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Is Conflict Contagious? Evidence from a Natural Experiment

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Abstract: The fact that conflicts tend to cluster in space is well documented. It remains unclear, however, whether this clustering is a result of contagion or of unobserved shocks that are correlated across space. We present new evidence for contagion by exploiting a natural experiment that increased the intensity of one conflict but had no direct effect on a second ongoing conflict in the same area. In particular, we analyze a ruling by the Supreme Court of the Philippines, which disallowed a proposed peace treaty with the Moro-Islamic Liberation Front (MILF), a Muslim separatist insurgency, and led to an escalation of conflict with the MILF in provinces with a large Muslim population. Though the ruling had no direct bearing on the conflict with the New People's Army (NPA), a communist guerrilla group, we find that it also led to a substantial increase in conflict with the NPA in the same provinces. We test several mechanisms and conclude that contagion was most likely the result of strategic escalation by the NPA in an attempt to exploit the local weakness of the armed forces.

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1 Introduction

A large empirical literature documents the fact that conflicts cluster in space and time, so that areas close to an already existing conflict are more likely to become involved in conflict themselves [1]. This finding is often interpreted as evidence that conflict is contagious - that it spreads through space much like a disease, with potentially devastating consequences for human development.[2] It is difficult to determine, however, whether the spatial clustering is due to contagion, or a direct result of unobserved shocks that are clustered in space. Many economic shocks known to cause conflict, like droughts and changes in commodity prices (Miguel et al., 2004; Dube and Vargas, Forthcoming), are correlated across space. What looks like contagion might therefore simply be the direct result of an economic shock that affected a wider geographic area and sparked several conflicts over a short period of time (Black, 2013).

This problem is similar to the well-known difficulty of estimating the causal effect of social interactions: just like neighboring countries, individuals with close proximity in social networks are often affected by the same unobserved shocks (Manski, 1993). Several recent studies address this problem and estimate contagion in social networks by exploiting shocks to individuals that should have no direct effect on those they are socially close to. For instance, Dahl et al. (2014) show that quasi-random policy variation that entices some men

[1] Studies that find evidence of this clustering include Most and Starr (1980); Starr and Most (1985); Hill and Rothchild (1986); Kadera (1998); Gleditsch and Ward (2000); Sambanis (2001); Ward and Gleditsch (2002); Salehyan and Gleditsch (2006); Buhaug and Gleditsch (2008); Braithwaite (2010); Kathman (2010); Weidmann and Ward (2010); Kathman (2011); Beardsley (2011); De Groot (2011); Schutte and Weidmann (2011); Zhukov (2012); Danneman and Ritter (2013); Maves and Braithwaite (2013); Zhukov (2013)

[2] The negative effects of civil conflict are well documented and include reduced economic growth (Abadie and Gardeazabal, 2003), educational attainment (Leon, 2012), height-for-age Z-scores (Akresh et al., 2012) and birth weight (Mansour and Rees, 2012). Perhaps as a result of these negative effects, conflict affected countries have made very little progress towards achieving the Millennium Development Goals (MDGs). The estimated one-and-a-half billion people living in conflict-affected countries are substantially more likely to be undernourished, less likely to have access to clean water and education, and face higher rates of childhood mortality (World Bank, 2012). Ending or preventing civil conflict is therefore seen as an important step on the way to reducing poverty and achieving the MDGs (World Bank, 2012; Gates et al., 2012).

to take up paternity leave, also makes their co-workers and brothers more likely to take up leave, a finding that is strong evidence for social contagion. Similarly, Duflo and Saez (2003) find that randomly enticing some individuals to enroll in tax-deferred retirement plans also makes their co-workers more likely to enroll. We adapt this approach to the study of conflict contagion by exploiting an exogenous shock that led to the escalation of one conflict but had no direct effect on a second ongoing conflict in the same area. We then show that the shock also caused the second conflict to escalate, which constitutes evidence of contagion.

In particular, we analyze the Supreme Court of the Philippines' August 2008 ruling, which disallowed an impending peace agreement between the Government of the Republic of the Philippines (GRP) and the Moro-Islamic Liberation Front (MILF), a Muslim separatist insurgency active in parts of the southern Philippine island of Mindanao. On the eve of the treaty's signing, the Philippines' Supreme Court ruled that its key stipulations concerning autonomous rule of majority Muslim regions were unconstitutional, effectively halting peace negotiations between the two parties. This caused frustration in the Muslim community and led to an escalation of the conflict between GRP and MILF in the Muslim provinces of Mindanao.

We provide evidence that the escalation of conflict with the MILF spilled over to the conflict between the GRP and the New People's Army (NPA), the armed wing of the Communist Party of the Philippines. The NPA is a separate insurgent group, whose goals and organizational structure are very different from those of the MILF. It does not seek autonomous rule for any parts of the Philippines and did not participate in formal peace talks at the time. Thus, the Supreme Court ruling had no direct bearing on conflict with the NPA. Nevertheless, evidence from Regression Discontinuity (RD) and Difference-in-differences estimators suggest that the Muslim provinces also experienced an increase in conflict with the NPA after the Supreme Court ruling, which constitutes evidence for contagion. We find no evidence that contagion was mediated by the large number of people who were internally

displaced as a result of the escalation in the MILF conflict.

To further understand the mechanism underlying the conflict contagion observed in this case, we explore the municipality-level determinants of conflict escalation within the Muslim provinces. We find that conflict between GRP and MILF escalated most strongly in municipalities with a high Muslim population. Conflict with the NPA, however, escalated more strongly in municipalities with a relatively low Muslim population, suggesting a true geographic spillover. This finding is consistent with the hypothesis that the NPA strategically increased its attacks, exploiting the fact that government forces assigned to fight the NPA in Muslim provinces were redeployed to areas with the highest Muslim population, to deal with the escalating MILF conflict there. This opened up the relatively less Muslim areas to strategic attacks from the NPA. This hypothesis is supported by the NPA's own statements from August 2008 declaring a strategic offensive (Madlos, 2008; Sison, 2008). It is similar to the mechanism suggested by Dell (2011), who found that escalations in conflict between the Mexican government and a drug cartel opened this cartel up to strategic attacks from other cartels.

