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Abstract

We conduct an empirical analysis of the geographic, economic, and social factors that contributed to the spread of civil war in Nepal over the period 1996–2006. This within-country analysis complements existing cross-country studies on the same subject. Using a detailed dataset to track civil war casualties across space and over time, several patterns are documented. Conflict-related deaths are significantly higher in poorer districts and in geographical locations that favor insurgents, such as mountains and forests; a 10 percentage point increase in poverty is associated with 25–27 additional conflict-related deaths. This result is similar to that documented in cross-country studies. In addition, the relationship with poverty and geography is similar for deaths caused by the insurgents and deaths caused by the state. Furthermore, poorer districts are likely to be drawn into the insurgency earlier, consistent with the theory that a lower cost of recruiting rebels is an important factor in starting conflict. On the other hand, geographic factors are not significantly associated with such onset, suggesting that they instead contribute to the intensity of violence only after conflict has started. Finally, in contrast to some cross-country analyses, ethnic and caste polarization, land inequality, and political participation are not significantly associated with violence.

Keywords

conflict, geography, insurgency, Nepal, poverty

Introduction

More than 70 civil wars have occurred around the world since 1945, claiming approximately 20 million deaths and displacing more than 67 million people (Collier & Sambanis, 2005). Understanding the causative factors of civil war has been the subject of growing attention by academics and policymakers alike. While most empirical studies based on cross-country analyses find that poorer countries are at greater risk of experiencing civil war (Collier & Hoeffler, 2004; Fearon & Laitin, 2003; Miguel, Satyanath & Sergenti, 2004), there is considerable disagreement regarding the interpretation of this observed relationship and the role of other factors such as geography, societal divisions, democracy, and prior experience of civil war. Blattman & Miguel (2009) provide a comprehensive review of the theoretical and empirical literature on civil war.

In this article, we conduct a within-country empirical analysis of Nepal's civil war, which lasted from 1996 to 2006. This study contributes to the growing literature on civil conflict in at least three ways. First, within-country empirical analyses of civil war are relatively rare and give an opportunity to test whether the theoretical mechanisms commonly invoked in the cross-country literature are also at work when looking within a country.[1] Cross-country studies have the caveat that conflict in one country might have very different causes and characteristics from conflict in another, and the data on conflict and other variables may not be comparable (Sambanis, 2001, 2004). On the other hand, most within-country studies of conflict have focused on local violence and used subjective interviews to assess the extent of conflict (Barron, Kaiser & Pradhan, 2004; Deininger, 2003). Such settings differ from organized conflicts like insurgencies or civil wars and hence cannot be directly related to the cross-country literature. Our study of Nepal, a country which had not experienced civil war before, is a useful way to investigate whether the risk factors of civil war identified in the cross-country literature can explain the variation in the intensity of civil war within a country. Second, we construct finer measures of conflict intensity based on the actual number of casualties, rather than just using a

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[1] Kalyvas & Kocher (2009) is a notable exception. Collier & Sambanis (2005) provide rich and detailed qualitative case studies on specific countries and regions.

dummy variable for whether an area experiences conflict or not. We are also able to determine whether deaths caused by rebels and by government forces follow similar patterns. Third, we study the evolution of the conflict over time and examine whether the documented relationships between poverty, geography, and violence are driven by involvement in the civil war at an earlier date, or by a greater intensity of conflict, once it has started.

The so-called 'People's War' in Nepal took place between 1996 and 2006 and claimed more than 13,000 lives. The conflict started in 1996, when members of the Communist Party of Nepal-Maoist (CPN-Maoist) attacked a police post in Rolpa district, Western Nepal. Over the subsequent decade, the Maoist insurgents targeted government officials, police officers, army depots, and banks and succeeded in controlling large areas of the country. The main objectives of the insurgents were to abolish the monarchy, establish a people's republic and elect a constituent assembly to draft a new constitution for the country. In 2006, a Comprehensive Peace Agreement was signed between the Maoists and the main political parties in Nepal. Former insurgent leader Prachanda became Nepal's Prime Minister after the CPN-Maoist party won the constituent assembly elections held in 2008.

We conduct a systematic empirical analysis of the determinants of violence by considering a range of geographic, economic and social variables that are hypothesized to affect the likelihood and intensity of conflict. We combine district-level data on conflict-related deaths compiled by the Informal Service Center (INSEC) with socio-economic information obtained from household surveys and other official sources. We use this dataset to assess the empirical relevance of mechanisms commonly invoked in the cross-country literature.

We find two main determinants of the intensity of conflict: geography and poverty. The presence of mountains and forests explains a quarter of the cross-district variation in conflict intensity; these are precisely the kind of geographic features that enable insurgents to hide easily from government forces, and hence reduce the costs of conducting an insurgency. Over and above the effect of geography, the lack of economic opportunities (measured by either higher poverty or lower literacy rates) is significantly and robustly correlated with a higher intensity of violence; a 10 percentage point increase in poverty is associated with 25–27 additional conflict-related deaths. This suggests that the 'opportunity cost' of conflict is lower in poorer areas, in that rebels are able to recruit people to fight for them at a lower cost (Collier & Hoeffler, 1998).

On the other hand, there could be different mechanisms to link poverty with conflict. For instance, poorer people might harbor a greater degree of 'grievance' against the government and therefore be more likely to join the anti-government insurgents. As a partial way to address this, we look at other potential determinants of grievances, such as the presence of greater numbers of people from the disadvantaged sections of Nepalese society, who might harbor resentments stemming from discrimination. However, these measures, as well as other potential determinants of conflict such as ethnic and caste polarization, land inequality, and political participation, are not found to affect violence, once we have controlled for economic backwardness. This negative result contrasts with some of the cross-country literature which finds a strong relationship between social diversity and the likelihood of civil war (Montalvo & Reynal-Querol, 2005).[2]

Finally, when looking at the evolution of conflict over time, we find suggestive evidence that the observed association between conflict and poverty is driven by poorer districts being involved at an earlier stage in the civil war. Geographic conditions, in contrast, appear to affect the intensity of the conflict once it has started, rather than how quickly an area is drawn into civil war.

The article is structured as follows: we first provide a brief description of the 'People's War' in Nepal. We then summarize the relevant theoretical literature, discuss the hypotheses we take to the data, and describe our data and empirical strategy. Finally, we summarize our findings and conclusions.

The 'People's War' in Nepal (1996–2006)

Nepal is a land-locked country located between India and China with a population of 28 million and per capita income of $340 in 2007. As of 2004, 31 percent of the population lived under the poverty line. Agriculture is the major driver of the economy, contributing 34 percent of GDP in 2007 and employing two-thirds of the workforce. A large number of Nepalis have migrated to other countries in search of economic opportunities, and remittances constituted 12 percent of GDP in 2004. Nepal was ruled by a monarchy till 1990, when widespread protests led to the curtailment of the king's powers and the establishment of a multiparty democracy. The first parliamentary elections were held in 1991, and two further general elections were conducted in 1994 and 1999. The fledgling democracy faced considerable political instability: in the first 12 years of democratization, there were as many as 12 governments.

