HARVARD | BUSINESS | SCHOOL

Geography, Poverty and Conflict in Nepal

Quy-Toan Do
Lakshmi Iyer

Working Paper

07-065

Geography, Poverty and Conflict in Nepal*

QUY-TOAN DO†
The World Bank
Harvard Kennedy School

LAKSHMI IYER‡
Harvard Business School

February 2009

*We thank the Informal Sector Service Centre (INSEC, Nepal) for data on conflict-related deaths. Shawn Cole, Elena Glinskaya, Simon Johnson, Miguel Messmacher, Martin Ravallion, Debraj Ray, Eric Werker, Hassan Zaman and seminar participants at the World Bank, Harvard Business School, the Workshop on Endogenous Institutions and Political Conflict (UC Berkeley) and NEUDC 2006 provided useful comments and suggestions. Tripti Thapa and Maya Shivakumar provided outstanding research assistance. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily reflect the views of the World Bank, its Executive Directors, or the countries they represent.

†Email: qdo@worldbank.org

‡Email: liyer@hbs.edu

Abstract

This paper conducts 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 once conflict has started. Finally, in contrast with some cross-country analyses, ethnic and caste polarization, land inequality, and political participation are not significantly associated with violence.

1 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 and Sambanis, 2005). Understanding the causative factors of civil war has been the subject of growing attention by academics and policy makers alike. An important question in this literature is whether poorer countries face a greater risk of conflict. Collier and Hoeffler (1998) propose an "opportunity cost" view of conflict, whereby conflict is most likely to occur where economic gains are high and opportunity costs are low. Fearon (2008), however, argues that higher opportunity costs also come with larger economic gains from winning, so that the link between poverty and conflict is more nuanced. In particular, Fearon and Laitin (2003) postulate that the association between poverty and civil war is in part due to weak state capacity in poor countries; they also find that geographical conditions that favor insurgency play an important role in the incidence of civil wars. Most empirical studies based on cross-country analyses corroborate the view that lower economic development is associated with more conflict (Collier and Hoeffler, 2004, Fearon and Laitin, 2003, and Miguel et al., 2004).

In this paper, 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.[1] The results from cross-country studies are subject to 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 and 2004). Furthermore, most within-country studies of conflict have focused on local violence and used subjective interviews to assess the extent of conflict (Barron et al., 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 analysis, on the other hand, investigates whether the risk factors of civil war identified in the cross-country literature can explain the variation in conflict intensity within a country. *Second*, we construct finer measures of conflict intensity based on the actual number of casualties,

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

rather than just using a 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 an earlier involvement in civil war, 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-M) attacked a police post in Rolpa district of 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-M won the Constituent Assembly elections held in 2008.

There is some diversity of views regarding the causes of the conflict in Nepal. Some reports and studies have suggested that the Maoists found support from the oppressed lower castes (Bray et al., 2003), portraying the insurgency as stemming from "rage against a long legacy of oppression based on caste and ethnicity" (Sengupta, 2005). Many studies have emphasized the role of landlessness or relative deprivation (Deraniyagala, 2005; Murshed and Gates, 2005; Macours, 2006).[2] On the other hand, an interview-based study

[2]Deraniyagala (2005) and Murshed and Gates (2005) focus on landlessness and relative deprivation as proximate correlates of the conflict. The former is a descriptive study without systematic empirical analysis at the district level. Relative deprivation with respect to the richest district Kathmandu, highlighted by the Murshed and Gates study, is empirically equivalent to the measure of poverty we use. The study documents the differences in income across various caste categories, but does not investigate the impact of these social divisions on conflict intensity; the estimates in the study 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.

argued that caste and ethnic divisions are not a major cause of the conflict (Gersony, 2003); accounts such as Thapa and Sijapati (2004) attribute the conflict mostly to poverty and underdevelopment

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 socioeconomic information obtained from household surveys and other official sources. We find that geographic conditions (presence of mountains and forests) explain a quarter of the cross-district variation in conflict intensity. Controlling for 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. Other potential determinants of conflict, such as ethnic and caste polarization, land inequality, and political participation are not found to affect violence other than through their relationships with poverty. This negative result contrasts with the cross-country literature.[3] 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 war.