Our findings have important implications for the large number of countries in which several armed groups are currently in conflict or at risk of conflict with the government.[3] They suggest that non-military measures to pacify one of the conflicts, such as programs for disarmament and economic development, can pay a "double-dividend". In addition to reducing the negative effects of the first conflict, these measures free up military resources that can be used to decrease the intensity of other conflicts in the country. In addition, increasing our understanding of conflict contagion can improve the accuracy of early warning indicators and help design policies to prevent the spread of conflict.

[3]Many Asian countries have, over the past 50 years, also experienced concurrent conflicts with communist and ethnic separatist armed groups. Examples are: Burma, India, Indonesia, Sri Lanka, and Thailand. Examples of countries outside of Asia that have experienced concurrent conflict with several armed groups are: Algeria, Angola, Colombia, Guatemala, Israel, Peru, and South Africa.

In addition to the literature on conflict contagion, this paper contributes to a nascent literature that attempts to estimate strategic interactions between groups in armed conflict. For instance, Gupta and Mundra (2005) find that in the Israeli-Palestinian conflict attacks by the PLO cause subsequent attacks by Hamas and Islamic Jihad, which they see as evidence of an attempt to "outbid" the rival faction in the struggle for popular support. Jaeger and Paserman (2006) find that attacks by Hamas and Hezbollah cause attacks by the Israeli Defense Forces but not vice versa, which they interpret as evidence of a one-sided retaliatory strategy. Haushofer et al. (2010) come to a different conclusion and argue that attacks from either party cause retaliatory attacks from the other side. It is of course difficult to establish the direction of causality in this context, since we rarely observe exogenous variation in one party's attacks. The studies in this literature therefore use methods that infer causality from the sequential timing of attacks, such as Vector Auto Regression, which assumes that earlier attacks can cause later ones but not the other way around. This assumption can be problematic in the presence of strategic interactions, for example when armed groups anticipate each other's actions and carry out preemptive attacks. Our method has the advantage of being based on a plausibly exogenous and unanticipated shock, which allows us to estimate the NPA's strategic response to an increase in violence between MILF and the Philippine military.

2 Background: Conflict in the Philippines and the Supreme Court ruling of August 2008

The Moro-Islamic Liberation Front (MILF) is a separatist insurgent organization fighting for an independent Muslim state in the southern Philippines. It was officially established in the late 1970s, as it broke away from the more moderate Moro-National Liberation Front

(MNLF) led by Nur Misuari, which has been active since the late 1960s. After decades of bitter and costly fighting, the MNLF negotiated a peace agreement with the Government of the Republic of the Philippines (GRP) in 1996, which led to the establishment of a semi-autonomous region called the Autonomous Region in Muslim Mindanao (ARMM). The MILF was opposed to these negotiations and continued its fight for a fully independent Muslim state. Peace negotiations between MILF and GRP began in the late 1990s but were derailed during intense fighting in 2000 when Philippine President Joseph Estrada declared an "all out war" on the MILF. Sporadic fighting continued throughout the 2000's peaking in 2003 and 2008. In March 2014, peace talks between the GRP and MILF brokered by Malaysia resulted in the signing of an accord called the Comprehensive Agreement on the Bangsamoro which calls for the establishment of Bangsamoro a larger and better funded autonomous region than its predecessor.

Our identification strategy is based on the events in August 2008, when the Supreme Court of the Philippines struck down an impending peace treaty between the MILF and GRP. In the months leading up to this, the two parties had drafted a memorandum of agreement on ancestral domain (MOA-AD), the details of which were revealed on July 17th of that year in Kuala Lumpur. Controversially, the MOA-AD stipulated an expansion of the Autonomous Region in Muslim Mindanao. There was substantial local opposition to this plan, particularly from government officials of some towns and villages that were set to be included in the expanded ARMM. On July 23rd, the Vice Governor of the province of North Cotabato filed a petition to the Supreme Court of the Philippines, asking it to halt the MOA. On August 4th, one day before the scheduled signing in Kuala Lumpur, the Supreme issued a temporary restraining order to halt the MOA-AD, pending a final verdict that would be reached several months later. This interruption in the peace process caused outrage among the Muslim community and prompted the MILF to attack government targets in North Cotabato. The government retaliated and fighting soon spread to nearby provinces in Mindanao. In response

to the escalation of violence, GRP President Gloria Macapagal-Arroyo withdrew her support for the MOA-AD without awaiting the Supreme Court's final verdict (the Court eventually declared the MOA-AD unconstitutional on October 14th). The fighting lasted for several months, leading to the deaths of approximately 300 people and the displacement of 600,000 (Hedman, 2009).

In this paper, we estimate whether the escalation of violence between MILF and GRP spilled over to the conflict between GRP and the New People's Army (NPA). The NPA was founded in 1969 as the armed wing of the Communist Party of the Philippines - a Maoist revolutionary movement that seeks to overthrow the country's political system. The NPA's goals and tactics differ substantially from those of the MILF. The NPA is much less geographically constrained and operates in almost all provinces of the Philippines. It does not seek formal autonomy for any region of the country, but rather to overthrow the government and replace it with a communist system. The NPA is highly decentralized and is organized in independently operating guerrilla fronts that usually cover geographic areas the size of a province or smaller. Its tactics rely on limited scale ambushes and harassment attacks rather than larger conventional battlefield confrontations with the usually better equipped government armed forces. While NPA and MILF sometimes allow each other to operate in the same territory, the MILF has consistently rejected calls for a strategic alliance, pointing to the differences in the goals of the two organizations (Maitem 2008). Consistent with this position, the MILF rejected the NPA's calls for tactical cooperation after the August 2008 Supreme Court ruling. As a result, NPA leaders said that they would not attempt to coordinate attacks with the MILF (GMA News 2008).[4]

Our analysis in the next section indicates that conflict between GRP and NPA increased significantly in August 2008 in provinces with a large Muslim population. Given the dif-

[4]NPA chairman Jose Sison did however state that this would be an opportunity to "confuse" the military by forcing it to divide its attention between NPA and MILF (GMA News 2008).

ference in goals between NPA and MILF, it is unlikely that the Supreme Court Ruling of August 2008 would have had a direct effect on conflict between GRP and NPA. The ruling concerned the constitutionality of autonomous rule of certain provinces. Since the NPA does not seek autonomous rule for any part of the Philippines, the ruling had no direct bearing on their objectives. This increases our confidence that the increase in conflict with the NPA in Muslim provinces after August 2008 was due to contagion between the two conflicts.