The Maoist insurgency officially started on 13 February 1996 with an attack on a police post in Rolpa, a district in Western Nepal, by members of the Communist Party of Nepal-Maoist (CPN-Maoist). The CPN-Maoist had participated in the first democratic elections in 1991 but had decided to follow a different path to their goal by 1994. The chief objectives of the Maoists were to establish a people's republic and set up a constituent assembly to draft a new constitution. In particular, this would mean curtailing some or all of the

[2] The link between diversity, broadly defined, and conflict is explored theoretically by Esteban & Ray (1994), who introduced the concept and measurement of 'polarization' that can be applied to either income or ethnicity. Other empirical studies, such as Easterly & Levine (1997) and Horowitz (1985), also document the positive relationship between ethnic and social diversity and the likelihood of experiencing conflict.

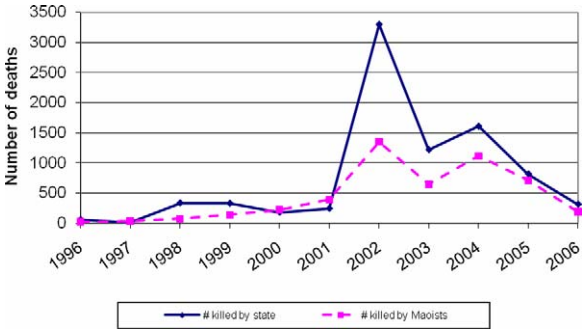

Figure 1. Conflict deaths 1996–2006

existing powers of the monarchy. The genesis of the insurgency in the districts of Rolpa and Rukum has been attributed to several factors, including the poverty and general underdevelopment of the area, grievances against the government for banning the cultivation of hashish in the 1970s and the crackdown on CPN-Maoist activists during 1994, and a longstanding presence of Communist activists in the area (Gersony, 2003).

In the first few years of the insurgency, the response from the government was to use the existing law and order framework to address the problem; more than 1,000 people were reported to have been arrested by the government in 1999 (INSEC, 1999). The political situation changed dramatically in 2001, after a somewhat mysterious incident in which Crown Prince Dipendra allegedly killed himself, his father King Birendra, and most members of his immediate family. King Gyanendra, King Birendra's brother, subsequently succeeded to the throne; he was inclined to take a more aggressive view towards the Maoists. When the Maoists unilaterally broke the 2001 ceasefire in November, Prime Minister Deuba imposed a state of emergency, declared the Maoists to be a terrorist group, and mobilized the Royal Nepal Army to counter the insurgency. The intensity of the conflict subsequently escalated sharply, with more than 3,000 people being killed by the state forces in the next year (see Figure 1).

Another ceasefire agreement with the Maoists was reached in January 2003, but the negotiations failed and violent conflict resumed in the latter half of 2003. By this time, the Maoists were in effective control of several districts in western and eastern Nepal. They had also been gradually increasing their activities in urban areas, calling several bandhs (general strikes) in Kathmandu; the number of deaths in urban areas also began to increase. In February 2005, in the face of growing attacks by Maoist activists, King Gyanendra dismissed the Prime Minister, placed major political figures under arrest, and seized power. This move and the subsequent curtailment of civil liberties in Nepal were sharply criticized by several nations, including the United States and India. In September 2005, with most rural parts of the country under their control, the Maoists declared a unilateral ceasefire and began talks with seven major political parties to present a common front against the monarchy. In the face of these growing pressures and citizen protests in the capital, King Gyanendra gave up power in April 2006.

In November 2006, Prime Minister Koirala signed a peace agreement with the Maoists, which stipulated the participation of the CPN-Maoist party in government and the monitoring of weapons by the United Nations Mission in Nepal. The monarchy was officially abolished in 2007, and elections to a constituent assembly were held in April 2008, fulfilling the two major demands of the Maoist movement. The CPN-Maoist won the majority of seats and former rebel leader Pushpa Kamal Dahal ('Prachanda') was sworn in as the first Prime Minister of the Federal Democratic Republic of Nepal.

More than 13,000 people lost their lives as a direct consequence of the decade-long civil war. There was considerable variation in the intensity of conflict across Nepal: nearly 5,000 people were killed in the Western Region, while casualties were much lower, around 1600, in the Far Western Region. Our objective is to understand the factors that explain such spatial heterogeneity.

Theoretical and empirical literature on conflict

One of the most robust empirical facts in the cross-country literature on conflict is that poorer countries are at a higher risk of experiencing civil war. The relationship between poverty and conflict incidence has therefore received both theoretical and empirical attention. Collier & Hoeffler (1998) emphasized the 'opportunity cost' view, according to which civil wars or insurgencies will be concentrated in areas where the cost of recruiting rebel forces is low, that is, in poorer areas, where people can be induced to join the rebel movement by paying lower wages. However, Fearon (2008) argues that in areas with low opportunity cost of conflict, the benefits of military control are also lower, since fewer resources are up for grabs. Theoretically, the association between poverty and conflict is therefore ambiguous. Empirically, Collier & Hoeffler (1998) nevertheless find a strong correlation between per capita GDP and civil war incidence, a result echoed in other studies such as those of Fearon & Laitin (2003). The corollary of this hypothesis is that civil wars are much more likely to start when there is a rise in poverty, as formalized by the model of Chassang & Padró-i-Miquel (2009). This has found strong empirical support in the cross-country work of Miguel, Satyanath & Sergenti (2004), who find that poor rainfall is much more likely to be followed by an outbreak of civil war.

In our empirical work, we capture this idea by including poverty as one of our key explanatory variables. Poverty is measured as the head count ratio, which is the proportion of people in the district with consumption levels below the government-specified poverty line. As a robustness check, we also use literacy rates to proxy for potential future earnings. Again, the idea is that lower levels of literacy mean lower prospects of high earnings and hence a lower opportunity cost of joining rebel forces. Some qualitative accounts of Nepal also attribute the conflict mostly to poverty and underdevelopment

(Thapa & Sijapati, 2004). Bohara, Mitchell & Nepal (2006) surprisingly find no correlation between poverty and conflict, a result probably explained by the fact that their measure of poverty is a relative ranking of the districts, which poorly captures the opportunity cost hypothesis.

The opportunity cost view is not the only way to interpret the observed cross-country relationship between poverty and civil war. Fearon & Laitin (2003) suggest an alternative hypothesis: poor countries are likely to have governments with limited resources and hence a limited capacity to counter an insurgency. This 'weak state' hypothesis is less likely to apply in our within-country framework, where we are comparing conflict intensity across districts of the same country. The strength of the state is therefore a constant in our setting. We test indirectly for relative weakness of the state across districts of Nepal by including the distance from Kathmandu as an additional regressor, on the assumption that the state is likely to be less prominent or capable in far-flung areas.

Yet another interpretation of the observed relationship with poverty is the 'grievance' hypothesis, whereby low levels of development lead to grievances against the government and hence a greater willingness to join antigovernment forces (Collier & Hoeffler, 2004). Some studies of Nepal include the role of relative deprivation or landlessness. Deraniyagala (2005) gives a descriptive study without systematic empirical analysis at the district level, while Murshed & Gates (2005) focus on relative deprivation with respect to the richest district Kathmandu. We should note that the measures they use (difference between the district's level of education or income and the level in Kathmandu) is empirically equivalent to including only the district's level of development (as we do), in a linear regression framework.[3] Their estimates are also likely to suffer from multicollinearity, since the authors include schooling, life expectancy, and the Human Development Index in the same regression. Macours (2006) documents the relationship between increasing within-district inequality and the number of abductions by the Maoists; however, the increase in inequality she documents could potentially be affected by the conflict itself, since it is computed using data collected after the conflict began.