The paper is structured as follows: Section 2 provides a brief description of the "People's War" in Nepal. Section 3 describes our data and empirical strategy, Section 4

[3]The link between diversity, broadly defined, and conflict is explored theoretically by Esteban and Ray (1994). They also introduce the concept and measurement of polarization that can be applied to either income (Duclos, Esteban and Ray, 2004) or ethnicity (Montalvo and Reynal-Queyrol, 2005). The latter find a strong positive association between ethnic polarization and the incidence of conflict in a cross-section of countries. Other empirical studies such as Easterly and Levine (1997) and Horowitz (1985) also document the positive relationship between ethnic and social diversity and the likelihood of experiencing conflict. Collier and Hoeffler (2004) also lay out a "grievance" framework, in which the presence of different ethnic groups can lead to significant animosity between groups; this is especially likely when one ethnic group tends to dominate over the others. Nevertheless, this "grievance" motive is prima facie difficult to distinguish empirically (and theoretically) from the polarization concept discussed earlier.

summarizes our findings and Section 5 concludes.

2 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. Politically, Nepal was a monarchy till 1990, when widespread protests led to the establishment of a multi-party 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 February 13, 1996 with an attack on a police post in Rolpa district of Western Nepal by members of the Communist Party of Nepal-Maoist (CPN-M). The CPN-M 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 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-M activists during 1994, and a long-standing 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 1000 people were reported to have been arrested by the government in 1999 (INSEC, 1999). The political situation changed dramatically in 2001, when Crown Prince Dipendra allegedly killed himself, his father King Birendra and most members of his immediate family. King

Gyanendra, who succeeded to the throne, was inclined to take a more aggressive view towards the Maoists. When the Maoists unilaterally broke the 2001 cease fire 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 escalated sharply after this, with more than 3,000 people being killed by the state forces in the next year (see Figure 1).

Figure 1 here

Another cease-fire agreement with the Maoists was reached in January 2003, but the talks 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, and even extended their attention to urban areas by blockading Kathmandu for several days in August 2004. 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 was 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 cease-fire, 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-M in government and the monitoring of weapons by the United Nations Mission in Nepal. The monarchy was officially abolished in 2007, and elections to the Constituent Assembly were held in April 2008, fulfilling the two major demands of the Maoist movement. The CPN-M 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 5000 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.

3 Data Sources and Empirical Strategy

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

$$Conflict_i = X_i\beta + e_i, \tag{1}$$

in which $Conflict_i$ is a measure of the intensity of conflict in district i, while X_i is a vector of pre-conflict district-level characteristics including geography, economic development and social divisions, described in detail below.[4,5]

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. Furthermore, 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.

Measures of conflict: 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 con-

[4] A district can be thought of as being comparable to a county in the US 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 1948 square kilometers in 2001, and the average population was 309,000.

[5] Details on data sources are in Section 6.

flict. Our main measure is the number of conflict-related deaths in the district normalized by the 1991 district population computed from the census.[6] 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 et al. (2004).

Geography and economic development: Since insurgents are usually numerically weak compared to the governments they are fighting against, they must be able to hide from government forces and be able to garner social support for their activities (Fearon and Laitin, 2003). This suggests that the presence of mountainous or forested terrain, poorly served by roads, should increase insurgency. We use the altitude (elevation) of the district to indicate the presence of hilly territory, along with 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.

A long-standing idea in the conflict literature is the "opportunity cost" view (Collier and Hoeffler, 1998). According to this, civil wars or insurgencies will be concentrated in areas where the cost of recruiting rebel forces is low, i.e. in poorer areas, where people can be induced to join the rebel movement by paying lower wages. We capture this idea by including a measure of poverty and also use literacy rates to proxy for potential future earnings. 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.[7]

Social divisions: Social diversity can affect conflict in two main ways, both distinct from the effect of poverty. 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

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

[7] Our results are robust to using other measures of poverty such as the poverty gap, poverty severity, as well as to using average per capita consumption expenditure in the district (results available upon request).

enough rebel groups. The net effect of social divisions is therefore a priori ambiguous.

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 the Nepalese society, and discrimination and human right abuses against the lower castes are not uncommon (Human Rights Watch, 2004). We construct a measure of caste polarization, along the lines proposed by Duclos, Esteban and Ray (2004). Such social polarization measures have been used in cross-country analyses of conflict (Montalvo and Reynal-Queyrol, 2005). 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.