3 Empirical Analysis and Results

3.1 Data

The conflict data used in this paper are derived from military field reports maintained by the Armed Forces of the Philippines. This data source has been previously used to study conflict in the Philippines by Felter (2005); Berman et al. (2011); Crost et al. (2014), among others. Our main measure of conflict intensity is the number of violent incidents (defined as incidents that led to at least on casualty) that occurred in a municipality in a given month. As an additional measure of the conflict's geographic spread, we use an indicator for whether a municipality experienced any violent incidents in a given month. Being binary, this measure is robust to outliers and similar to commonly used cross-national measures of civil conflict incidence, such as those provided by the UCDP/PRIO dataset. Data on the provincial Muslim population comes from the 2000 Census.

3.2 Summary Statistics

Table 1 shows municipality-level summary statistics, separately for municipalities in Muslim and Non-Muslim provinces. We define the group of Muslim provinces as those provinces in Mindanao that have a Muslim population fraction above the median province in that island group.[5] Figure 1 shows the location of these provinces. The statistics show that the country's Muslim population is highly concentrated in the 22 Muslim provinces. Muslims make up 46.5 percent of the population in the average municipality in these provinces, but only 0.34 percent in the remaining provinces. The conflict with the MILF is similarly concentrated in the Muslim provinces. The average municipality in this group experienced 0.039 violent incidents per month and has a 2.5 percent probability of experiencing any violent incidents in conflict with the MILF during the period of observation. Outside of the Muslim provinces there is hardly any conflict with the MILF. In fact, during the period of observation, there were only two municipalities that experienced any violent incidents in conflict with the MILF, and each of them only experienced a single incident.

Conflict with the NPA is more intense outside of the Muslim provinces, but less geographically concentrated than conflict with the MILF. The average municipality outside of the Muslim provinces has a 1.61 percent probability of experiencing any violent incidents involving the NPA in a given month. The corresponding probability in the Muslim provinces is approximately two-thirds smaller at 0.56. Similarly, the average number of violent incidents involving the NPA is approximately two-thirds smaller in the Muslim provinces than outside of them. Still, conflict with the NPA in the Muslim provinces is not negligible and substantially more prevalent than conflict with the MILF outside of the Muslim provinces. Furthermore, a low level of violence does not mean that a conflict is economically insignifi-

[5]The province of Palawan is the only province outside of Mindanao that has a substantial Muslim population. However, the MILF is not active there, so we exclude it from our definition of Muslim provinces that were affected by the escalation of conflict after the Supreme Court ruling of August 2008.

cant (Abadie and Gardeazabal, 2003; Murdoch and Sandler, 2004). Apart from the lives and resources lost to violence, the mere presence of insurgents distorts economic incentives, by increasing entrepreneurial risks and/or imposing an implicit tax from extortion and bribes paid to insurgents for protection.

3.3 Regression Discontinuity Estimates

The first part of our analysis uses a Regression Discontinuity design at the municipality level to estimate the immediate change in the intensity of conflict with MILF and NPA after the Supreme Court Ruling of August 2008. Specifically, we estimate the following regression, separately for the Muslim provinces and the rest of the country:

$$Y_{it} = \beta_0 + \beta_1 After08_t + \beta_2 t + \beta_3 After08_t \times t + \varepsilon_{it}$$

Y_{it} denotes the conflict outcome of interest (number of violent incidents, probability of any violent incident) in municipality i in month t. $After08_t$ is an indicator that takes the value 1 in the months after July 2008 and 0 in the months before.[6]. The specification also flexibly controls for linear time trends before and after the Supreme Court ruling. The parameter β_1 reflects the immediate change in the conflict outcome in August 2008. Under the assumption that there are no unobserved shocks to conflict in the Muslim provinces in August 2008, β_1 can be interpreted as the causal effect of the Supremem Court ruling. Standard errors are clustered at the municipality level to control for serial correlation of the error term within municipalities. However, since unobserved shocks to conflict are often correlated across space, it is possible that the errors are also spatially correlated. To account for this, Section 5.1 in the Appendix shows that our results are robust to using the standard errors developed

[6]As discussed in Section 2, the petition to halt the peace agreement was already filed in the second half of July 2008. We therefore exclude this month from our analysis since the anticipation of the Supreme Court ruling may already have affected conflict

by Conley (2008), which allow for spatial correlation of errors across municipalities.

Figure 2 graphically represent the RD design for conflict with the MILF. The scatter dots represent the average conflict outcome in a given month. The dashed line is a linear fit; the solid line a local linear fit with a triangular kernel and a bandwidth of nine months. The figure shows that conflict with the MILF in Muslim provinces escalated markedly in August 2008. The conflict outcomes then followed a downward trend but remained elevated during the entire nine months after the Supreme Court ruling. Figure 3 show that conflict with the NPA also escalated in the Muslim provinces after August 2008. Compared to the MILF conflict, the initial increase in both conflict outcomes is less pronounced. However, the NPA conflict further intensified over the following months. As for the MILF, conflict with the NPA remains above its pre-ruling mean for the entire nine months after the ruling.