There can be other indicators of grievances, such as the ethnic or religious diversity in the population. Diverse populations may harbor a greater level of grievances, especially if the diversity takes the form of one group dominating over the other. On the other hand, diversity, especially in terms of language, can make it harder to organize large enough rebel groups. The net effect of societal divisions on conflict is therefore unclear. The results in the cross-country literature are equally ambiguous, depending upon how social divisions are measured. While Fearon & Laitin (2003) find no effect of social divisions (measured by ethnic fractionalization), Montalvo & Reynal-Querol (2005) find a strong relationship between social divisions and civil war, when social divisions are measured using a polarization index, which is discussed in detail in the work of Duclos, Esteban & Ray (2004). The basic idea is to capture the dimensions of social diversity which are more likely to lead to conflict between groups. At one extreme, a completely homogenous society is likely to have low levels of conflict. At the other extreme, a society composed of a large number of small groups is also likely to have low levels of conflict, since it is very costly for the groups to overcome their differences and band together to fight against any common enemy. The highest level of conflict is therefore likely to take place when there are a small number of fairly large well-organized groups. The polarization measure captures this dimension of social diversity and is actually maximized when society is divided into two equal-size groups.

Nepal has a very diverse society in several dimensions. Although the majority of the population belongs to the Hindu religion, there are deep caste divisions in Nepalese society, and discrimination and human right abuses against the lower castes are not uncommon (Human Rights Watch, 2004).[4] We construct a measure of caste polarization, along the lines proposed by Esteban & Ray (1994); the exact details of the computation are in the Data Appendix. We also use an alternative measure for the dominance of upper castes (Brahmins, Chhetris, Thakuris, and Newars) in the district, which is simply the proportion of these castes in the population. We similarly construct measures of linguistic diversity: a polarization measure using 13 different language groups, and the proportion speaking Nepali, the single most spoken language. We should note that caste polarization is highly correlated with the fraction of people who speak Nepali, since the high castes tend to be Nepali-speaking.

There is no clear consensus on the relationship between ethnic or caste identity and support for the Maoist movement. Some reports and studies have suggested that the Maoists found support from the oppressed lower castes (Bray, Lunde & Murshed, 2003), portraying the insurgency as stemming from 'rage against a long legacy of oppression based on caste and ethnicity' (Sengupta, 2005). However, Gersony (2003) argues, based on interviews, that caste and ethnic divisions are not a major cause of the conflict, while de Sales (2000) presents a nuanced picture of the two-way relationship between the Maoist movement and ethnic identity formation and politicization. We see our nation-wide empirical approach as a

[3] We have the regression equation for district i: $Conflict_i = a + b_1X_{1i} + b_2X_{2i} + \ldots + b_mX_{mi} + e_i$, where the Xs represent different variables (poverty rates, proportion of advantaged castes, etc.), a is a constant term, and $e_i$is a stochastic error term. This is mathematically equivalent to writing $Conflict_i = a^* + b_1(X_{1i} - X_1K) + b_2(X_{2i} - X_2K) + \ldots + b_{\mathrm{m}}(X_{\mathrm{mi}} - X_{\mathrm{m}}K) + e_i$, where the XK variables represent the values for Kathmandu. If we ran the second regression, we would get the same coefficients as in the first regression, except for a different constant term.

[4] Murshed & Gates (2005) document the differences in income across various caste categories but do not investigate the impact of these social divisions on conflict intensity.

complement to such in-depth case studies of specific regions and communities.

Finally, we consider the role of geography and infrastructure in explaining the incidence of conflict. Since insurgents are usually numerically weak compared with the governments they are fighting against, they must be able to hide from government forces and garner social support for their activities. This suggests that the presence of mountainous or forested terrain, poorly served by roads, should increase insurgency. The cross-country literature finds a strong role for geographic variables (Fearon & Laitin, 2003). In our empirical work, we use the altitude (elevation) of the district to indicate the presence of hilly territory, as well as the proportion of district area that is forested. We proxy transportation infrastructure development with the total length of the road network, normalized by the area of the district. These variables capture the ability of the government to control insurgencies, rather than the ease with which insurgents can start organizing a rebel force.

The cross-country literature has also examined the role of several other factors, such as whether the country is a democracy or not, whether the country has oil or other exportable natural resources, the presence of a substantial diaspora who might provide resources and funding to rebels, and the time elapsed since the last civil war. Variables such as democracy and the presence of a foreign diaspora are country-level characteristics, and their effects cannot be captured in a within-country comparison. Nepal has no significant exportable natural resources and did not have a civil war before the 'People's War' began in 1996. These factors, which might be important in other settings, are thus excluded from our analysis.

Data sources and empirical strategy

Measuring conflict intensity

Our measures of conflict intensity are based on data provided in the annual Human Rights Yearbooks published by the Informal Sector Service Centre (INSEC), a Nepalese non-governmental organization. INSEC was able to provide us with data on the number of people killed both by the Maoists and by the state in this conflict. Our main measure is the number of conflict-related deaths in the district normalized by the 1991 district population computed from the census.[5]

The benefits of such data are twofold. First, the scale of data coverage allows us to look at the conflict throughout the country, instead of focusing on specific areas, hence permitting a quantitative analysis. Second, INSEC data are an improvement to self-assessed conflict intensity that is elicited in survey context (see a discussion on the measurement of conflict intensity in Do & Iyer, 2011), as they are less subject to recall biases. Murshed & Gates (2005) also use data from the same source (until 2002), but measure intensity of conflict by the number of deaths. We feel that the number of deaths has to take into account the scale of the district: 100 conflict-related deaths in a district with a population of 10,000 obviously reflects a much greater intensity of conflict than the same number of deaths in a district with 100,000 people (this is the actual range of population variation across the districts of Nepal in 2001). To analyze the onset of the insurgency, we will also define a binary variable that takes value 1 if more than 100 people have been killed as a consequence of the conflict. This approach is similar to the binary variables for the onset of civil war used in cross-country studies such as Fearon and Laitin (2003) and Miguel, Satyanath & Sergenti (2004).[6]

Multiple regression analysis

We investigate the proximate correlates of the Maoist conflict in Nepal by running regressions of the following form:

$$Conflict_i = a + b_1X_{1i} + b_2X_{2i} + \ldots b_mX_{mi} + e_i \quad (1)$$

where $Conflict_i$ is a measure of the intensity of conflict in district i, a is a constant term, and X_is are a set of pre-conflict district-level characteristics including geography, economic development, and social divisions, described in detail previously.[7] Details on data sources are in the Data Appendix.

