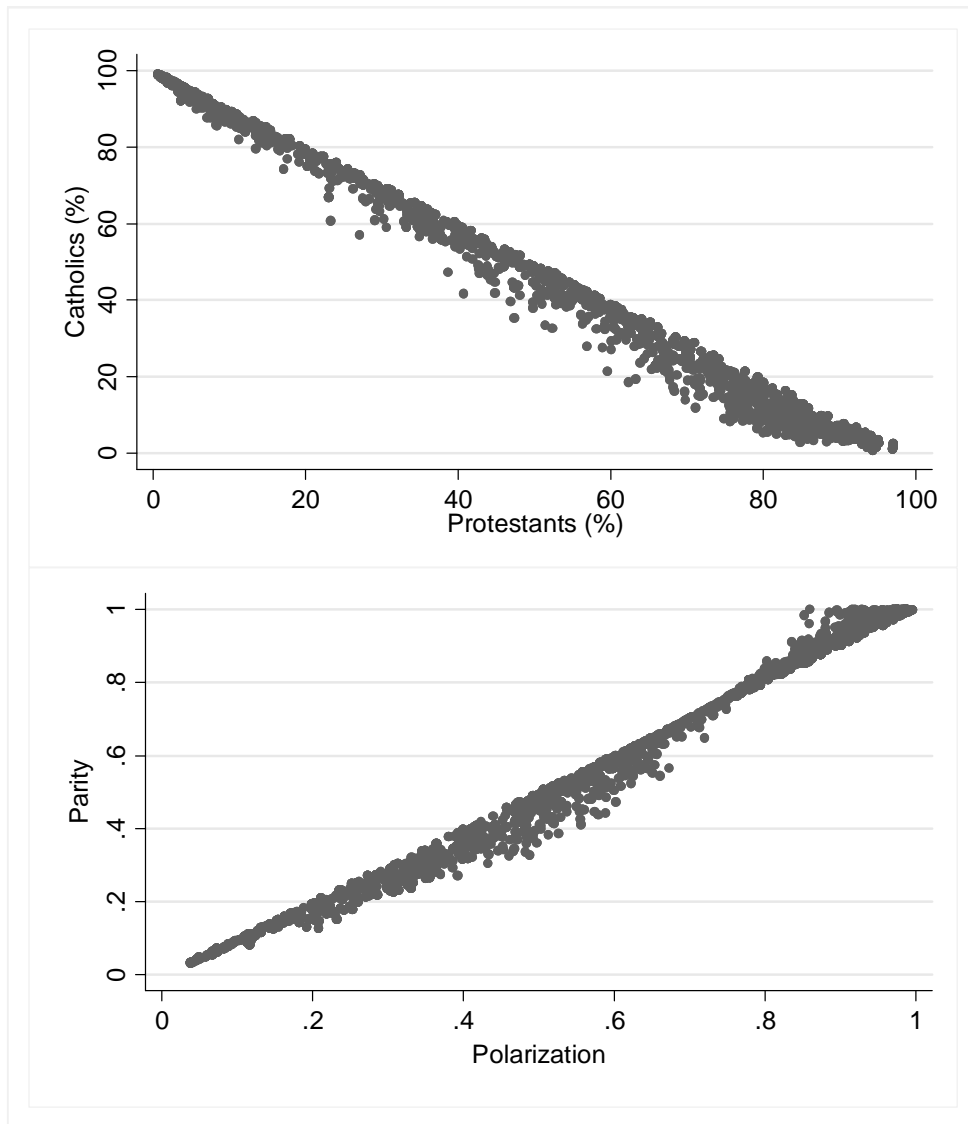
Figure A3. *Scatter plot: Relationship between the percentage of Catholics and the percentage of Protestants within wards (top panel), and between the parity and polarization indexes (bottom panel)*
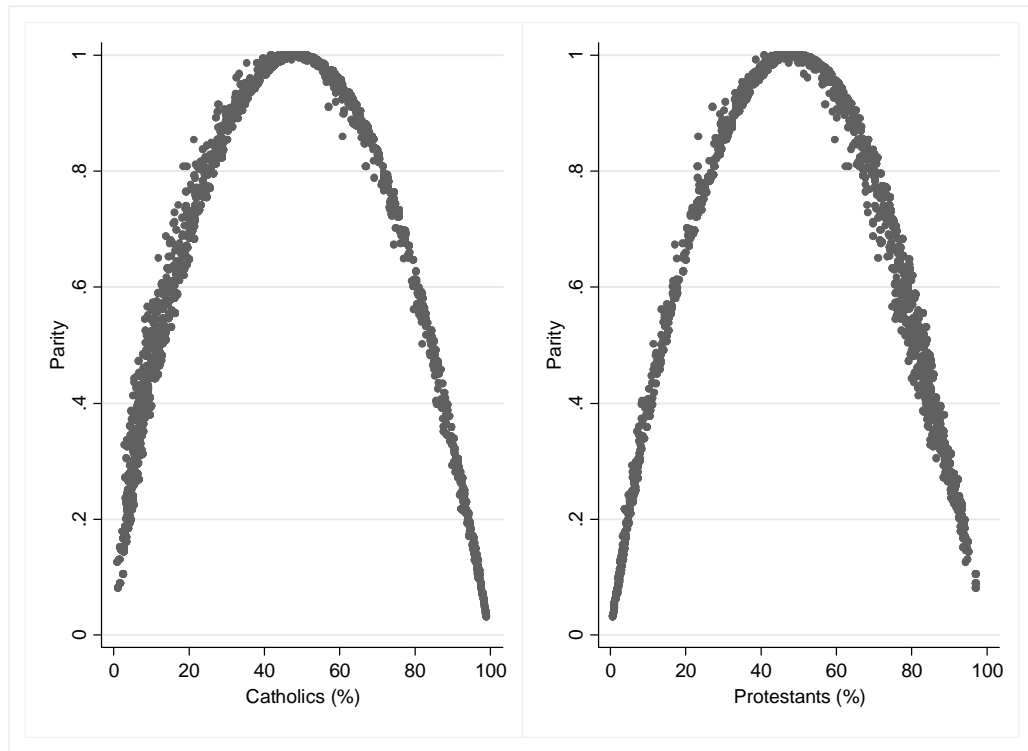
Figure A4. *Scatter plots: Parity and percentages of Catholics and Protestants at ward level*