Table 2 shows the results of the corresponding RD regressions. The results in columns 1 and 2 show that, immediately after the Supreme Court Ruling, the average municipality in the Muslim provinces experienced approximately 0.13 additional violent incidents per month involving the MILF. The probability of experiencing any violent incidents involving the MILF in a given month increased by approximately 7 percentage points after the ruling. All of these increases are statistically significant at the 1% level and large compared to the pre-ruling means of 0.006 violent incidents per month and a 0.51 percent probability of experiencing any violent incidents involving the MILF.

Columns 3 and 4 of Table 2 show that, in Muslim provinces, the probability of experiencing any violent incidents involving the NPA in a given month increased by approximately 0.9 percentage points after the Supreme Court ruling. The average municipality experienced approximately 0.0098 additional violent incidents involving the NPA per month. The increases in both outcomes are statistically significant at the 5% level. While these magnitude is small compared to the increases in conflict with the MILF, they represent an over 100% increase

relative to the pre-ruling means of 0.0042 violent incidents per month and a 0.37 percent probability of experiencing any violent incidents involving the NPA. Since there are 237 municipalities in the Muslim provinces, this amounts to approximately 20 additional violent incidents during the 9 months after the ruling, assuming that the effect size was constant over this time period. However, Figure 3 shows that conflict with the NPA kept intensifying for several months after the initial increase immediately after the ruling. To estimate the full extent of contagion, second part of our analysis therefore estimates a difference-in-differences model at the province level, using non-Muslim provinces as a control group.

3.4 Difference-in Differences Estimates

Our Difference-in-differences estimates are based on the following equation:

$$Y_{it} = \beta_0 + \beta_1 Muslim_i + \beta_2 After08_t + \beta_3 Muslim_i \times After08_t + \theta_i t + \varepsilon_{it}$$

Y_{it} denotes the conflict outcome of interest in province i in month t. As before, the first outcome is the number of violent incidents involving the relevant armed group in province i in month t. The second outcome is now defined as the number of municipalities in province i in month t that experienced at least one violent incident involving the group. $After08_t$ is an indicator that takes the value 1 in the months after July 2008 and 0 in the months before. $Muslim_i$ is an indicator that takes the value 1 for Muslim provinces. θ_i denotes a set of province-specific linear time trends that controls for different trends in unobserved variables between Muslim and non-Muslim provinces. Under the assumption that Muslim and non-Muslim provinces are not differently affected by unobserved shocks after July 2008, the parameter β_3 reflects the causal effect of the Supreme Court ruling. Standard errors are clustered at the province level to control for serial correlation of the error term within provinces. In addition, Section 5.1 in the Appendix shows that our results are robust to

using the standard errors developed by Conley (2008), which allow for spatial correlation of errors across provinces.

In the present context, the diff-in-diff estimator has two advantages over the RD estimator.[7] First, the RD design only estimates the instantaneous increase in conflict immediately after the Supreme Court ruling. However, Figure 3 suggests that conflict with the NPA further intensified over a period of several months after the ruling. By only capturing the immediate increase, the RD design is therefore likely to underestimate the ruling's full effect on the NPA conflict. Second, the RD estimates may reflect a direct effect of the ruling on the NPA's expectations. For instance, the ruling may have signaled to the NPA that the government cannot be trusted in future peace negotiations, and this may have led them to adopt a more violent strategy. We would, however, expect this strategic change to affect non-Muslim as well as Muslim provinces, so that it should not be reflected in the diff-in-diff estimate.

One concern about the diff-in-diff estimator is that the control group could have been contaminated if either NPA or AFP moved some of their troops from non-Muslim provinces to Muslim provinces. This could have led to a decrease in conflict in non-Muslim provinces and an upward bias in the diff-in-diff estimate. For the NPA, this is unlikely given its decentralized organizational structure, based on guerrilla fronts that usually cover areas not larger than a single province. The independent nature of these guerrilla fronts, as well as the importance of having fighters familiar with the local language, culture and terrain, makes it difficult for the NPA to move troops from one guerrilla front to another, so that longer distance troop movements across province borders are unlikely.

Troop movements are more likely for the AFP, and in Section 3.5 we explicitly test whether this mechanism can explain our results. To preview, our results suggest that conflict with

[7] Of course, it also has the disadvantage that it could be biased by unobserved shocks over the entire post-ruling period, whereas the RD design would only be biased by shocks that occur precisely in August 2008.

the NPA *increased* in areas that AFP troops were moved away from to deal with the MILF, most likely because this opened the remaining troops up to strategic attacks. This suggests that AFP troop movements away from non-Muslim provinces most likely led to an increase in conflict in the control group and a downward bias in the diff-in-diff estimator. Empirically, the results of the diff-in-diff estimator below show that conflict in non-Muslim provinces did not decrease significantly after the ruling, providing no evidence that troop movements led to conflict displacement from non-Muslim to Muslim provinces.

Table 3 shows the results of the diff-in-diff regressions. The results in columns 1 and 2 suggest that the Supreme Court ruling led to a significant increase in the MILF conflict in Muslim provinces relative to non-Muslim provinces. For both conflict outcomes, the magnitude of this increase is very similar to that estimated by the RD regressions shown in Table 2. The results in columns 3 and 4 suggest that conflict with the NPA also increased significantly in Muslim provinces relative to non-Muslim provinces in the months after the Supreme Court ruling. In the nine months after the ruling, the average Muslim province experienced 0.33 additional violent incidents involving the NPA per month, and 0.27 additional municipality-months with at least one violent incident, relative to non-Muslim provinces. Both estimates are statistically significant at the 5% level. For both outcomes, the coefficient associated with the post-ruling time period is small and not statistically significant, providing no evidence that troop movements led to conflict displacement from non-Muslim to Muslim provinces.