Such a multiple regression allows us to assess the impact of multiple factors on the outcome variable (conflict) simultaneously. For instance, we do see a positive association between conflict intensity and poverty (Figure 2), but this relationship could well be driven by adverse geography (such as mountainous terrain), which can simultaneously increase poverty and provide a staging ground for insurgency. Multiple regression analysis allows us to estimate the association with poverty, after controlling for the impact of other factors. The interpretation is that, all other factors being equal, a unit increase in the poverty measure (X_1) will increase conflict intensity by b_1 units.[8]

These associations between conflict intensity and district characteristics may not be causal relationships for at least two reasons. If there are other unmeasured factors which determine both pre-conflict district characteristics and the later spread of the conflict, observed correlations would be spurious. As a partial control for potential confounders, we have run additional regressions with a range of district characteristics and our main results are robust to the inclusion of many additional variables.

[5] We use the 1991 census data, since the 2001 population figures might be affected by conflict-induced migration.

[6] We should note that there can be other indicators of conflict, such as injuries, forced conscription, abductions, forced migrations, protest marches, disruptions to economic activity caused by strikes, and so on. In this sense, we have chosen to focus on the indicators of the most extreme forms of conflict which result in deaths of citizens.

[7] A district can be thought of as being comparable to a county in the USA, in the sense that it is administratively below the region level. Nepal is divided into 75 districts, grouped into 5 development regions. The average area of a district was 1,948 square kilometers in 2001, and the average population was 309,000.

[8] A rigorous treatment of multiple regression methods can be found in Wooldridge (2003).

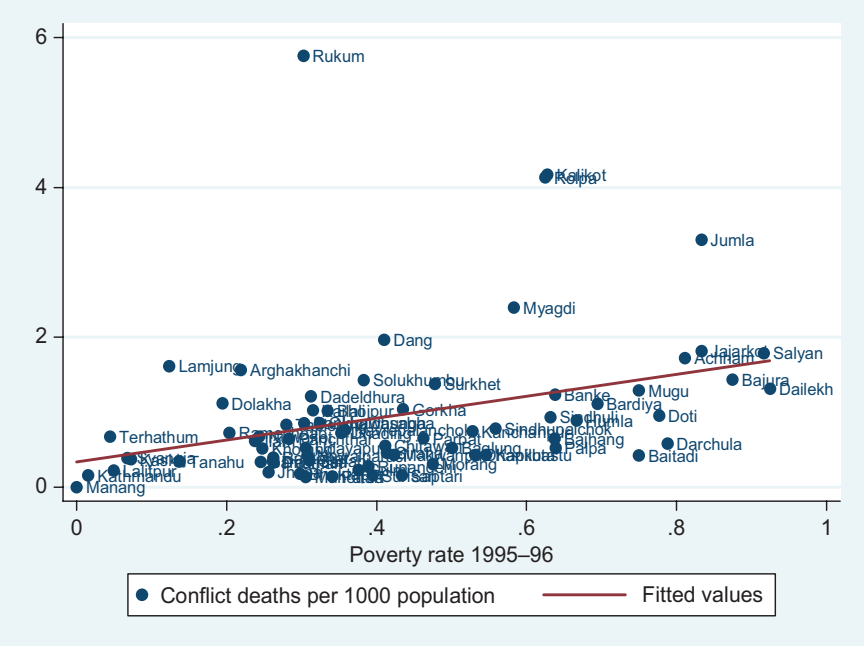

Figure 2. Conflict deaths and poverty

Secondly, our estimates may also not be causal if districts that have experienced high conflict intensity are also districts that have been the theater of social unrest in the past. Past conflicts could then directly affect pre-insurgency levels of economic development. However, the fact that this type and intensity of conflict was unprecedented in Nepal's history gives us confidence that such a channel of influence is unlikely.

Table I summarizes the variables used in our analysis. We note a large variation across districts both in the measures of conflict intensity and in the potential explanatory variables. More than two-thirds of all districts have experienced 100 or more conflict-related deaths during the 1996–2006 period, and nearly half have experienced more than 150 deaths. 42% of the population was below the poverty line in Nepal at the time the conflict began, and the literacy rate varied from an extremely low 20% in Kalikot district to 70% in Kathmandu.

Empirical analysis of the determinants of violent conflict

Geography and poverty are significant predictors of conflict intensity

We find that conflict is significantly higher in poorer areas, and in geographical locations that favor insurgents, such as mountains and forests. Table II summarizes the results from running specification (1) with an array of district characteristics. Geographical factors such as elevation and the presence of forests explain 25% of the variation in the intensity of conflict across districts (Column 1), and the pre-conflict poverty level of the district is a significant predictor of the intensity of conflict as well (Column 2).

This relationship is robust to the inclusion of measures of social divisions such as the proportion of advantaged castes (Column 3) or an index of caste polarization (Column 4). The coefficient on poverty is always significant and fairly stable across specifications. To have an idea of the magnitude of these results, we note that a 10 percentage point increase in the district poverty rate is associated with an increase of 25–27 conflict-related deaths.[9] Another way to gauge the magnitude is as follows: a one standard-deviation increase in poverty rate (23 percentage points) is associated with 57–63 additional conflict-related deaths (0.23–0.26 standard deviations). We also ran these regressions for state-caused deaths and Maoist-caused deaths separately. Columns 5 and 6 suggest that while overall casualty numbers increase with poverty, it is so on both sides of the battlefield.[10] We should note that these

[9] For instance, using the estimates in Column 2, a 10 percentage point increase in poverty results in an additional 0.1106 deaths per 1,000 population; average population of a district in 1991 was 246,548. Multiplying the two yields the figure of 27 additional deaths. Our results are robust to using other measures of poverty, such as the poverty gap and poverty severity, as well as to using average per capita consumption expenditure in the district (results available upon request).

[10] While the coefficient on poverty for state-caused deaths is twice as large as the coefficient for Maoist-caused deaths on an absolute basis, we should note that the number of state-caused deaths per 1,000 is also almost twice the extent of Maoist-caused deaths. Hence, the coefficient is not much larger on a proportional basis. To put it more precisely, a 10 percentage point increase in the poverty rate would increase state-caused deaths by 10% and Maoist-caused deaths by 11%. On a standard deviation basis, a one standard deviation increase in the poverty rate would increase state-caused deaths by 0.24 standard deviations and Maoist-caused deaths by 0.26 standard deviations.

Table I. Summary statistics

	Observations	*Mean*	*S.D.*	*Minimum*	*Maximum*
Measures of conflict intensity					
Conflict-related deaths per 1,000 district population	75	0.96	0.99	0	5.76
Deaths caused by state per 1,000 population	75	0.63	0.74	0	4.67
Deaths caused by Maoists per 1,000 population	75	0.33	0.29	0	1.40
Dummy for more than 100 killed	75	0.71	0.46	0	1
Dummy for more than 150 killed	75	0.45	0.50	0	1
Geography					
Maximum elevation ('000 meters)	75	4.08	2.71	0.19	8.85
Proportion of forested area	75	0.39	0.19	0.04	0.98
Development					
Poverty rate (proportion below poverty line)	72	0.42	0.23	0.00	0.92
Infant mortality rate (deaths per 1,000 births)	75	93.85	32.00	32.00	201.00
Literacy 1991 (%)	75	38.03	11.02	19.60	70.10
Road length per sq km (1990)	75	0.09	0.18	0.00	1.11
Caste and language diversity					
Caste polarization	75	0.53	0.14	0.24	0.78
Proportion of advantaged castes	75	0.41	0.22	0.04	0.85
Linguistic polarization	75	0.59	0.28	0.03	0.93

All summary statistics are for district-level data.
See Data Appendix for sources and descriptions of all variables.

specifications exclude the district of Rukum, one of the places where the conflict started, because it is likely an outlier in the relationship between poverty and conflict (see Figure 2 and discussion below).