Table I summarizes the variables used in our analysis. We note a large variation across districts both in the measures of conflict intensity, as well as 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 percent 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 percent in Kalikot district to 70 percent in Kathmandu.

Table I here

4 Empirical analysis of the determinants of violent conflict

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 percent 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.[8] 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). Columns (5) and (6) suggest that while overall casualty numbers increase with poverty, it is so on both sides of the battlefield. We should note that these 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).

Table II here

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 in the appendix 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

[8] For instance, using the estimates in column (2), a 10 percentage point increase in poverty results in an additional 0.1106 deaths per 1000 population; average population of a district in 1991 was 246,548. Multiplying the two yields the figure of 27 additional deaths.

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 in both 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.

Figure 2 here

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.[9] 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).[10]

[9]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 capital and political participation (Bohara et al., 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).

[10]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.

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 with poverty is no longer statistically significant, suggesting that the overall higher level of deaths experienced by poorer areas is primarily due to them being involved in the conflict at an earlier date.

Figure 3 here

Further evidence for this is provided by estimating a Cox (1972) proportional hazards model, where the dependent variable is a measure of the "onset of conflict". We construct this as a binary variable indicating whether, by a given year, districts have reported more than 100 conflict-related deaths. 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 75^{th} percentile of the poverty distribution (i.e. with a 60 percent poverty rate) is 1.5 times more likely to attain the 100 deaths threshold than a district at the 25^{th} percentile (i.e. with a 26 percent poverty rate), conditional on not attaining this threshold in the previous year.[11]

Table III here

Finally, when using road infrastructure to proxy for the ease of access to remote areas by government forces, no clear-cut association is detected. Geographic characteristics also do not seem to predict the onset of conflict, unlike the relationships with overall casualty

[11] Unconditional linear regressions show that a district at the 75^{th} percentile of poverty will attain this threshold 7-8 months before a district at the 25^{th} percentile.

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.

5 Conclusion

We conduct 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 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. These findings are consistent with cross-country results, suggesting that similar factors are relevant in both settings. 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.

6 Appendix: Data sources and variable construction

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)

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 "others." The polarization measures is computed as $4 \sum s_i^2(1 - s_i)$, 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*

Association, Japan Forest Technology (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

Barron, Patrick, Kai Kaiser, and Menno Pradhan (2004) 'Local conflict in Indonesia: measuring incidence and identifying patterns.' *mimeo, World Bank*

Bohara, Alok, Neil Mitchell, and 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, and S. Mansoob Murshed (2003) 'Nepal: Economic drivers of the Maoist insurgency.' In *The political economy of armed conflict: Beyond greed and grievance,* ed. Karen Ballentine and Jake Sherman (Boulder, Colorado: Lynne Rienner Publishers)

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

___ (2004) 'Greed and grievance in civil war.' *Oxford Economic Papers* 56(4), 563–595

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

Cox, D.R. (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, 579–606

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

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

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

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

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

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

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

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

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

Kalyvas, Stathis N., and Matthew Adam Kocher (2009) 'The Dynamics of Violence in the Vietnam War: An Analysis of the Hamlet Evaluation System (HES).' *Journal of Peace Research (Forthcoming)*

Macours, Karen (2006) 'Relative deprivation and civil conflict in Nepal.' *Working paper*

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

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

Murshed, Mansoob S., and 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

—— (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.' *The New York Times* p. 30 October

Sharma, Hari Bhakta, and 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, and Bandira Sijapati (2004) *A Kingdom Under Siege: Nepal's Maoist Insurgency, 1996 to 2003* (Kathmandu: The Printhouse)

Table I: Summary statistics

	Observations	Mean	s.d.	Minimum	Maximum
Measures of conflict intensity					
Conflict-related deaths per 1000 district population	75	0.96	0.99	0	5.76
Deaths caused by state per 1000 population	75	0.63	0.74	0	4.67
Deaths caused by Maoists per 1000 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 1000 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.

Table II : Ordinary Least Squares analysis of the determinants of conflict intensity

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

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

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

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 excl.	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***		0.728	1.028***	0.928***	1.103*	0.503*	1.274***	0.405	2.130***
	(0.354)		(0.495)	(0.312)	(0.302)	(0.433)	(0.213)	(0.401)	(0.767)	(0.790)
Infant mortality		0.009**								
		(0.003)								
Proportion of advantaged castes		0.077	0.339	0.196	0.029	0.010	0.019	-0.081	-1.281	-2.040**
		(0.409)	(0.521)	(0.372)	(0.338)	(0.382)	(0.269)	(0.376)	(0.899)	(0.913)
Linguistic polarization	0.116									
	(0.394)									
Elevation	0.069***	0.051*	0.080***	0.063***	0.063***	0.067***	0.070***	0.068***	-0.016	-0.003
	(0.020)	(0.026)	(0.028)	(0.023)	(0.023)	(0.011)	(0.011)	(0.022)	(0.063)	(0.066)
Proportion of forested area	1.621***	1.289**	2.015***	1.134***	1.084***	1.589**	1.085**	1.580***	2.961**	2.717***
	(0.531)	(0.566)	(0.671)	(0.324)	(0.310)	(0.384)	(0.291)	(0.495)	(1.245)	(0.975)
Log(population)										
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.

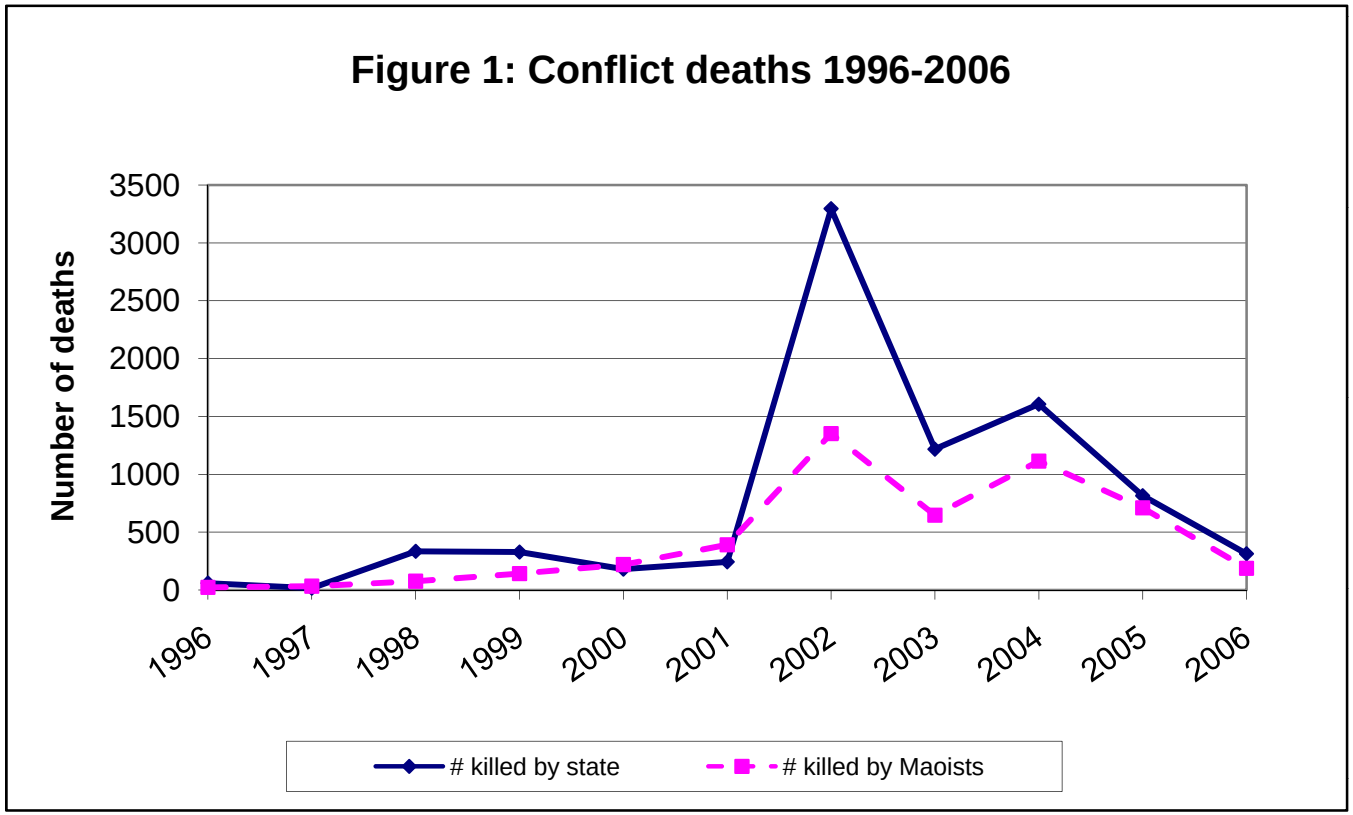
Figure 1: Conflict deaths 1996-2006
Number of deaths
3500
3000
2500
2000
1500
1000
500
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
killed by state
killed by Maoists

Figure 2: Conflict deaths and poverty

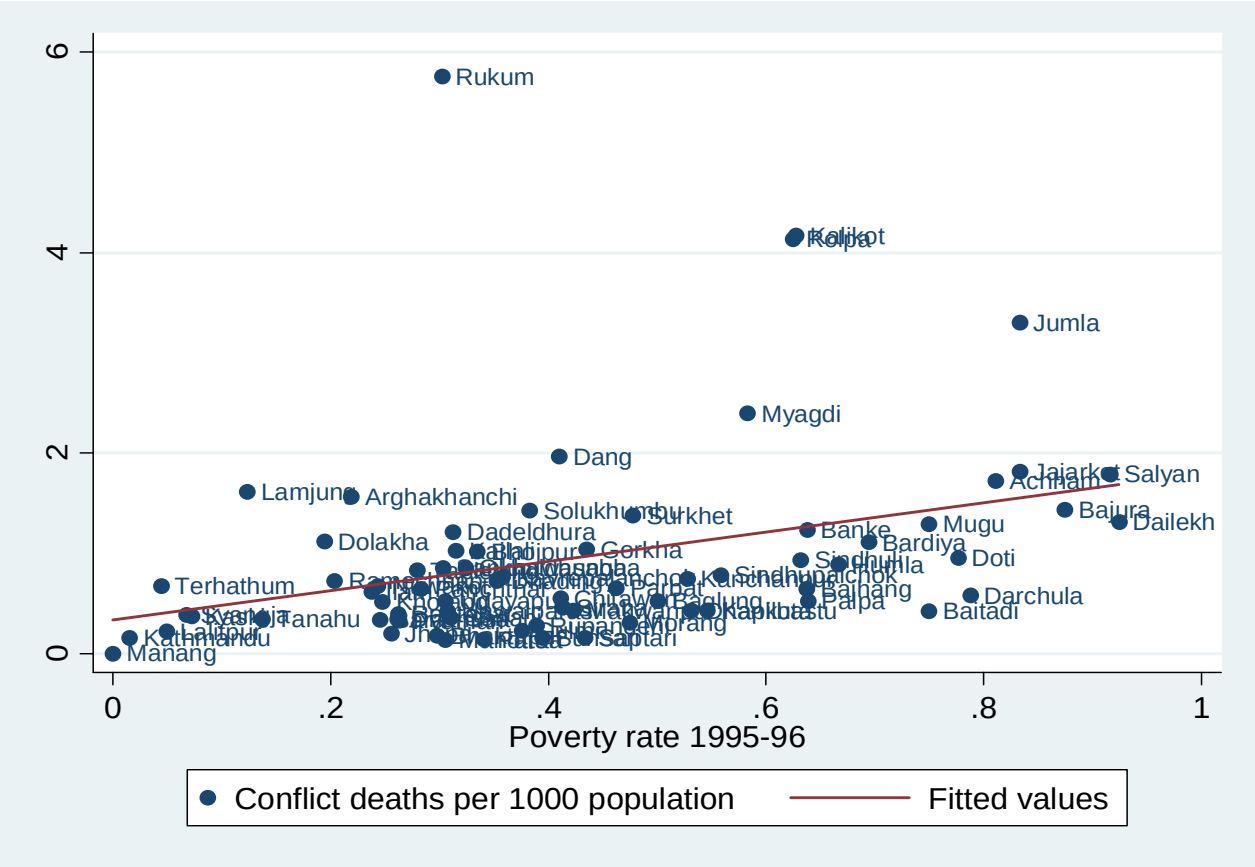

Figure 3: Relationship between poverty and conflict over time
(with 95% confidence intervals)