The contagion effect is very large compared to the mean of 0.067 violent incidents per month involving the NPA in Muslim provinces. In absolute term, it amounts to approximately 65 additional violent incidents in the 22 Muslim provinces over the 9 months after the Supreme Court ruling. Of course, the economic damages of this increase in conflict is likely to be substantially larger than the direct damage caused by these 65 incidents. The literature on civil conflict has found that increases in violence have substantial indirect negative effects such as reduced economic growth (Abadie and Gardeazabal, 2003), educational attainment

(Leon, 2012), height-for-age Z-scores (Akresh et al., 2012) and birth weight (Mansour and Rees, 2012).

3.5 What is the Mechanism of Contagion?

Previous studies of conflict contagion, as well as anecdotal evidence, suggest three possible mechanisms for the observed contagion effect. First, the presence of additional troops in Muslim provinces may have exacerbated conflict there, either because it increased the number of military targets or because the higher troop concentration led to more inadvertent encounters with NPA combatants. Second, contagion may be due to the NPA's strategic incentives to increase their attacks, exploiting the fact that government forces usually assigned to fighting the NPA were relocated to deal with the MILF. This mechanism is supported by the NPA's own statements from August 2008 declaring a strategic offensive (Madlos, 2008; Sison, 2008). It is similar to the mechanism suggested by Dell (2011), who found that escalations in conflict between the Mexican government and a drug cartel open this cartel up to strategic attacks from other cartels. Third, contagion may be mediated by the presence of internally displaced persons (IDPs). The escalation in conflict with the MILF led to the displacement of an estimated 600,000 people, many of whom ended up in refugee camps or makeshift tent cities (Hedman, 2009). The presence of a large refugee population is thought to increase conflict risk, perhaps because armed organizations can either recruit some of the refugees to their cause or hide existing combatants among them (Salehyan and Gleditsch, 2006).

These three mechanisms have different testable implications. The troop presence mechanism suggests that there should be a strong spatial overlap between the increase in both conflicts, since it should involve the same government troops. The strategic mechanism, on the other hand implies a true geographic spillover – conflict with the NPA should increase most in areas

that troops were moved away from to deal with the MILF conflict. Finally, the internal displacement mechanism suggests that conflict with the NPA should have increased most strongly in areas with a large number of IDPs.

We conduct two tests for these implications. First, we examine the role of internally displaced persons (IDPs), using data from a report by the Internal Displacement Monitoring Centre (IDMC, 2009). This report estimated the number of persons in each province that were displaced due to the escalation in conflict after August 2008. Using this data, we estimate the following province-level regression:

$$Y_{it} = \beta_0 + \beta_1 Muslim_i + \beta_2 IDP_i + \beta_3 After08_t + \beta_4 Muslim_i \times After08_t + \beta_5 IDP_i \times After08_t + \theta_i t + \varepsilon_{it}$$

where IDP_i is the number of IDPs per capita in province i and all other variables are defined as previously. According to our data, all non-Muslim provinces had zero IDPs, so that the variable IDP is identical to an interaction term between the Muslim indicator and the number of IDPs per capita. Therefore β_4 reflects the Supreme Court ruling's effect on conflict in Muslim provinces with zero IDPs, while β_5 reflects how this effect changes with an increase in per capita IDPs. Columns 1-2 of Table 4 shows that the increase in conflict with the MILF was strongest in the provinces that saw the highest numbers of IDPs per capita. This is most likely due to reverse causality since the escalation in MILF conflict caused the displacement. However, columns 3-4 show no evidence that conflict with the NPA increased more strongly in the provinces with a larger number of displaced persons, a result that is not consistent with the displacement mechanism. The result is also not consistent with the troop presence mechanism, which suggests that conflict with MILF and NPA should escalate in the same provinces.

To distinguish between the troop presence and strategic mechanism, we explore the role

of the municipality-level Muslim population in the escalation of conflict within the Muslim provinces. Specifically, we estimate the following municipality-level regression, using only municipalities in the Muslim provinces:

$$Y_{ijt} = \beta_0 + \beta_1 Muslim_i + \beta_2 After08_t + \beta_3 Muslim_i \times After08_t + \theta_j t + \varepsilon_{ijt}$$

Y_{ijt} denotes the conflict outcome of interest in municipality i in province j in month t. $After08_t$ is an indicator that takes the value 1 in the months after July 2008 and 0 in the months before. $Muslim_i$ is an indicator that takes the value 1 for municipalities with a Muslim population fraction above the median of the Muslim provinces.

The estimates of this equation are reported in 5. Columns 1 and 2 suggest that the escalation of conflict with the MILF was concentrated in municipalities with a large Muslim population. If the contagion were due to the troop presence mechanism, we would also expect a larger increase in conflict with the NPA in these municipalities. However, columns 3 and 4 of Table 5 show that the increase in NPA conflict was strongest in municipalities with a relatively low Muslim population. These results suggest that, within the Muslim provinces, the escalation in the NPA conflict was not concentrated in the same municipalities as the escalation in the MILF conflict. This result is consistent with the strategic mechanism, but not with the troop presence mechanism. It suggests that government forces were moved within the Muslim provinces from municipalities with low Muslim population to those with high Muslim population, to deal with the escalating MILF conflict there. This opened up municipalities with low Muslim population to strategic attacks from the NPA.

4 Conclusion

This paper presents evidence of conflict contagion. Specifically, we show that a sudden escalation of violence in one conflict can lead to an escalation in a nearby conflict with a different group. To do this, we analyzed the effect of a ruling by the Supreme Court of the Philippines in August 2008 that declared unconstitutional an impending peace agreement with the Moro-Islamic Liberation Front (MILF), a Muslim-separatist insurgency. The Supreme Court ruled that the agreement's stipulations concerning autonomous rule of majority Muslim areas were unconstitutional, which caused frustration in the Muslim community and led to an escalation of conflict with the MILF in the Muslim provinces of Mindanao.

Our empirical analysis suggests that these provinces also experienced an increase in conflict with a different insurgent group - the communist New People's Army (NPA) - directly after the Supreme Court ruling. Since the NPA does not seek autonomous rule for any parts of the Philippines and did not participate in formal peace talks at the time, the Supreme Court ruling had no direct bearing on conflict with this group. This suggests that the increase in conflict between the Philippine military and the NPA after the ruling was most likely a result of contagion from the MILF conflict.