The relationship between conflict and poverty is also clear from the maps in Figure 4. Figure 4A shows the relative conflict intensity across the districts of Nepal, and Figure 4B shows the incidence of poverty. Comparing the two, we see that places that have very high poverty also tend to have high levels of conflict.

Robustness of the relationship between conflict and poverty

Re-running these regressions with literacy rates instead of poverty (a measure of current as well as future earnings potential) yields results confirming that economic backwardness is associated with higher levels of conflict (Column 7); areas with higher literacy rates are less prone to conflict. Replacing poverty by a measure of infrastructure (road length per square kilometer) also yields a similar result; the presence of roads is associated with lower conflict (Column 8). In addition, elevation becomes insignificant when we include the road length variable, suggesting that part of the correlation with elevation arises because of the difficulty of building roads in hilly areas and hence a greater ability of insurgents to escape from government forces. In all these specifications, measures of social divisions based on caste are not significant predictors of conflict intensity.

Appendix Table I runs further robustness tests of the relationship between economic backwardness and conflict. The association between conflict and measures of economic development remains robust when we use alternative measures of economic development such as infant mortality (Column 1), or alternative proxies for social diversity such as linguistic polarization (Column 2) or the proportion speaking Nepali (results not shown). The coefficient on poverty is smaller in magnitude and insignificant when we include Rukum in our regressions (Column 3), but Figure 2 suggests that this is particularly driven by Rukum being an outlier in the relationship between poverty and conflict intensity. Other potential outliers (Rolpa and Kalikot) are not as influential; our results remain very similar when we exclude these districts (Columns 4 and 5).

We account for the potential spatial correlations of conflict and poverty by clustering the standard errors at the region level (Column 6), adding region fixed-effects (Column 7), and correcting the standard errors for spatial correlation (Column 8). The results still show a robust statistical association between poverty and our adopted measure of conflict intensity, although fixed-effect estimations suggest a weaker link within regions than between them.

We conclude that geography and poverty are robust predictors of conflict violence in Nepal. Other potential determinants suggested in the cross-country literature or proposed by other scholars of the Maoists' war in Nepal are not found to robustly explain the incidence of civil conflict, once the effects of geography and poverty have been accounted for.

We ran several other specifications to check the robustness of our findings, including variables such as district-level income inequality, distance from Kathmandu, the level of urbanization, and the distance from Rolpa and Rukum. None of these variables are statistically significant predictors of conflict intensity, and the coefficient on poverty changes very little with the addition of these variables. We also replicated the results of other studies on Nepal by adding measures of social

Table II. Ordinary least squares analysis of the determinants of conflict intensity

	Dependent variable: Conflict-related deaths (per thousand district population)							
Independent variables	*(1) Geography*	*(2) Poverty*	*(3) Caste divisions*	*(4) Caste divisions 2*	*(5) Deaths caused by state*	*(6) Deaths caused by Maoists*	*(7) Literacy*	*(8) Roads*
Poverty rate 1995–96		1.106*** (0.354)	1.103*** (0.320)	1.011*** (0.336)	0.772*** (0.237)	0.331*** (0.107)		
Literacy rate 1991							−0.028*** (0.008)	
Road length per sq km								−0.951** (0.438)
Elevation	0.085*** (0.024)	0.067*** (0.020)	0.067*** (0.023)	0.046* (0.025)	0.048** (0.018)	0.019*** (0.007)	0.062** (0.024)	0.042 (0.030)
Proportion of forested area	1.896*** (0.525)	1.591*** (0.502)	1.589*** (0.535)	1.369*** (0.438)	1.087*** (0.364)	0.502*** (0.184)	1.447*** (0.543)	1.409** (0.656)
Proportion of advantaged castes			0.010 (0.406)		0.023 (0.293)	−0.013 (0.130)	0.690 (0.451)	0.795 (0.569)
Caste polarization				0.922 (0.600)				
Observations	74	71	71	71	71	71	74	74
R-squared	0.25	0.37	0.37	0.39	0.37	0.31	0.40	0.29

Robust standard errors in parentheses. *, **, and *** indicate that the coefficients are statistically significant at the 10, 5, and 1 percent level, respectively. Regressions are based on district-level data. Constant not reported. All regressions exclude the district of Rukum.

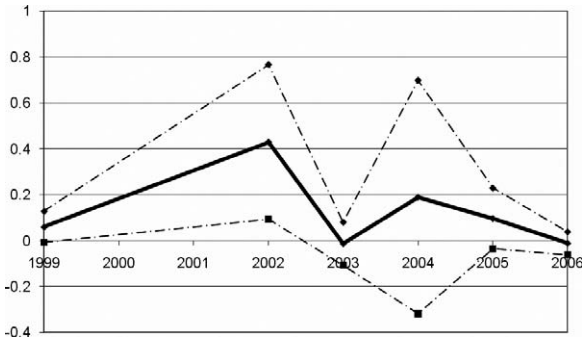

Figure 3. Relationship between poverty and conflict over time (with 95% confidence intervals)

capital and political participation (Bohara, Mitchell & Nepal, 2006) and ultra-left political activity (Acharya, 2007). Our findings show that the associations documented by these authors are not robust to the inclusion of poverty and geography variables (all results available upon request).

Finally, we use binary variables to capture the scale of violence: dummies for whether a district suffered more than 100 or more than 150 conflict-related deaths. We again find that poorer areas are more likely to suffer a higher number of conflict related deaths (Column 10).[11]

Do poorer places experience conflict earlier?

We next investigate what can be driving these results: are poorer districts the scene of more violence, or is it rather the case that poorer districts were first to be affected by the civil conflict and were therefore exposed to violence for a longer period by 2006? Since we have annual data on conflict-related deaths for 1999 and every year from 2002 to 2006, we look at how the relationship between poverty and violence evolved over time. Figure 3 shows the point estimate and 95 percent confidence intervals of the coefficient on poverty when we run for each year the specification of Table II, Column 2. As we can see, the relationship with poverty is strongest in 2002, when the conflict intensified with the deployment of the Royal Nepal Army. In subsequent years, the coefficient on poverty is no longer statistically significant, suggesting that the overall higher level of deaths experienced by poorer areas is primarily due to their being involved in the conflict at an earlier date.

Further evidence for this is provided by estimating a proportional hazards duration model, where the dependent variable ('duration') measures how long the district 'survives' without crossing the threshold of 100 deaths. Since we have annual data only after 2002, all districts that cross the 100-death threshold before 2002 are no longer 'survivors'; that is the reason why these regressions are run only for 52 observations. The interpretation of coefficients from the duration model is as follows: the coefficient on poverty assesses the probability that the district will cross the threshold in any given year, *given that it has not yet crossed that threshold until that year*, that is, it explicitly models the failure to 'survive', conditional on having survived till a given period. This is believed to be an appropriate model of conflict since the longer the survival, the greater the chances for not surviving the next period, because conflict deaths are assessed cumulatively. For details, we refer the reader to the classic work of Cox (1972).