We find no evidence that contagion was mediated by the large number of people who were internally displaced due to the escalation in the MILF conflict. Rather, our evidence is most consistent with the hypothesis that the NPA strategically increased its activities, exploiting the fact that government forces usually assigned to fighting the NPA were relocated to deal with the MILF.[8]

Most previous studies on conflict contagion focused on the empirical observation that con-

[8]This hypothesis is supported by the NPA's own statements from August 2008 (Madlos, 2008; Sison, 2008).

flicts cluster in space and time as evidence for contagion. This approach may, however, confound contagion with the direct effects of unobserved shocks that are clustered in space (Black, 2013). Our approach addresses this problem by exploiting a plausibly exogenous shock to one conflict that should have no direct effect on the conflicts around it. In doing so, this paper also contributes to a nascent literature that attempts to estimate strategic interactions between groups in armed conflict (e.g. Gupta and Mundra, 2005; Jaeger and Paserman, 2006; Haushofer et al., 2010). The studies in this literature usually attempt to infer causality from the sequential timing of attacks, which can be problematic if parties anticipate each other's actions and carry out preemptive attacks. Because our approach is based on a plausibly exogenous and unanticipated shock, it allows us to more directly estimate the causal effect of an increase in conflict with one armed group on the strategic behavior of another group.

Our findings have important implications for the large number of countries in which several armed groups are in conflict (or at risk of being in conflict) with the government. Specifically, they suggest that non-military measures to reduce the intensity of one conflict, such as programs for disarmament and economic development, can pay a "double-dividend". In addition to reducing the negative effects of the first conflict, these measures free up military resources that can be used to decrease the intensity of the other conflicts in the country.

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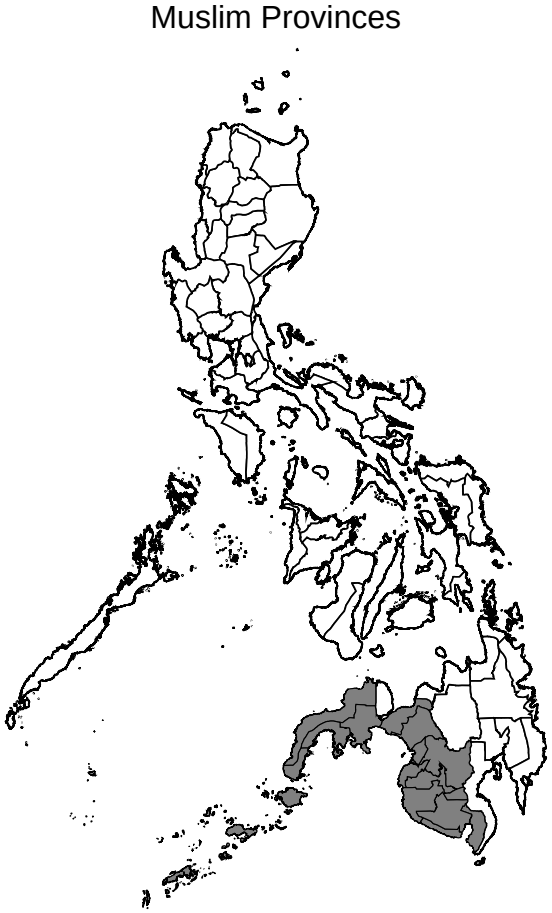
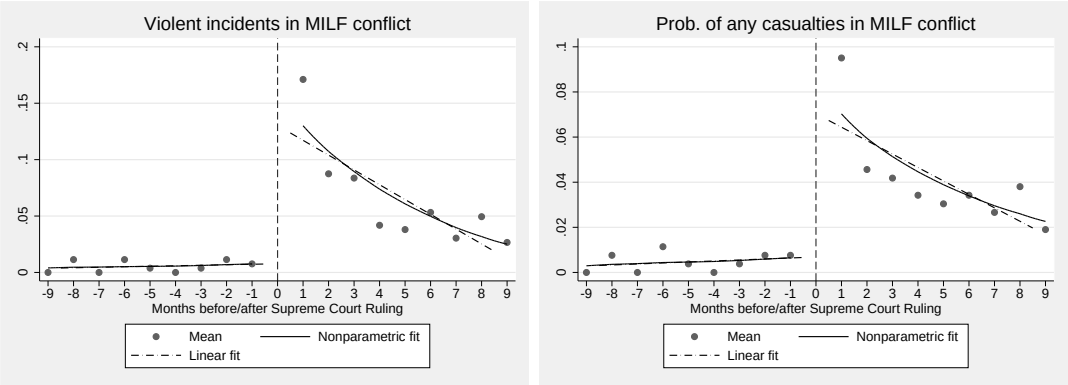
Figures and Tables

Figure 1: Muslim Population by Province



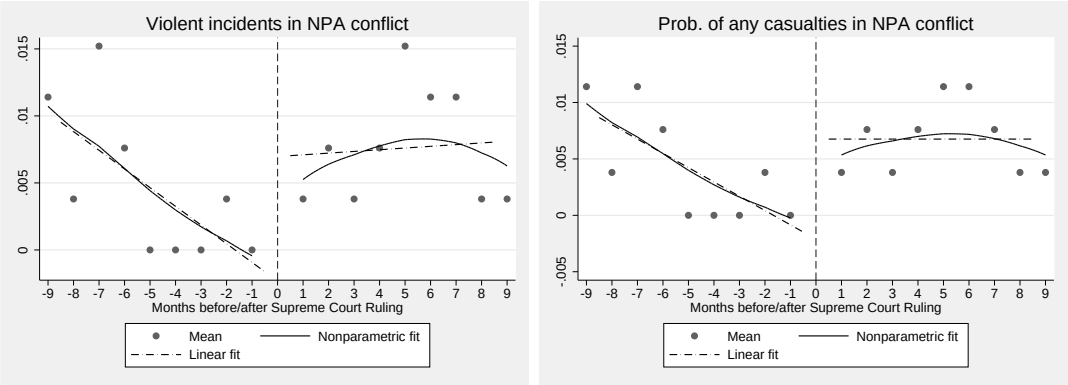
Muslim provinces – defined as those provinces in Mindanao with a Muslim population fraction above the median for that region – are marked in gray. Data source: 2000 Census of the Philippines.