The results from this analysis show that poorer areas are significantly more likely to experience the onset of conflict, contingent on not having experienced the onset in the previous year (Table III). The coefficient in Column 2 can be interpreted as follows: in any given year, a district at the 75th percentile of the poverty distribution (i.e. with a 60% poverty rate) is 1.5 times more likely to attain the 100 deaths threshold than a district at the 25th percentile (i.e. with a 26% poverty rate), conditional on not attaining this threshold in the previous year.[12]

Finally, when using road infrastructure to proxy for the ease of access to remote areas by government forces, no clearcut association is detected. Geographic characteristics also do not seem to predict the onset of conflict, unlike the relationships with overall casualty levels documented in Table II. These two findings strongly suggest that factors that enable insurgents to hide (dense forests, hilly areas with no road access) are more likely to determine the intensity of the conflict once it has started, rather than predict where the conflict is likely to start. We should note that these relationships remain robust when we define onset simply as the date at which the number of casualties crosses 100 (Appendix Table II).[13]

Conclusion

We conducted a within-country empirical analysis of the correlates of conflict intensity in Nepal, analogous to cross-country analyses of civil wars. Our within-country approach

[11] Note that the binary variable indicating whether a district experienced more than 100 deaths does not show significant correlation with poverty, while it does when the threshold is set to 150 deaths instead. This is probably due to the fact that a large majority of districts reached the 100 death cutoff by 2006.

[12] Unconditional linear regressions show that a district at the 75th percentile of poverty will attain this threshold 7–8 months before a district at the 25th percentile.

[13] Since we have annual data only from 2002, districts which crossed the threshold before 2002 are coded as having crossed the threshold in 2002, and districts which had still not attained the 100-death threshold by 2006 are coded as having reached it in 2007 (to avoid dropping them from the analysis). This introduces measurement error in our OLS regression, which is mitigated by the ordered logit specification since it considers only the categories without assigning specific numeric values to them (so the relevant categories are 'before 2002', 'in 2003', 'in 2004', 'in 2005', 'in 2006', and 'after 2006'). In this sense, the ordered logit estimates are better than the OLS estimates. The duration analysis of Table III is the cleanest, since it estimates the effect of poverty on crossing the 100-death threshold, given that the threshold has not been crossed so far.

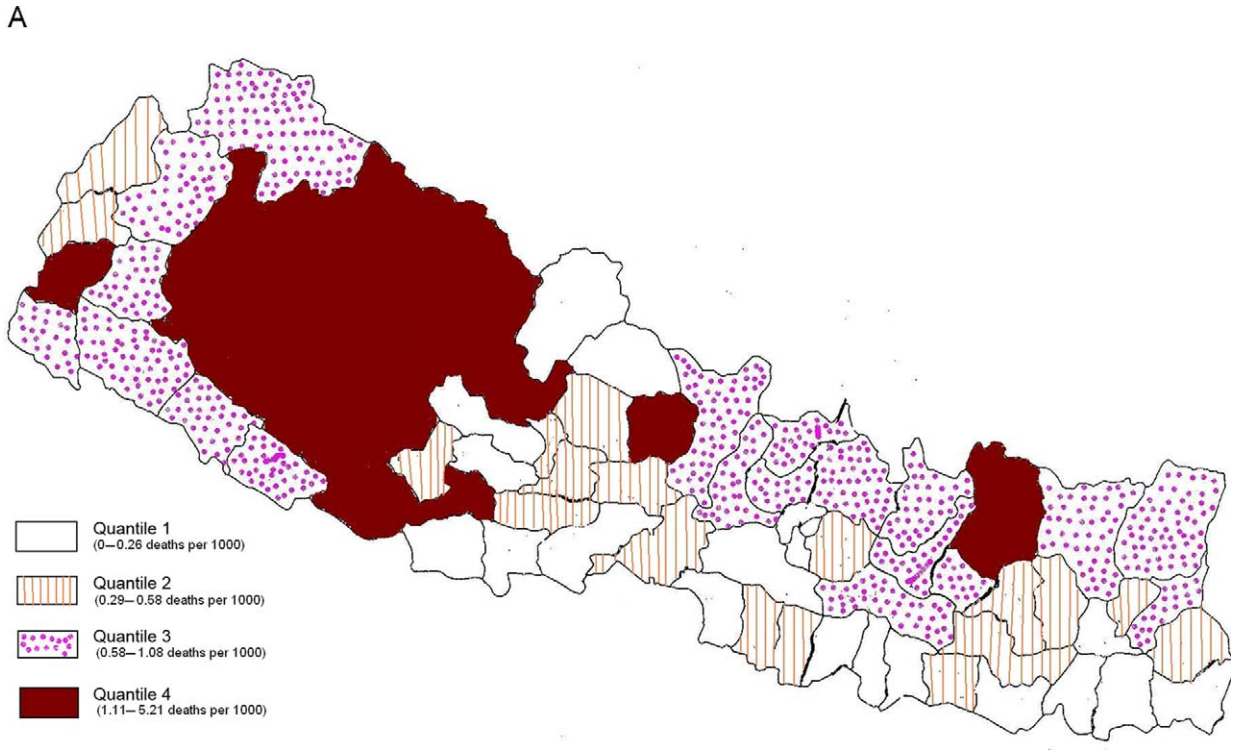

Figure 4A. Nepal: Map of conflict intensity

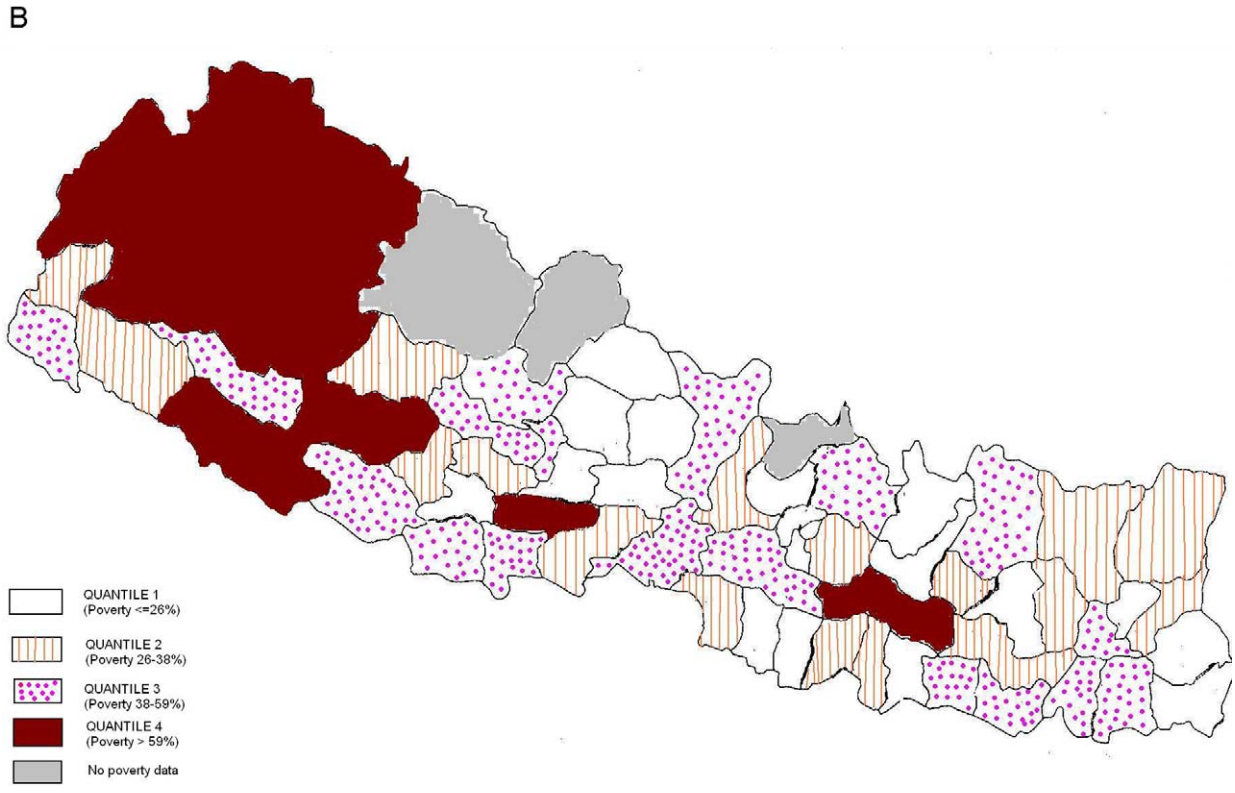

Figure 4B. Map of poverty quantiles

Table III. Cox proportional-hazard analysis of the determinants of conflict outbreak

	Dependent variable: District experienced more than 100 deaths (1:yes,0:no)					
Independent variables	*(1) Geography*	*(2) Poverty*	*(3) Caste divisions*	*(4) Caste divisions 2*	*(5) Literacy*	*(6) Roads*
Poverty rate 1995–96		1.335* (0.706)	1.336* (0.708)	1.636** (0.760)		
Literacy rate 1991					−0.055*** (0.017)	
Road length per sq km						−1.225 (1.121)
Elevation	0.062 (0.058)	0.073 (0.058)	0.074 (0.060)	0.107* (0.062)	0.098 (0.065)	0.039 (0.063)
Proportion of forested area	2.211** (0.962)	1.395 (1.030)	1.414 (1.067)	2.221* (1.161)	1.705 (1.044)	1.768* (1.059)
Proportion of advantaged castes			−0.064 (0.946)		0.546 (0.963)	0.407 (1.042)
Caste polarization				−2.271 (1.569)		
Observations	52	52	52	52	52	52

Robust standard errors in parentheses. *, **, and *** indicate that the coefficients are statistically significant at the 10, 5, and 1 percent level, respectively. Regressions are based on district-level data. Constant not reported. All regressions exclude the district of Rukum.

enables us to examine the occurrence of the same insurgency across different parts of the country and over time. We find that conflict intensity is higher in places with greater poverty and in places where geographical characteristics favor insurgents. Our results support the opportunity cost view of conflict, whereby higher poverty makes recruitment cheaper for insurgents. It is also possible that high levels of poverty lead to a greater level of grievances against the government, and hence more support for insurgent groups.

We find suggestive evidence that the association between poverty and the number of conflict-related casualties is driven by the fact that poorer districts are more likely to be involved earlier in the conflict. In contrast, geography is not likely to predict which places are involved earlier in the conflict but does make conflict more severe after it has started. Other potential factors identified in the cross-country literature, such as social polarization, are not found to affect the levels of violence in the Nepalese civil war, once the effects of poverty and geography have been accounted for. Overall, our results strongly suggest that poverty reduction is likely to have the additional political benefit of making conflict less likely, by increasing the opportunity cost of recruitment and perhaps reducing the level of grievances felt by the local population. This increases the long-term benefits of poverty alleviation programs and provides additional impetus for their implementation.

Replication data

The dataset, codebook, and do-files for the empirical analysis in this article can be found at http://www.prio.no/jpr/datasets.

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Data Appendix

Measures of conflict

Conflict-related deaths: Human Rights Yearbooks and web site of the Informal Sector Service Center (INSEC)

Population: 1991 census

Geography

Elevation, latitude, rainfall: Sharma and Subedy (1994)

Proportion of district under forest area: Japan Forest Technology Association (2001)

Roads: Sharma and Subedy (1994)

Development indicators

Poverty head count ratio (proportion of households below the poverty line): Nepal Living Standards Survey 1995–96 (NLSS-I) conducted by the World Bank

Literacy rate 1991: 1991 census

Infant mortality rates: Sharma and Subedy (1994)

Appendix Table I Robustness checks of the determinants of conflict intensity

	Dependent variable									
	Conflict-related deaths (per thousand district population)								*More than 100 casualties (1:yes,0:no)*	*More than 150 casualties (1:yes,0:no)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
	Additional control variables		*Outliers*			*Spatial correlation*				
	Linguistic diversity	*Infant mortality*	*Rukum included*	*Rukum, Rolpa excluded*	*Rukum, Rolpa, Kalikot excl.*	*S.E clustered at region level*	*Region fixed-effects*	*Correction for spatial correlation*	*Probit*	*Probit*
Poverty rate 1995–96	1.176*** (0.354)		0.728 (0.495)	1.028*** (0.312)	0.928*** (0.302)	1.103* (0.433)	0.503* (0.213)	1.274*** (0.401)	0.405 (0.767)	2.130*** (0.790)
Infant mortality		0.009** (0.003)								
Proportion of advantaged castes		0.077 (0.409)	0.339 (0.521)	0.196 (0.372)	0.029 (0.338)	0.010 (0.382)	0.019 (0.269)	−0.081 (0.376)	−1.281 (0.899)	−2.040** (0.913)
Linguistic polarization	0.116 (0.394)									
Elevation	0.069*** (0.020)	0.051* (0.026)	0.080*** (0.028)	0.063*** (0.023)	0.063*** (0.023)	0.067*** (0.011)	0.070*** (0.011)	0.068*** (0.022)	−0.016 (0.063)	−0.003 (0.066)
Proportion of forested area	1.621*** (0.531)	1.289** (0.566)	2.015*** (0.671)	1.134*** (0.324)	1.084*** (0.310)	1.589** (0.384)	1.085** (0.291)	1.580*** (0.495)	2.961** (1.245)	2.717*** (0.975)
Number of observations	71	74	72	70	69	71	71	71	71	71
R-squared	0.37	0.35	0.31	0.36	0.42	0.49	0.49			

Robust standard errors in parentheses. *, **, and *** indicate that the coefficients are statistically significant at the 10, 5, and 1 percent level, respectively. Regressions are based on district-level data. All regressions exclude the district of Rukum unless specified otherwise. Constant not reported.

Appendix Table 2. Robustness checks for the onset of conflict (dependent variable: year in which number of conflict deaths exceeds 100)

	OLS *(1)*	*Ordered logit* *(2)*	*OLS* *(3)*	*Ordered logit* *(4)*
Poverty rate 1995–96	−1.604* (0.811)	−1.956** (0.967)		
Literacy rate 1991			0.042*** (0.015)	0.058** (0.023)
Elevation	−0.068 (0.072)	−0.047 (0.086)	−0.009 (0.072)	0.000 (0.093)
Proportion of forested area	−4.438*** (1.050)	−6.311*** (1.650)	−4.624*** (0.951)	−6.966*** (1.726)
Proportion of advantaged castes	2.052** (0.909)	2.230* (1.204)	0.836 (0.933)	0.923 (1.329)
Observations	71	71	74	74
R-squared	0.29		0.32	

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Dependent variable coded as 2002 for all those that exceeded 100 deaths before 2002, and as 2007 for those that had not yet reached that threshold by 2006. This is relevant for OLS regressions of Columns 1 and 3, and less for Ordered Logit, which uses only categorical variables.

Caste and language diversity

District level proportions of population in 76 caste categories and 13 language categories: 2001 census. We retained caste (language) categories which make up more than 1% of the district population; castes (languages) that make up less than 1% of the district population are classified as 'other'. The polarization measure is computed as $4 \Sigma s_i^2 (1 - s_i)$, where s_i is the proportion of (caste or linguistic) group i in the population.

References

Acharya, Avidit (2007) The causes of insurgency in Nepal. Working paper.

Barron, Patrick; Kai Kaiser & Menno Pradhan (2004.) Local conflict in Indonesia: Measuring incidence and identifying patterns. Policy research working paper 3384, World Bank.

Blattman, Chris & Edward Miguel (2009) Civil War. NBER working paper 14801.

Bohara, Alok; Neil Mitchell & Mani Nepal (2006.) Opportunity, democracy and the exchange of political violence: A subnational analysis of conflict in Nepal. *Journal of Conflict Resolution* 50(1): 108–128.

Bray, John; Leiv Lunde & S Mansoob Murshed (2003) Nepal: Economic drivers of the Maoist insurgency. In: Karen Ballentine & Jake Sherman (eds) *The political economy of armed conflict: Beyond greed and grievance*. Boulder, CO: Lynne Rienner, 107–132.

Chassang, Sylvain & Gerard Padró-i-Miquel (2009) Economic shocks and civil war. *Quarterly Journal of Political Science* 4(3): 211–228.

Collier, Paul & Anke Hoeffler (1998) On economic causes of civil war. *Oxford Economic Papers* 50(4): 563–573.

Collier, Paul & Anke Hoeffler (2004) Greed and grievance in civil war. *Oxford Economic Papers* 56(4): 563–595.

Collier, Paul & Nicholas Sambanis, eds (2005) *Understanding Civil War: Evidence and Analysis.* Washington, DC: World Bank.

Cox, DR (1972) Regression models and life tables (with discussion). *Journal of the Royal Statistical Society* Series B 34: 187–220.

Deininger, Klaus (2003) Causes and consequences of civil strife: Micro-level evidence from Uganda. *Oxford Economic Papers* 55(4): 579–606.

Deraniyagala, Sonali (2005) The political economy of civil conflict in Nepal. *Oxford Development Studies* 33(1): 47–62.

de Sales, Anne (2000) The Kham Country, Nepal: Between ethnic claims and Maoism. *European Bulletin of Himalayan Research* 19 (http://himalaya.socanth.cam.ac.uk/collections/journals/ebhr/pdf/EBHR_19.pdf).

Do, Quy-Toan & Lakshmi Iyer (2011) Mental health in the aftermath of conflict. Prepared for Michelle Garfinkel and Stergios Skaperdas, eds, *Oxford Handbook of the Economics of Peace and Conflict*, forthcoming.

Duclos, Jean-Yves; Joan Esteban & Debraj Ray (2004) Polarization: Concepts, measurement, estimation. *Econometrica* 72(6): 1737–1772.

Easterly, William & Ross Levine (1997) Africa's growth tragedy: Policies and ethnic divisions. *Quarterly Journal of Economics* 112(4): 1203–1250.

Esteban, Joan-Maria & Debraj Ray (1994) On the measurement of polarization. *Econometrica* 62(4): 819–851.

Fearon, James (2008) Economic development, insurgency, and civil war. In: Elhanan Helpman (ed.) *Institutions and Economic Performance.* Cambridge, MA: Harvard University Press, 292–328.

Fearon, James & David Laitin (2003) Ethnicity, insurgency, and civil war. *American Political Science Review* 97(1): 75–90.

Gersony, Robert (2003) *Sowing the wind: History and dynamics of the Maoist revolt in Nepal's Rapti hills.* Mercy Corps International Report.

Horowitz, Donald (1985) *Ethnic Groups in Conflict.* Berkeley, CA: University of California Press.

Human Rights Watch (2004) Discrimination against Dalits in Nepal (http://hrw.org/english/docs/2004/02/09/nepal7322.htm).

Informal Sector Service Centre (INSEC), various issues. *Human Rights Yearbook.* Kathmandu: INSEC.

Japan Forest Technology Association (2001) Information system development project for the management of tropical forest: Activity report of wide area tropical forest resources survey, Kingdom of Nepal. Technical report.

Kalyvas, Stathis N & Matthew Adam Kocher (2009) The dynamics of violence in the Vietnam War: An analysis of the Hamlet Evaluation System (HES). *Journal of Peace Research* 46(3): 335–355.

Macours, Karen (2006) Relative deprivation and civil conflict in Nepal. Working paper, Johns Hopkins University.

Miguel, Edward; Shanker Satyanath & Ernest Sergenti (2004) Economic shocks and civil conflict: An instrumental variables approach. *Journal of Political Economy* 112(4): 725–753.

Montalvo, Jose G & Marta Reynal-Querol (2005) Ethnic polarization, potential conflict and civil wars. *American Economic Review* 95(3): 796–816.

Murshed, Mansoob S & Scott Gates (2005) Spatial-horizontal inequality and the Maoist insurgency in Nepal. *Review of Development Economics* 9(1): 121–134.

Sambanis, Nicholas (2001) Do ethnic and nonethnic civil wars have the same causes? *Journal of Conflict Resolution* 45(3): 259–282.

Sambanis, Nicholas (2004) What is a civil war? Conceptual and empirical complexities of an operational definition. *Journal of Conflict Resolution* 48(6): 814–858.

Sengupta, Somini (2005) Where Maoists still matter. *New York Times,* 30 October: 30.

Sharma, Hari Bhakta & Tika Ram Subedy, eds (1994) *Nepal District Profile: A Districtwise Socio-techno-economic Profile along with a Comprehensive National Profile of Nepal.* Kathmandu: National Research Associates.

Thapa, Deepak & Bandira Sijapati (2004) *A Kingdom Under Siege: Nepal's Maoist Insurgency, 1996 to 2003.* Kathmandu: The Printhouse.

Wooldridge, Jeffrey R (2003) *Introductory Econometrics: A Modern Approach.* Cincinnati, OH: South-Western College Publishing.

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