Figure 2: The Supreme Court Ruling and Conflict with the MILF



The left panels shows the trends of the average number of violent incidents involving the MILF in Muslim provinces. The right panels show the probability that a municipality experiences any violent incidents with each group in a given month. Scatter dots represent monthly averages, solid lines are linear fits on both sides of the August 2008 threshold.

Figure 3: The Supreme Court Ruling and Conflict with the NPA



The left panels shows the trends of the average number of violent incidents involving the NPA in Muslim provinces. The right panels shows the probability that a municipality experiences any violent incidents with each group in a given month. Scatter dots represent monthly averages, solid lines are linear fits on both sides of the August 2008 threshold.

Table 1: Summary Statistics

	Muslim Provinces	Non-Muslim Provinces	p-value of Difference
Muslim population (%)	46.5	0.34	0.001
	(42.9)	(2.75)	
Violent incidents involving MILF	0.039	0.00008	0.010
	(0.292)	(0.009)	
Prob. of any casualties in conflict with MILF	0.025	0.00008	0.003
	(0.156)	(0.009)	
Violent incidents involving NPA	0.0063	0.0184	0.004
	(0.087)	(0.155)	
Prob. of any casualties in conflict with NPA	0.0056	0.0161	0.004
	(0.074)	(0.126)	
No. of provinces	22	57	79
No. of municipalities	237	1151	1388
No. of observations	4302	24912	29214

The unit of observation is the municipality-month. Colum (1) presents summary statistics for provinces with a Muslim population fraction above the median province in Mindanao, column (2) presents results for the remaining provinces. Standard deviations are in parenthesis. P-values of differences in means are based on clustered standard errors at the province level.

Table 2: The Supreme Court Ruling of 08/2008 and Conflict in Muslim Provinces: RD Estimates

	Conflict with MILF		Conflict with NPA	
Dependent Variable: Violent Inc.	Any cas.	Violent Inc.	Any cas.	
	(1)	(2)	(3)	(4)
After 07/2008	0.1348***	0.0699***	0.0098**	0.0093**
	(0.0340)	(0.0141)	(0.0049)	(0.0045)
Trend	0.0005	0.0005	–0.0013*	–0.0011*
	(0.0007)	(0.0005)	(0.0007)	(0.0007)
Trend × after 07/2008	–0.0149***	–0.0070***	0.0014	0.0011
	(0.0045)	(0.0021)	(0.0009)	(0.0008)
Mean before 07/2008	0.0060	0.0051	0.0042	0.0037
	(0.0019)	(0.0015)	(0.0015)	(0.0013)
No. of municipalities	237	237	237	237
No. of observations	4302	4302	4302	4302

The unit of observation is the municipality-month. Columns (1) and (2) present results for conflict with the MILF, columns (3) and (4) present results for conflict with the NPA. In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in the municipality in a given month. Columns (2) and (4) present linear probability models of the probability that a municipality experienced at least one casualty in a given month. The variable *Trend* denotes the number of months before/after July 2008. Standard errors, clustered at the municipality level, are in parenthesis. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Table 3: The Supreme Court Ruling of 08/2008 and Conflict: Diff-in-Diff Estimates

	Conflict with MILF		Conflict with NPA	
	Violent Inc.	Any cas.	Violent Inc.	Any cas.
	(1)	(2)	(3)	(4)
Muslim prov. × after 07/2008	2.69**	1.39***	0.33**	0.27**
	(1.11)	(0.47)	(0.14)	(0.12)
Muslim province	–0.58*	–0.20*	–0.42***	–0.36***
	(0.30)	(0.11)	(0.09)	(0.08)
After 07/2008	–0.00	–0.00	–0.13	–0.09
	(0.00)	(0.00)	(0.10)	(0.07)
No. of provinces	79	79	79	79
No. of observations	1422	1422	1422	1422

The unit of observation is the province-month. Columns (1) and (2) present results based on conflict incidents involving the Armed Forces of the Philippines (AFP) and the Moro-Islamic Liberation Front (MILF). Columns (3) and (4) present results based on conflict incidents between the AFP and the New People's Army (NPA). In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in a province in a given month. In columns (2) and (4) it is the number of municipalities in a province that experienced at least one casualty in a given month. All specifications include province-specific linear time trends. Standard errors, clustered at the province level, are in parenthesis. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Table 4: The Role of Internally Displaced Persons

	Conflict with MILF		Conflict with NPA	
	Violent Inc.	Any cas.	Violent Inc.	Any cas.
	(1)	(2)	(3)	(4)
IDPs per capita × after 07/2008	33.09***	13.77***	–0.21	–0.11
	(3.44)	(0.92)	(0.64)	(0.59)
Muslim prov. × after 07/2008	–0.23	0.18	0.34*	0.28*
	(0.32)	(0.17)	(0.17)	(0.15)
IDPs per capita	–8.45***	–2.47***	–0.10	–0.09
	(0.61)	(0.65)	(0.21)	(0.21)
Muslim province	0.17	0.01	–0.41***	–0.35***
	(0.14)	(0.10)	(0.10)	(0.08)
After 07/2008	–0.01	–0.01	–0.13	–0.09
	(0.01)	(0.01)	(0.10)	(0.07)
No. of provinces	79	79	79	79
No. of observations	1422	1422	1422	1422

The unit of observation is the municipality-month. Columns (1) and(2) present results based on conflict incidents involving the Armed Forces of the Philippines (AFP) and the Moro-Islamic Liberation Front (MILF). Columns (3) and (4) present results based on conflict incidents between the AFP and the New People's Army (NPA). In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in a province in a given month. In columns (2) and (4) it is the number of municipalities in the province that experienced at least one casualty in a given month. All specifications include province-specific linear time trends. Standard errors, clustered at the province level, are in parenthesis. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Table 5: The Role of Municipality-Level Muslim Population

	Conflict with MILF		Conflict with NPA	
	Violent Inc.	Any cas.	Violent Inc.	Any cas.
	(1)	(2)	(3)	(4)
Municipality Muslim pop. × after 07/2008	0.117*	0.060**	–0.016**	–0.016**
	(0.064)	(0.026)	(0.008)	(0.008)
Municipality Muslim population fraction	–0.021	–0.009	–0.001	–0.000
	(0.015)	(0.008)	(0.004)	(0.004)
After 07/2008	0.081***	0.042***	0.017**	0.017**
	(0.030)	(0.015)	(0.007)	(0.007)
No. of municipalities	239	239	239	239
No. of observations	4302	4302	4302	4302

Results are based on the sample of all municipalities in Muslim provinces. The unit of observation is the municipality-month. Columns (1) and (2) present results based on conflict incidents involving the Armed Forces of the Philippines (AFP) and the Moro-Islamic Liberation Front (MILF). Columns (3) and (4) present results based on conflict incidents between the AFP and the New People's Army (NPA). In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in a municipality in a given month. Columns (2) and (4) present linear probability models of the probability that a municipality experienced at least one casualty in a given month. All specifications include province-specific linear time trends. Standard errors, clustered at the municipality level, are in parenthesis. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

5 Appendix

5.1 Allowing for Spatial Correlation in Errors

The regression tables in the main body of the paper report clustered standard errors that allow for serial correlation of the error term within municipality (for the RD estimates) or within province (for the diff-in-diff estimates). However, since unobserved shocks to conflict are often correlated across space, it is possible that the errors are also spatially correlated. As a robustness test, we calculated the standard errors developed by Conley (2008), which allow for spatial as well as serial autocorrelation. These standard errors were perviously used by Hsiang (2010). To calculate them, one must choose two parameters. The first is a cutoff for the serial correlation kernel, which determines the lag length at which serial correlation is assumed to vanish. For this, we choose 18 months, which is the length of our period of observation, so that we allow for serial correlation across the entire time-period. The second parameter is a cutoff for the spatial correlation kernel, which determines the distance at which spatial correlation is assumed to vanish. We calculate three sets of standard errors for spatial cutoffs of 100km, 500km and 1000km.

The results are reported in Tables 6 and 7. They show that all estimates are still statistically significant at the 1% level when using Conley's standard errors. This is true for all three spatial cutoffs. In fact, the standard errors tend to become smaller as we increase the spatial cutoff, which suggests that the clustered standard errors reported in the main body of the paper are not biased downward by ignoring spatial correlation.

Table 6: Robustness to Spatial Correlation in Errors: RD Estimates

	Conflict with MILF		Conflict with NPA	
	Violent Inc.	Any cas.	Violent Inc.	Any cas.
RD estimate	(1)	(2)	(3)	(4)
Spatial correlation cutoff: 100km	0.1348***	0.0699***	0.0098**	0.0093**
	(0.0406)	(0.0240)	(0.0043)	(0.0041)
Spatial correlation cutoff: 500km	0.1348***	0.0699***	0.0098**	0.0093**
	(0.0353)	(0.0201)	(0.0033)	(0.0031)
Spatial correlation cutoff: 1000km	0.1348***	0.0699***	0.0098**	0.0093**
	(0.0325)	(0.0188)	(0.0033)	(0.0030)
Mean before 07/2008	0.0060	0.0051	0.0042	0.0037
	(0.0019)	(0.0015)	(0.0015)	(0.0013)
No. of municipalities	237	237	237	237
No. of observations	4302	4302	4302	4302

The unit of observation is the municipality-month. Columns (1) and (2) present results for conflict with the MILF, columns (3) and (4) present results for conflict with the NPA. In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in the municipality in a given month. Columns (2) and (4) present linear probability models of the probability that a municipality experienced at least one casualty in a given month. The variable *Trend* denotes the number of months before/after July 2008. Standard errors in parenthesis, calculated following Conley (2008), with a serial correlation cutoff of 18 months and spatial correlation cutoffs of 100km, 500km and 1000km, respectively. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels.

Table 7: Robustness to Spatial Correlation in Errors: Diff-in-Diff Estimates

	Conflict with MILF		Conflict with NPA	
	Violent Inc.	Any cas.	Violent Inc.	Any cas.
Diff-in-Diff estimate	(1)	(2)	(3)	(4)
Spatial correlation cutoff: 100km	2.69**	1.39***	0.33**	0.27**
	(0.71)	(0.39)	(0.10)	(0.088)
Spatial correlation cutoff: 500km	2.69**	1.39***	0.33**	0.27**
	(0.90)	(0.48)	(0.86)	(0.065)
Spatial correlation cutoff: 1000km	2.69**	1.39***	0.33**	0.27**
	(0.85)	(0.46)	(0.083)	(0.063)
No. of provinces	79	79	79	79
No. of observations	1422	1422	1422	1422

The unit of observation is the province-month. Columns (1) and (2) present results based on conflict incidents involving the Armed Forces of the Philippines (AFP) and the Moro-Islamic Liberation Front (MILF). Columns (3) and (4) present results based on conflict incidents between the AFP and the New People's Army (NPA). In columns (1) and (3) the dependent variable is the number of incidents with at least one casualty that occurred in a province in a given month. In columns (2) and (4) it is the number of municipalities in a province that experienced at least one casualty in a given month. All specifications include province-specific linear time trends. Standard errors in parenthesis, calculated following Conley (2008), with a serial correlation cutoff of 18 months and spatial correlation cutoffs of 100km, 500km and 1000km, respectively. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels.