



MORE INEQUALITY, MORE KILLINGS: THE MAOIST INSURGENCY IN NEPAL

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Abstract

The hypothesis that inequality causes violence is investigated empirically in the context of killings by Nepalese Maoists in their ongoing People's War against their government. Inequality is measured by the Gini index as well as polarization indices. The dependent variable is the number of people killed by Maoist rebels during 1996-2003 in each Nepalese village. We find strong evidence that greater inequality escalates deadly violence. We also find that the presence of social networks and government welfare programs may reduce the violence, and that the level of income, while unrelated to conflict, mitigates the effects of inequality on conflict. The inequality variables themselves have distinct effects, with polarization appearing to be the more resilient type of inequality causing conflict.

Keywords: Inequality; Polarization; Violent conflict; Maoists; Negative binomial multilevel model;

1. Introduction

This paper studies the relationship between conflict and inequality. It is not the first study to do so, but its focus on inequality as a source of conflict has usually been studied in a cross-country setting in which the institutional heterogeneity across units of observations is vast. Since such heterogeneity is unobserved, it makes quantitative inference about this relationship difficult, if not impossible, from cross-country samples. Within-country samples have a far better prospect of making those inferences because the institutional heterogeneity is largely controlled. Further, policy recommendations are more meaningful when they are placed within an institutional context, more precisely, within the context of the absence of institutions.

Is inequality associated with conflict? Sociologists, political scientists, and economists, have contributed to a rich literature in their attempts to answer this question. The motivation for empirical studies in this literature is clear. If inequality is causally related with violence, then policies directed at reducing inequality will also reduce violence. Cross-country studies of conflict and inequality pervaded the early literature since the seminal paper by Sigelman and Simpson (1977). Attempts to reassess this relationship have been made, among others, most notably by Collier (2000), MacCulloch (2004), Mueller (1985), Mueller and Seligson (1987), Selbin (2002), Wang et al. (1993), Weede (1986, 1987), and Williams and Timberlake (1984). However, the literature to date remains ambiguous about the relationship between inequality and conflict,¹ in large part because no method for controlling for unobservable heterogeneity across countries has been found to be up to the task.

The setting of our study is the Maoist rebellion in Nepal, which has claimed over ten thousand lives and displaced twenty times as many persons since it began in 1996. We use the regional variation across villages in Nepal to explore the association between conflict and inequality. Exploiting intra-country variations across districts or villages to address the association between inequality and conflict sidesteps the tremendous heterogeneity that confronts users of cross-country data, due to a variety of cross-cultural norms, institutions, and unique historical settings. We use a village-level sample that is more homogeneous with respect to such

¹ See Lichbach's (1989) survey.

“unobservables”. Further, we use a set of micro-level control variables to account for observed heterogeneity.

This study differs from the current empirical literature in three other regards. First, the empirical specification is motivated by rational choice theory. The theory clearly explains why, when society becomes very unequal, agents may resort to redistribution by forcible means. The absence or weakness of conflict mitigating institutions, for example redistribution using tax-and-transfer instruments, makes violence an admissible instrument of redistribution. The theory produces testable hypotheses about the relationship between inequality and conflict. Thus, the issue variables in our model have a strong link with the underlying theory. Second, since the focus variable is inequality, our study explores the use of measures that go beyond the popular Gini index to measure inequality. We construct measures of economic polarization as proposed in Esteban and Ray (1994, 1999). Third, our dependent variable is measured as count data -- the number of deaths inflicted by Maoist forces in each Nepalese village between 1996 and 2003. We have already argued that our sub-national sample suffers less unobserved heterogeneity than do cross-country data. In order to account for remaining unobserved heterogeneity in the data, we empirically model Maoist killings using a hierarchical count-data model.

We are aware of three other recent studies of Maoist violence in Nepal, by Do and Iyer (2007), Acharya (2007), and Murshed and Gates (2005). The data and methods in our study are distinctly different from the data used in these studies. They examine Maoist violence at the more aggregated district level. We have gone the extra mile to assemble village level data, and then use a multi-level method that takes into account district-level heterogeneity. Regardless, the variety in the data, methods and issues addressed in this set of studies and ours, makes for a valuable complementary collection of findings on the Maoist problem in Nepal. While Do and Iyer find no association between *ethnic* polarization and Maoist violence, we find a strong association between *economic* polarization and Maoist violence. While Acharya (2007) finds geography (road density, inclined land area) and politics (number of parliamentary seats won by the precursor to the Maoist party) to be associated with violence, we find that social capital and government transfers to the poor ameliorates it. The Murshed-Gates study’s finding of an association between the Gini and violence is given a causal meaning and extended to economic

polarization in our study.² Taken together, these studies and ours provide evidence on variables associated with the origin and escalation of Maoist violence. Since a number of these variables may be targeted by policy, the findings have important implications for what may be done to reduce or eliminate the violence.

The paper proceeds as follows. In Section 2, a theory that focuses on inequality as a cause of conflict is described. Three testable hypotheses are derived and stated. In Section 3 the estimating equation is motivated, and the village-level Nepal data are described in detail. The hypotheses are tested in Section 4. The association between economic polarization and conflict in Nepal is a main result. An instrumental variables estimation suggests that this relationship may even be causal. Other results that are important from a policy point of view are also discussed. Section 5 concludes.

2. Theory and Hypotheses

Our empirical aim is to attempt theory-based inference. The tradition in the theoretical conflict literature has been to think of conflict as resources devoted to redistribution or the amount of redistribution itself (e.g. Alesina and Rodrik 1994; Persson and Tabellini 1994; Perotti 1993). Models motivated by political economy measure conflict by the amount of spending by agents to manipulate policy in the direction of their ideal preference (e.g. Esteban and Ray 1999). Since conflict-as-redistribution in these theoretical models and *violent*-conflict-as-redistribution (the focus of this paper) are both motivated by redistribution, theories of conflict provide the foundation for understanding cases of violent conflict. The main difference between the two is that in theoretical models conflict-as-redistribution occurs within the framework of institutional rules and norms, while violent- conflict-as-redistribution occurs as a reaction to either the breakdown of such rules and norms or because those institutions are missing in the first place.

An extension of conflict-as-redistribution theories brings out the relationship between inequality and conflict clearly. A model that brings out the relationship between inequality in wealth distribution and conflict especially starkly is developed in Milante (2004). In this model, conflict is measured by the net change in wealth after resources are spent on redistributive

² Neither the Murshed-Gates nor the Acharya studies control for poverty or take into account endogeneity of regressors as we do.

activities. While it is framed in the context of institutional and non-violent means of redistribution, we will use it as a basis for understanding the circumstances that drive collective action towards redistribution by forcible and violent means.³ We will make predictions about the determinants of violent conflict when some of the institutions implicit in the model break down. The model is formally summarized in the appendix, and we describe the main mechanism of the model here. Other theoretical models may be similarly extended to produce our predictions about violent conflict.

Consider a country with N agents who live for two periods. The status quo wealth distribution in the country – as measured by a Gini index or Esteban and Ray's (1994, 1999) measure of polarization – may be somewhat unequal, or very unequal. Suppose agents are able to expend part of their wealth on activities directed at redistributing the country's wealth in their favor. In models of crime (e.g. Kelly 2000) such activities consist of theft of property and wealth, and expenditures on armed guards to prevent such activity. In models of governmental corruption (e.g. Bardhan 1997) they consist of bribing officials to prevent them from blocking productive activity. In political economy models (e.g. Baye, Kovenock and de Vries 1993) they consist of lobbying of politicians by firms who wish to bend policy in their favor.

Suppose that the government has taken steps to ensure that both the rich and the poor have equal access to institutions that redistribute. Then the amount of the economy's wealth that is appropriable or redistributable depends on the extent of property rights laws and their enforcement. Suppose that a fraction $0 \leq \beta \leq 1$ of any agent's wealth cannot be redistributed, and that all individuals have equal access to the wealth that remains contestable. The fraction of the contestable wealth captured by each agent is determined by the agent's share of the resources devoted to redistribution.⁴ Then each agent's payoff is the sum of his uncontested income and the amount of wealth he appropriates from the pool of contestable wealth. This is the objective function that each agent maximizes in choosing their optimal spending on redistributive activity.⁵

³ In Milante's model, violence is not allowed, and a "privation" effect works to reduce the amount of redistribution.

⁴ An interior solution requires redistribution to be convex in rent-seeking/lobbying expenditures. That is, diminishing returns should make redistribution expensive on the margin.

⁵ The model may be made richer by making such expenditures functions of characteristics of the society, such as ethnic fractionalization or other sources of antagonism.

The optimal per person spending on redistribution is lower the less contestable is other people's wealth (see appendix). Since redistribution is a zero sum game, when there is inequality the agents who earn above-mean income gain from redistribution, while the less-than-mean-income agents lose. Define $R^+(\Delta)$ to be total net wealth change accruing to the population with above-mean-income, and by $R^-(\Delta)$ the total net wealth change accruing to the population with below-mean-income. The parameter Δ determines the degree of economic inequality inherent in the wealth distribution. The larger is Δ , the greater is the inequality as measured by any measure, say, the Gini index or Esteban and Ray's (1994, 1999) measure of polarization.

The main theoretical result from Milante's model concerning inequality and total redistribution (derived formally in the appendix) is this:

$$\frac{\partial R^+}{\partial \Delta} < 0,$$

and

$$\frac{\partial R^-}{\partial \Delta} > 0.$$

That is, redistribution is progressive and makes the wealth distribution more equitable. The greater the inequality in the existing wealth distribution, the greater is the aggregate gain to the poorer half of the country's population. In sum, if access to institutions that redistribute resources is equally available for all, redistribution *reduces* inequality. Further, the greater the inequality, the greater is the redistribution. This prediction is robust across a number of political-economic models of redistribution (Alesina and Rodrik 1994; Persson and Tabellini 1994; Perotti 1993). The position of the median voter in the wealth distribution in these models is responsible for this result.

This outcome, however, requires that the country possess the requisite institutions. Specifically, institutions must guarantee that:

- the required per capita spending on redistributive activity does not exceed initial wealth,
- there is equal access for all individuals to the country's contestable wealth, and
- legal institutions enforce these standards.

Among the set of developing countries it is the exceptional one that actually satisfies these requirements. Even so, as Skaperdas' (1992) stark model of cooperation and conflict indicates,

the absence of fundamental institutions such as property rights does not imply forcible redistribution.⁶

An important missing ingredient in these models is the possibility of collective action combined with the violation of the above assumptions. That has the potential to fuel violent conflict and forcible redistribution. Take the case of a country with large enough inequality that a sizable proportion of the population fails to come up with the minimum requisite per capita expenditure to participate in redistribution by institutional means. Such threshold requirements may prevent a sizable proportion of the population from participating in the institutionally established redistribution process.⁷ For example, suppose the optimal expenditures are a positive number beyond the means of the median voter. Then a majority of the population is effectively barred from participating in the redistribution process. The first two conditions are thus violated, and in that situation redistribution in fact aggravates inequality since redistribution benefits only those who participate.⁸

⁶ In Skaperdas' model, a cooperative outcome without conflict is possible if the "conflict technology" (which determines each person's probability of winning sole possession of wealth in the event of war) is ineffective or weak enough that it precludes very uneven payoff outcomes (e.g. all or nothing) from inventing resources into armaments.

⁷ In Skaperdas' model this process can possibly be modeled by changing abilities in the production process (to generate inequality), and model conflict as a tipping equilibrium, where tipping occurs after a threshold level of inequality is reached.

⁸ This idea in fact generalizes the experience of many poor countries which started out with a much more equal wealth distribution in the earlier stages of their history than what exists today. The continuing relative deprivation of the poor in such countries arises from unequal access to public goods such as good schools or quality healthcare. Granovetter and Tilly's (1988) analysis of why inequality exists, and persists, identifies five actors: capitalists, workers, organizations, households, and government. They "contend over the rewards of labor in the three arenas of employment status, jobs, and labor market and do so primarily by attempting to influence the process of ranking and sorting" (Granovetter and Tilly, 180). The relative bargaining strengths of these actors determine the outcome of the ranking and sorting processes in the labor market. The result is an equilibrium income inequality, consumption inequality, and wealth inequality in the given society. The threat points of the actors in the bargaining game are critically determined by their ability to solve internal coordination problems and coalesce, so they can exert the greatest influence during the sorting and ranking processes. Ebbs and tides in the relative threat points of these actors are therefore the source of historical changes in inequality. If landlords' monopsony power in rural labor markets gives rise to rural inequality, the latter persists and worsens as landlords' positions gain strength. If, however, property rights are not enforceable, publicly by the government or privately by the landlords, increasing inequality leads rural workers to organize and conduct appropriation activities, as predicted by the theory. In their analysis of the American experience with inequality, Williamson and Lindert (1980) suggest that uneven technological development, rapid increase in the supply of unskilled labor (due to the lack of education), and accelerated capital accumulation were the

The continuing worsening of inequality, combined with the presence of weak legal enforcement, then make theft and violence admissible instruments of redistribution. If only a small number of agents relative to the population experience deprivation they will likely be disorganized and approach their appropriation activities individually. Risk-aversion on the part of agents may further constrain their impulse. However, as inequality grows and the wealth of a substantial number of agents falls below their optimal expenditure on appropriable activity, the coordination problems that prevented them from organizing due to their small numbers, is overcome. This is especially the case when there are increasing returns to organizing, as in the case of organized violence

In sum, a threshold level of inequality that leads to deprivation for a significant section of society lays the basis for violent conflict. When this group is too poor to afford the requisite “tax” for redistribution by institutional means, the only remaining instrument involves forcible redistribution. Where enforcement is weak and a critical mass organizes, forcible redistribution is not only admissible, but possibly unleashed.⁹ We state our main hypothesis, therefore, as:

H1: *Greater inequality is positively associated with a higher incidence of violent conflict.*

If institutions emerge, which can redistribute peacefully, or if the prevention of theft can be effectively enforced, the mechanism described above may be forestalled. Even in the absence of such legal institutions, other self-enforcing institutions may emerge to forestall violent redistributive activity. While a debate exists over how “social capital” influences institutions, it is generally accepted that democratic institutions are founded on “good social capital”.

Putnam’s (2000) definition of social capital as the collective value of all social networks and the “inclinations that arise from these networks to do things for each other” motivates our

three most important factors behind the increases in inequality. Uneven technological development and accelerated capital accumulation sharply biased the receipt of rewards, while an increase in the supply of unskilled labor lowered the bargaining strength of labor.

⁹ Gurr (1970) defines relative deprivation as a person’s perception of the discrepancy between his income expectations and income capabilities. The potential for collective violence varies strongly with the intensity and scope of relative deprivation among members of a group. In the theoretical model, inequality is captured by the parameter Δ . If, as assumed by the theory, all agents have the same capabilities and expectations, this parameter is an adequate measure of relative deprivation. But with heterogeneity in capabilities and expectations within and across groups, this measure becomes more complex. Our polarization measures are designed to empirically capture this heterogeneity.

measurement of social capital. The source of such institutions in developing countries may be the learning that equitable sharing of the peace dividend from avoiding conflict is collectively and individually preferable to a situation with forcible appropriations in which only a few benefit. Or it may be, as Lin (2001) describes, that social capital is essentially economic investment in social relations motivated by market returns. Whatever the source, Fukuyama (1995) suggests that social capital makes up for a lack of institutions by creating a set of informal values and norms within groups that encourage members of the group to cooperate. The creation of social capital thus limits, or is designed to limit, forcible appropriations. In the search for factors that may limit violence, we set forth this proposition as our next testable hypothesis:¹⁰

H2: *Greater social capital is associated with lower incidence of violent conflict.*

Government can and does provide public goods, even if unequally.¹¹ The theoretical model predicts that any redistribution program that reduces inequality should also lower violent conflict. On the margin, if benefits from social programs exceed the agent's expected payoffs from appropriation activities, it deters the agent from indulging in violent conflict. By raising the opportunity cost of engaging in violence, social programs weaken each agent's resolve to engage in collective violent action. We state this as our next testable hypothesis:

H3: *The larger are transfers by the government, the lower is the incidence of violent conflict.*

It is through transfers and social programs that government lowers poverty (as distinct from inequality). It is not clear in the literature whether the destitute have the ability and motivation to collectively engage in violence. For example, a "privation" constraint may be binding for the very poor, which prevents them from acquiring even the most basic instruments

¹⁰ In Skaperdas' model social capital may be used to model the source of the conflict technology. If social cohesiveness is a very desirable attribute, it makes conflict technology less effective, and in turn, leads to more cooperative outcomes.

¹¹ Mechanisms for public goods provision (Tiebout 1956), while weak in poor countries like Nepal, are not nonexistent. Evidently government cares about the plight of the poor enough to balance the demands on their meager budgets by making some transfers.

of violence. However, the extent of poverty may be an enabling factor for activists, who are not destitute themselves, to organize for forcible redistribution. We attempt to shed light on this mechanism by exploring a reduced form relationship between poverty and violence, which we state as our final hypothesis.

H4: *Greater poverty is associated with a higher incidence of violent conflict.*

3. Data and Variables

3.1 Background

The empirical setting for testing the hypotheses about violent conflict is the Maoist uprising in Nepal, which began in 1996. Although Nepal is a small country, the lessons from its attempts at economic and political emergence are anything but small. The Nepal experience provides a lab experiment to understand why many other emerging countries have hesitated to experiment with political liberalizations. Never since its unification in 1768 has Nepal experienced such a violent division within its own rank and file. Ganguly and Shoup (2005) provide an account of experiments with democracy, their failure to improve the average Nepalese citizen's living standards, and the rise of the Maoists.

During and after the 1990 People's Movement that re-introduced multi-party democracy to Nepal, key figures of the Maoist movement took part in the multiparty politics. The democratic reforms implemented under the 1990 constitution were illusory because they failed to address the fundamental problems facing most Nepalese citizens – inequality and widespread poverty, reflected in high infant mortality, lack of access to basic amenities like power and clean water, and importantly, a palpable rural-urban divide. These shortcomings were dire in the countryside. Upper-caste Hindu-led parties pursued interests that were distant from the median voter. The median voter was illiterate and had stronger ties to his ethnic community than to the nation.

In 1991, the communist party (United People's Front, UPF) was the third largest political party in the lower house of Parliament. In 1994, a fraction of the UPF broke away from its parent party and ran a parallel party, boycotted the mid-term elections, and planned to start a violent

campaign. On February 13, 1996, they did. The People’s War began with simultaneous attacks on three remotely stationed police outposts, a bank branch, a soft-drinks bottling plant, a liquor factory, and a private house. Their guerilla strategy of establishing bases in the rural and remote areas fared them well in redistributing captured land from absentee landlords to the locals who could farm the land under a system of cooperatives. What started as an insignificant and isolated incident in 1996 transformed into a devastating conflict that claimed more than 13,000 lives and displaced over 200,000 people over the next ten years.¹²

There exists an uneasy peace after the signing of the Comprehensive Peace Accord between the Nepalese government and the Maoists on November 21, 2006. The likelihood that another Maoist outbreak catapults out of control over another extended period remains, unless its underlying causes remain unresolved. Our theory underscores economic inequality and economic polarization as the main underlying causes (H1, H2). There are ameliorating forces (H3, H4) which may form the basis for possible policy solutions. Our tests of these hypotheses thus have important implications for policy

3.2 *Data and variables*

Our hypotheses motivate the following functional form for empirically explaining violent conflict:

$$KILLINGS = f(INEQUALITY, SOCIALCAPITAL, GOVTGRANT, POVERTY) \quad [1]$$

+ - + -

The signs below the variables indicates the hypothesized relationship between the dependent variable, *KILLINGS* and its determinants (*GOVTGRANT* refers to government transfers).

Nepal is administratively divided into 74 districts, with each district further subdivided into village development committees (VDCs, or ‘villages’). There exist approximately 4,000 villages. The dependent variable *KILLINGS* is measured at the village level as the total number of persons killed by Maoists during the period 1996-2004. As we mention in the introduction, the more detailed level of the unit of observation makes our study of the Nepal conflict distinct from the Do-Iyer, Acharya and Murshed-Gates studies. The conflict data are drawn from annual

¹² Mahat (2005) and Gurung (2003) describe the Maoist People’s War in Nepal in detail.

reports of the Informal Sector Services Center (INSEC), a non-profit national human rights organization. The annual reports contain details such as the date of each event that resulted in human casualties, the circumstances surrounding the event, and the number of deaths. Based on these reports, the casualty data are summed for the eight-year period. Since time-series data for the villages (or even districts) on inequality, polarization, and poverty variables are non-existent, we use our village-level cross-section to make inferences. Since the eight-year time period over which the dependent variable is measured leads other variables, it reduces (but may not eliminate) concerns about endogeneity.

The inequality measures we use are (i) the Gini index, and (ii) alternative polarization measures. While we would prefer to use wealth and asset data to construct these measures, such data are simply unavailable at the household level. Instead, we use consumption expenditure data, which are available in the nationally representative household survey. Since this survey does not cover all villages, we use a micro-level estimation technique to make survey-to-census imputations of household expenditures for villages with missing data. The first step in this process is to construct complete household expenditure data in order to measure inequality at the village level. We begin with a description of the household survey and the census data.

The data to construct this study's main explanatory variables are drawn mainly from the World Bank's Living Standard Measurement Survey for Nepal conducted in 1995-96 (jointly with Nepal's Central Bureau of Statistics (CBS)), and the 2001 Nepal Population Census. We refer to this study as the Nepal Living Standard Survey (NLSS). The NLSS consists of nationally representative household survey responses to questions about household income and expenditures, and several socio-economic and demographic characteristics. The data set contains a national sample of 3373 rural and urban households. These were selected from 274 primary sampling units around the country, or communities, based on a probability-proportional-to-size (PPS) sampling plan. In addition to the household survey, the NLSS also conducted a community-level survey designed to elicit information about community characteristics and the types of social networks present in the surveyed households' communities.

The 2001 Nepal Population Census, conducted by the CBS, administered two types of forms – a complete enumeration (the “short” form) and sample enumeration (the “long” form). The long form was administered to one in every eight housing units, yielding a sample of 520,624 Nepalese households. In order to construct inequality variables (such as the Gini and

polarization indices) and poverty-gap indices for all villages, detailed expenditure data for a larger sample than provided by the NLSS sample is required.¹³ The census sample is far more inclusive but lacks the all-important expenditure and income variables. We therefore use a micro-level estimation technique developed from small area statistics (Ghosh and Rao 1994) to impute expenditures of the census-level households.¹⁴

Essentially, the NLSS sample is used to impute expenditures for the census long-form sample using information on covariates that are common to both the NLSS and the census. Let y_l be household l 's expenditure obtained from the NLSS survey. A regression of y_l on a vector of covariates X_l , where X_l are chosen so that they are also available for the census sample, is then estimated using generalized least squares.¹⁵ The long form census sample with the imputed expenditures is then used to construct our inequality and poverty measures as follows: Using y_l to denote the per capita consumption expenditure of household l in a given village, the Gini index for the village is given by (Deaton 2000, 139):

$$GINI = \frac{1}{\mu N(N-1)} \sum_{i>j} \sum_j |y_i - y_j|, \quad [2]$$

where μ is average expenditure, N is sample size, and $|y_i - y_j|$ is the absolute deviation of expenditure between two households. An alternative, but related formulation of the Gini index is given by :

$$GINI = \frac{N+1}{N-1} - \frac{2}{N(N-1)\mu} \sum_{i=1}^N \rho_i y_i \quad [2a]$$

¹³ As self-reported household income is less reliable than the measures of household expenditures (Deaton 2000), we use household expenditure as an indicator of household welfare.

¹⁴ See Elbers, Lanjouw and Lanjouw (2003) for the theory behind this technique.

¹⁵ For survey-to-census imputation, we use socioeconomic and demographic characteristics of households, ethnicity, housing characteristics, location, sources of lights, energy, water, etc. where the first stage R^2 is 0.502.

where ρ_i is the rank of household i in the y -distribution, arranged so that the richest person is ranked 1. We use [2a] in our computation of the Gini.

Esteban and Ray (1999) show that the concept of polarization is fundamentally different from inequality, as measured by the Gini coefficient. The Gini is actually a special case of the polarization index. In the Nepal context, this approach posits that an adequate polarization measure for consumption spending must reflect three characteristics: (i) in each village, the measure must partition the distribution of consumption spending into more than one group, and preferably not too many; (ii) there must be a high degree of intra-group homogeneity as measured by a large mass within each partition; and (iii) there must be a high degree of inter-group heterogeneity, as measured by significant distances between the partitions.¹⁶

Satisfying these conditions yields a measure that may or may not be strongly correlated with other inequality measures such as the Gini coefficient. Polarization seeks to measure potential hostility or antagonism among groups, and therefore captures another dimension of inequality than does the Gini. The Esteban-Ray economic polarization measure (for a village) is essentially a mapping of the distribution of consumption spending by families in the village into a value. The higher this value, the greater is the degree of polarization. The polarization index is measured for a specific village as (Esteban and Ray 1994):

$$POLARIZATION(\alpha) = K \sum_{i=1}^{L_k} \sum_{j=1}^{N_j} \pi_i^{1+\alpha} \pi_j |y_i - y_j|, \quad [3]$$

where $|y_i - y_j|$ is the size of absolute difference in the consumption expenditure of households i and j , π_k is the k^{th} household's proportional weight¹⁷ and L_k is the number of households sampled from k^{th} village. K is a positive constant. In [3] α measures the intensity of group

¹⁶ Axiomatically, their measure purports to satisfy all three conditions: First, the joining of two neighboring probability masses into one mass exacerbates polarization in the presence of another separately identifiable point mass. Second, given three point masses (or partitions), moving a point mass away from the center towards an extreme value, however small the move, increases polarization. Third, given two point masses (or partitions), breaking the more central point mass equally into two and distributing them at two opposite, more extreme, points increases polarization.

¹⁷ Since the census sample includes only one in eight households, we construct the household's proportional weight using information about population size of each village and the size of the census-sampled households.

identification, termed the “degree of polarization sensitivity” by Esteban and Ray (1994) and shown to range between 0 and 1.6. $POLARIZATION(0)$ (with $K=1$) approximates the Gini.¹⁸ The larger is α , the greater is the departure of the inequality measure from polarization. We use three different values, $\alpha = 0, 1$ and 1.5 , and employ the kernel estimation method in Duclos, Esteban and Ray (2004) to construct three Esteban-Ray polarization measures at the village level. They are termed $POLARIZATION_0$, $POLARIZATION_1$ and $POLARIZATION_{1.5}$, respectively.¹⁹

Our poverty measure is the Foster-Greer-Thorbecke (FGT) poverty-gap index for the year 1995-96. It calculates the percentage of households (in a village) below the poverty line as:

$$POVERTY = \frac{1}{n} \sum_{i \in L_p} \left(\frac{z - y_i}{z} \right)^\gamma, \quad [4]$$

where z defines a household’s poverty expenditure threshold,²⁰ y_i is household i ’s expenditure, n is the number of households, and L_p is the set of households below the poverty line (the notation is simplified: n and L_p vary across villages). $\gamma > 0$ is a poverty aversion parameter: if $\gamma = 0$, [4] is simply the proportion of households below the poverty line, that is, it is the “headcount” index. When $\gamma = 1$, [4] is the average poverty-gap index, that is, the average shortfall of household expenditure from the poverty line. The poverty measures for different values of γ are highly correlated in our sample, and we use the headcount measure ($\gamma = 0$) in the analysis.

The presence and strength of social capital is measured using the rural sub-sample of the NLSS. This sub-sample contains community-level information on five different network groups: forest-user groups, farmer groups, water management associations, women in development groups, and credit groups. We combine four types of information to construct a composite social

¹⁸ As Montalvo and Reynal-Querol (2005) show, the Gini index is given by:

$$GINI = \sum_{i=1}^{L_i} \sum_{j=1}^{N_j} \pi_i \pi_j |y_i - y_j|,$$

¹⁹ This is the discrete version of the continuous-time measure in Duclos, Esteban and Ray 2004.

²⁰ We adopted the poverty line definition used by Nepal’s Central Bureau of Statistics of 4404 Nepali rupees at 1995/96 constant price (CBS 2005).

capital measure for each group: years in operation (S_1), proportion of households involved in a particular group (S_2), percentage of female members in the group (S_3), and the average number of meetings per year (S_4). The social capital contributed, for example, by farmer groups in village v is measured as

$$FARMERGRP_v = \sum_{n=1}^4 \frac{S_{nv} - \min_v \{S_{nv}\}}{\max_v \{S_{nv}\} - \min_v \{S_{nv}\}} \quad [5]$$

where $S_n, n=1, \dots, 4$ are the four components of social capital and v indexes the village. $FARMERGRP_v$ is thus a unit-free index that combines the age, participation, reach, and intensity of the activity of farmer group networks in village v .²¹ We use equal weights for each of these characteristics of the network categories in the absence of any *a priori* assumption. Since the rural sub-sample of the NLSS surveys less than 274 villages across Nepal, the social capital information is not available for all villages. Rather than lose a significant proportion of the village sample, we pool the sample at the district level and compute the social capital indices at the district level. They are then replicated at the village level.

Finally, we have useful village and district level variables from 2001 as controls. Percentage of farmers in the population (*FARMER*), average years of schooling (*EDUCATION*), percentage of people whose primary language is Nepali (*NEPALI*), and binary indicators for whether the village is in a rural (*RURAL*) area and ecologically mountainous or hilly (*MOUNTAIN, HILLS*) are measured at the village-level and population density (*DENSITY*) is at the district level.

3.3 Methodology

Since the dependent variable *KILLINGS* is measured as count data, we use the Negative Binomial (NB) model. It is preferred over the Poisson model for over-dispersed count data (Greene 2000). In our view, an important modeling consideration is the fact that villages are likely to share the characteristics of districts to which they belong. Ethnic composition, political

²¹ The scaling in [5] serves to standardize the four components so they may be added. This method of computing social capital indices is similar to what is used to construct the Human Development Index of United Nations Development Program (UNDP 2006).

representation, culture, socio-economic backgrounds and government programs are likely to be common to villages within a district. To a large extent, our control variables account for much of this observed heterogeneity. In order to account for unobserved heterogeneity to the extent possible, we employ a hierarchical regression method in which villages are modeled as being nested within their districts.²² In sum, we estimate a two-level hierarchical Negative Binomial model, which is accomplished by a random-effects specification.²³ The model we estimate is:

$$\begin{aligned} KILLINGS_{vd} = & \beta_1 INEQUALITY_{vd} + \beta_2 SOCIALCAPITAL_{vd} + \beta_3 GOVTGRANT_{vd} \\ & + \beta_4 POVERTY_{vd} + \mathbf{X}_{vd} \mathbf{B} + u_d + e_{vd} \end{aligned} \quad [6]$$

where $CONFLICT_{vd}$ is the number of deaths inflicted by Maoists in village v nested in district d . The issue variable $INEQUALITY$ used to test Hypothesis 1 is measured, respectively, as $GINI$ and the three variants of $POLARIZATION$. The issue variables used to test Hypotheses 2 and 3 are $SOCIALCAPITAL$, $GOVTGRANT$, and $POVERTY$. Other than $SOCIALCAPITAL$ which is measured at the district level these issue variables are measured at the village level. The vector \mathbf{X}_{vd} includes control variables measured at the village and district levels. The two error components u_d and e_{vd} account for unobserved heterogeneity at the district and village levels, respectively (see previous fn). They are modeled as random effects and presumed to be

²² The two-level hierarchical regression model that we use (see e.g. Goldstein 1995) decomposes variances into a village component and a district component as:

$$y_{vd} = \gamma_{00} + \sum_{p=1}^P \gamma_{p0} x_{vd}^p + \sum_{q=1}^Q \gamma_{0q} z_{vd}^q + u_{0d} + e_{vd},$$

where y_{vd} is conflict measured Maoist killings in village v in district d , x_{vd}^p , $p = 1, \dots, P$, are the p regressor measured at the village level, z_{vd}^q , $q = 1, \dots, Q$, are the q explanatory variables measured at the district level, γ_{00} is the intercept, and γ_{p0} and γ_{0q} are the slope coefficients. The error components u_{0j} and e_{ij} are the residuals, respectively, at the district and the village levels. This “variance components” model decomposes the variance for each of the hierarchical (here two) levels. We assume that the intercept varies across the districts but not the slopes (doing so would make it the “random coefficients” model).

²³ The option of including district-fixed effects for the 74 districts would wipe out the social capital variables which are measured at the district level, and which play an important role in our study.

uncorrelated with the regressor and to be (conditionally) identically and independently distributed across observations.

4. Results

4.1. Baseline Hypotheses Tests

Table 1 presents descriptive statistics of the variables used in the empirical analysis across 3857 villages. The dependent variable *KILLINGS*, the number of people killed by Maoists over the eight-year period 1996-2003, has a per-village average of 0.68, or a total of 2,623 killings. The main issue variable, inequality, is measured using three distinct variables: *GINI*, and two polarization measures (*POLARIZATION₁* and *POLARIZATION_{1,5}*). The population-weighted averages, though not reported here, are not greatly different. For $\alpha=1$, *GINI* and *POLARIZATION* have a sample correlation equal to 0.47, yet the correlation of *GINI* with *POLARIZATION_{1,5}* drops to 0.18. As Esteban and Ray (1994) conjecture, in our sample the polarization and Gini indices measure fundamentally different aspects of inequality. While *GINI* measures the distribution of consumption spending in a continuous setting, *POLARIZATION* measures consumption distances within a community. In our sample, even when the Gini index is relatively small, wealth distances appear to be significant.

The *FARMERGRP*, *WATERUSERGRP*, *FORESTUSERGRP*, *CREDITGRP*, *WOMENGRP* have considerable variation and are only somewhat correlated with each other. They therefore capture distinct dimensions of social capital created by Nepalese villagers and deeply connected with their means of livelihood. Some of them will play an important part in our empirics, as they provide the fabric for informal institutions created as a response to the absence of formal ones. The mean for *GOVTGRANT* indicates that 43.21 rupees per person per year were given in grants on average. Although equaling only \$0.70 in 1996 dollars, it is a nontrivial amount in rural Nepal where poverty is widespread. The sample mean of 0.44 for *POVERTY* (headcount) indicates that approximately 44% of the population lives below the poverty line.

The remaining variables are controls. The statistics indicate that Nepal is an economically, geographically, and ethnically diverse country. The village population is largely rural and just half of them speak Nepali as their primary language. The average level of education is low, and people suffer from long spells of unemployment. Per capita income in the

sample is approximately Rupees 9240 or \$145 in 1996 dollars. The geographic variables indicate that 13% of the sample is from the mountainous northern area of Nepal, and 52% comes from the hilly middle section of the Nepal. The remaining 36% comes from the wooded Terai in the southern part of the country.

Testing H1

Table 2 presents the first set of results from the two-level hierarchical Negative Binomial model. Hypothesis 1 predicts a positive relationship between inequality and the intensity of violent conflict. Regardless of how inequality is measured, the data show a strong association between inequality and the number of Maoist killings, as predicted by the theory.

The coefficient of 6.33 measures the percentage by which the number of killings increases with a unit change in the Gini. The reported estimates are from the log-link function and may be interpreted as estimates from a log-linear model. Therefore, an increase of 0.1 in *GINI* is associated with a 63.3% increase in Maoist killings. The 0.1 increase is in fact the approximate change in the Gini for Nepal over the past eight years (1996 – 2004, CBS 2005). Evaluated at the sample mean, the 63% increase in killings translates into a total (across all villages) of 1,652 additional deaths over an eight-year period. When *POLARIZATION* is measured with $\alpha = 1$, a 0.10 increase in polarization leads to a 121.6% increase in Maoist killings, or a total of 3,189 additional deaths over an eight-year period. When *POLARIZATION* is measured using $\alpha = 1.5$, an increase of 0.10 in this measure is associated with an increase in Maoist killings by 57.9% or 1,518 deaths over an eight-year span. The quantitative implications of these estimates are considerable, regardless of the measure of inequality used.

Testing H2

Our quantification of the value of social networks in the five social capital variables are fundamentally tied to civic participation and governance at the village-level. While these networks may enhance the presence of central government, they have more likely emerged as mechanisms of self-governance where government institutions have repeatedly failed. We believe social capital in Nepal takes the form of investment in social relations motivated by market returns (Lin 2001) and that social capital creates a set of informal values and norms within villages that encourages members to cooperate (Fukuyama 1995). Members join their

groups because they perceive economic and social benefits from subscribing to the norms developed within the group.

If cooperation among group members is reinforced by actual improvements in social outcomes, market outcomes, and conflict-mitigation, it makes groups long-lived. These five user groups are long-lived. Lam's (1998) study of 150 irrigation systems in Nepal documents the effectiveness of farmer groups and water-user groups in solving common-resource pool problems. Irrigation systems governed by the farmers were in better condition and delivered more water at the end of the system, thus enhancing farm productivity, than systems governed by the Nepal Department of Irrigation. Ostrom (1992) views this result as being consistent with the idea of social capital manifested in collective action by water-user groups. The study by Varughese and Ostrom (2001) of 18 forest-user groups in Nepal found that among these groups those that were able to overcome group heterogeneity (distance from the forests, wealth and ethnicity) and organize for collective action had above-average forest stocks and improved trends in forest conditions. Those who failed to organize experienced worsening forest conditions. Finally, women groups are motivated by increasing the social status of women and also increasing economic opportunities, while credit groups allow access to credit by lowering the risk to lenders from non-payment by individuals in the group. Norms developed in credit groups empower groups of individuals and make it costly for individuals to default.

Does social capital in Nepalese villages deter violent conflict? Table 2 supports this view. The presence of strong farmer groups and women groups appear to deter Maoist killings. The quantitative implications are significant. In the first model, for example, an increase in the farmer group index of 0.10 (a one standard deviation change) is associated with a 25.5% reduction in Maoist killings. This result holds approximately equally across the three models reported in Table 2. An increase in the women group index of 0.27 (one standard deviation change) is associated with a 16.2% decline in Maoist killings. Since these variables are not very correlated, these results are approximately additive. Thus, villages in which both networks are active may be expected to have around 40% fewer Maoist killings than a village in which neither network exists. While credit groups and water-user groups may serve an economic purpose, they do not appear to have any beneficial spillover effect on violence.

The positive coefficient on the forest group is contrary to theory (*H2*), and deserves explanation. In order to reverse the deforestation that took place after the nationalization of

forests in 1957, the Nepalese government began a policy in the late 1970s to decentralize forest resources by encouraging the formation of forest-user groups that would self-govern this common-resource pool. Agrawal and Ostrom's (2001) comparative study of forestry decentralization in India and Nepal concludes that in Nepal, "despite claiming participatory decentralization, the forestry program has devolved such limited property rights that it can scarcely be classified as a case of decentralization" (p. 503). User groups have only somewhat attenuated the use of access rights. Further, they have no managerial discretion or exclusive use rights, and constitutional choice authority is retained by the government. It is likely that our measure of social capital for this group is unable to capture the more complex structure of disincentives under which forest-user groups must operate. Conflicts have thus escalated not only between user groups and the government but also between the user groups and Maoists.²⁴

To the extent that user groups have improved the conditions of forests, the positive coefficient requires another explanation. In villages without forest-user groups, deforestation has forced the emigration of the ablest, making them home to the poorest. If, on average, villages with forest-user groups are pro-government or anti-Maoists and if villages without such groups are pro-Maoist, then this political preference (not captured by other variables) leads to a positive coefficient on this variable. While the poorer villages (those without forest-user groups) become refuges for the rebels, they are not the territory on which Maoists carry out killings.

Women's groups do appear to be effective in thwarting violent conflict. A growing number of the new members of the Maoist rebel groups have been women. The existence of women's groups may discourage their participation in violence by offering alternative avenues for them to voice their frustrations or by enabling them to use the network to solve their problems. Taking up the gun then becomes the final, and possibly distant, resort.

Farmer and women groups therefore appear to perform the function of real democratic institutions – developing social norms that enable peaceful solutions to problems. Hypothesis 2 is therefore supported by the negative signs of these two coefficients²⁵ (but not by a social network

²⁴ Despite the fact that the property rights are not properly allocated in favor of the forest user groups, community forests have become an income source for villagers. Disputes over sharing of the forest income during the MPW created tensions and conflict between villagers and Maoists.

²⁵ Though statistically insignificant, the coefficients of *WATERUSERGRP* and *CREDITGRP* are also negative.

related to forest-user groups). Below, we explore an alternative way of examining the role of social capital in reducing the violent conflict using interaction variables.

Testing H3 and H4

The two government policy variables, *GOVTGRANTS* and *POVERTY*, are both estimated with the predicted signs (Hypotheses 3 and 4). An increase in per capita government grants by 0.56 (56 Rupees, or one standard deviation increase) is associated with a 32% decrease in Maoist killings, or 839 fewer deaths over an eight-year period. This estimate implies that these 839 lives could have been saved by increasing spending by less than \$1.00 per Nepalese citizen per year! A decrease in the poverty headcount by 18% (one standard deviation) is associated with a substantive impact on the number of Maoist killings. Across all three models, that magnitude of decline in poverty would reduce Maoist killings by 55%, or by 1,500 over an eight-year period.²⁶ Thus, a policy that combines government grants with additional transfers targeted at reducing poverty can potentially solve much of the problem for which the Maoists are blamed. The results encourage a focused strategy of negotiating with Maoists on these two aspects of government policy. Decreasing poverty is obviously a slow and expensive process. Perhaps there is a role for international agencies not only as donors, but in ensuring that government funds find their way to the intended beneficiaries so that the transfers reach their goals.²⁷

Many control variables are statistically significant. The negative sign on population density indicates that Maoist killings occur in less dense areas. Population density also serves to control for scale effects. The higher the proportion of the population that speaks Nepali as the primary language, the greater is the number of Maoist killings. Rural areas experience fewer

²⁶ Do and Iyer (2007) estimate 23-25 conflict-related deaths due to a 10% increase in the district level poverty rate. This estimate predicts about 1,875 conflict-related deaths nationwide. While different from our estimate (due to the different levels of aggregation, and also to the difference in incremental poverty rates used - 10 vs. 18 percent) we affirm the Do-Iyer finding.

²⁷ Given that the measures of inequality and poverty are obtained from the micro-level estimates, they may contain measurement errors. As a sensitivity analysis, we attempted to deal with measurement errors by using a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In the Bayesian method a *prior* distribution is combined with the likelihood of the data to produce a *posterior* distribution, from which we make inferences. The MCMC method is used to simulate the posterior distribution which we use to compute exact point estimates and standard errors. The posterior estimates thus computed are actually similar to those reported in the paper, and are not reported separately.

killings. The northern regions of Nepal, which consist of mountainous and hilly areas, experience more killings than the southern (Terai) region.

Among the variables we use as controls, it is worth considering two channels through which income may directly influence violence, even though this link is outside the framework of our theory. One channel is the “privation” constraint (e.g. Milante 2004) which precludes the acquisition of instruments of violence simply because it is beyond economic means. Provoking and maintaining widespread unrest over long periods requires sizable economic support. Villages with low per capita incomes should therefore have low levels of violence. But suppose this privation constraint is overcome by inter-village Maoist networks. Then a simpler channel is at work behind the positive association between *INCOME* and violence: Maoists are able to successfully export violence to high-income villages. According to the first model in Table 2, an increase in income of 3,460 Rupees (one standard deviation) is associated with an increase of 1,468 Maoist killings over an eight-year span. The third model indicates that a similar increase in income is associated with more than 2,000 additional killings over an eight-year period.

Interestingly, the *ETHNICITY* variable has a significant and positive association with Maoist violence, indicating that people whose mother tongue is Nepali are relatively more victimized than other ethnic groups. This result is consistent with the Maoist organizational strategy of attracting ethnic groups to their movement by promising them separate states if their movement succeeds. The idea of different states based on language and ethnicity within a federal system picked up during the MPW’s reign, and sustained even after the MPW as several ethnic groups separately began demanding a federal structure based on language/ethnicity.

4.2. Non-Linearity

In order to study a possibly non-linear relationship between inequality and violence, we explore interactions between inequality and other variables. We first study the interaction of inequality with income. This interaction answers the question of whether income ameliorates or worsens the impact of inequality on Maoist killings. Table 3 provides partial answers. Estimates on the issue variables are reported for two models, one that uses *GINI* to measure inequality and another that uses *POLARIZATION*_{1,5}. In the former model, the income-interaction effects indicate that higher income is associated with lower marginal impact of the Gini on Maoist violence. That is, as the level of village income rises, it dampens the impact that this measure of inequality has on

violence. One reason for this finding is this: the more (less) affluent is a village, the more (less) it is able to protect itself against Maoist violence by lobbying government to divert the services of the army and the police to their region and/or purchase protection privately by donating money to the Maoists. A less obvious reason is that the same Gini coefficient in high- and low-income villages translates into a better standard of living for all residents in the high-income village relative to the low-income village.²⁸ Thus, the impact of inequality on the intensity of violence is smaller in high-income villages. Beyond a certain threshold level of income, inequality has no influence on violence. It is in areas where inequality is large and the average income is low that Maoist violence is at its worst. This finding indicates that when the villagers' income increases, the opportunity cost of violent activities increases for a given level of inequality, resulting in lower levels of violent activities.

A fundamental difference between the two measures of inequality is that measuring inequality by $POLARIZATION_{1,5}$ leads to the opposite inference. The positive sign on the interaction of $POLARIZATION_{1,5}$ and $INCOME$ indicates that higher (mean) income in fact exacerbates the marginal impact of polarization on Maoist violence. Thus, the same level of $POLARIZATION_{1,5}$ in high- and low-income villages does *not* necessarily translate into a better quality of life for residents in high-income villages relative to low-income villages. This distinguishes the impact of polarization on conflict from the impact of the Gini. Assume for the moment, a causal connection between inequality and conflict (we discuss this below). The main message then, is that growth without redistribution that adequately decreases polarization (not merely the Gini) will have little impact on reducing killings by Maoists.

Next, we study the interaction of inequality variables with social capital. These interactions answer the question of whether social capital ameliorates the impact of inequality on Maoist killings. The model with the Gini shows that the interaction of $GINI$ with social capital measures has no noticeable influence on the marginal impact of inequality on Maoist violence. On the other hand, the model with $POLARIZATION_{1,5}$ indicates that activities of forest groups do ameliorate the impact of increased polarization on Maoist killings. The cross-partial coefficient of -33.07 is economically significant, indicating that a one-standard deviation increase in

²⁸ In the sample, $GINI$ and $INCOME$ have a correlation of 0.50. In contrast, $POLARIZATION_{1,5}$ has a small negative correlation with $INCOME$.

FORESTGRP (= 0.21) ameliorates the impact of a one-standard deviation increase in *POLARIZATION* (= 0.03) on Maoist killings by 546 deaths over an eight-year period. Thus, while income growth reverses the deleterious impact of a deteriorating Gini, it takes a specific type of social capital (forest groups) to reverse the deleterious impact of worsening polarization.

4.3. *Endogeneity*

Thus far, the inequality measures were presumed to be exogenous. Arguably they are, since *GINI* and *POLARIZATION* change slowly over time. It is possible however, that shocks to the error term, for instance due to a sudden outbreak of violence in a region, are correlated with similar movements in these variables. If, for example, there is significant out-migration of wealthy landlords or high-income families in response to sudden outbursts of violence, then the two inequality measures are negatively correlated with the error term, and their coefficient estimates are biased downward. In order to instrument for possible endogeneity of *GINI* and *POLARIZATION*_{1,5} we construct four instruments from data in the 1984 Nepal Statistics. Due to constraints imposed by data availability, the instruments are measured at the district-level. They are: log number of students attending school in the district, percentage of the district's population with secondary-level education, log land area of the district, and percentage of the district's land area under paddy cultivation. We argue they are exogenous, being unrelated with the dependent variable *KILLINGS* (and hence the error term).²⁹

Exogeneity of the instruments does not mean that they are adequate for the purpose of providing reliable inferences, in finite samples, about the impact of inequality on Maoist killings. For that they must jointly be strongly correlated with the inequality measures. The first-stage *F*-statistic for the four instruments in the *GINI* equation is 19.48 and in the *POLARIZATION*_{1,5} equation it is 7.40, indicating that causal inference does not suffer from the “weak instrument” problem (Stock and Watson 1997). That is, the two-stage method does produce reliable inferences.

The results from the second-stage estimation of the two-level negative binomial model presented in Table 4 allow causal inference. As we surmised, the uninstrumented models

²⁹ A correlation between the dependent variable *KILLINGS* and school enrollment rate (an instrument) may exist via employment opportunity. This argument, however, is unfounded in our case since the relationship between employment and killings is insignificant.

understate the impact of inequality on violent conflict. The estimate of 32.55 on *GINI* indicates that an increase of 0.026 in *GINI* (a one standard deviation change in the instrumented Gini) causes an 85% increase in Maoist killing, or a total of 2,219 additional deaths over an eight-year period. The estimate of 50.88 on *POLARIZATION*_{1,5} indicates that a 0.011 increase in that measure (a one-standard deviation change) causes an increase of 56% in Maoist killings, or 1,468 deaths over an eight-year period. These estimates are substantially larger than their uninstrumented counterparts shown in Table 2.

Of interest are the interaction terms in Table 5. *INCOME* is no longer statistically significant in the model with *GINI*, but their interaction is negative and statistically significant (just as in the uninstrumented case) indicating that an increase in income ameliorates the marginal impact of the Gini on Maoist killings. In contrast to the uninstrumented case, an increase in income no longer exacerbates the marginal impact of inequality as measured by *POLARIZATION*_{1,5} on Maoist killings. There are two other notable differences between the uninstrumented results in Table 3 and those in Table 5. The interactions of *POLARIZATION* with credit groups and women groups are statistically significant and economically large positive coefficients. Thus, while credit groups alleviate Maoist killings (coefficient of -2.66), the greater is *POLARIZATION*_{1,5} the less effective are credit groups in reducing the impact of polarization on Maoist killings (positive interaction coefficient).

The positive coefficient on the interaction of *POLARIZATION*_{1,5} with women groups is puzzling at best, and menacing at worst. The estimate indicates that while women groups themselves are not necessarily influential in lowering the number of killings, the presence of women groups actually exacerbates the marginal influence of polarization on Maoist violence. Have women groups in highly polarized villages redefined themselves as Maoist activists? If so, the increasing participation of women in Maoist groups³⁰ is perhaps the most disturbing impact of increased polarization, and is a phenomenon deserving further study.

³⁰ It is reported that in the Maoist organization about 50% of cadres at the local level and 30% of the soldiers are women (SATP n.d.).

5. Conclusion

This study analyzes the association between inequality and violent conflict within the confines of a single country. In addition to the traditional Gini index measure of inequality, we construct economic polarization measures (Esteban and Ray 1994, 1999) to explain violent conflict. Our predictions about the relationship between violent conflict and economic inequality are built on rational-choice theoretic foundations. The predictions are taken to data on Maoist killings in Nepal. From Maoist killings data across 3857 villages we find strong evidence that economic inequality, whether measured by the Gini or by Esteban-Ray polarization, is positively associated with Maoist killings. Exogenous variables are used to instrument the inequality measures, thus allowing us to interpret this not merely as a correlation but as a causal relationship.

Inequality also influences violent conflict via interaction effects. Interactions with income indicate that income softens the impact of the Gini on the intensity of violence, but this is not necessarily true for the case of polarization. Polarization thus proves to be a more resilient form of inequality.

Our results support the hypothesis that social capital generates spillover effects in the form of shared values, norms, self-governance and understanding among villagers, which encourages cooperation among community members. This helps deter violent conflict. Interactions of social capital measures with inequality are less sanguine (especially when we instrument inequality for endogeneity). The trumping of the possibly deterrent effect of social capital on violence by inequality is perhaps the most pernicious effect of inequality in Nepal.

An important finding is that the transfer of resources from the central to the local governments can play a role in reducing violence, most likely by reducing poverty and providing a sense of hope. In the backdrop of widespread poverty in the villages of Nepal, a significant positive association is found between the level of poverty and the intensity of the violence.

The policy implications of these findings are obvious, but some are easier to undertake than others. Government grants and targeted transfers to reduce poverty can potentially solve some of the problems for which the Maoists are blamed. Such policies can deliver good outcomes, at least in the short and medium run, provided that the transfers find their way to the intended beneficiaries. Ultimately though, economic growth is perhaps the main long-term solution to the poverty problem.

It is harder to overcome the more resilient relationship between inequality and violence. To the extent that reducing poverty also reduces inequality, transfers may work. But transfers may also be used by Maoists to arm themselves. Increasing income through growth may not be sufficient to reduce violence if the estimate on the interaction of polarization with income is any indication (at least not until income reaches a sufficiently high level which may take decades).

Perhaps a partial answer lies in the experience of other countries. Why have other unequal countries not witnessed the widespread violence seen in Nepal. India, for example, sees conflict between the government and Maoist organizations only locally and sporadically. An hypothesis is that redistribution by the federal government from wealthier states to poorer ones has been effective in preventing inequality from worsening beyond the limit at which collective action for violence might occur. Further research into whether this model might work for Nepal should be rewarding for several reasons. If this hypothesis is valid, it is not only consistent with our findings but would exemplify the kind of center-state institutions that Nepal needs in its transition to democracy. It would also indicate to emerging countries that have not seen violence on this scale how to forestall widening inequality and deepening polarization in their societies which might threaten their growing prosperity.

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Appendix: Theoretical Model of Inequality and redistribution

Milante's (2004) model starkly demonstrates how economic inequality may cause conflict. A country is populated by N agents who live for two periods. The agents are indexed in ascending order of their initial wealth, w_n , so that $w_1 < w_2, \dots, < w_N$. Normalizing the total wealth of all agents to unity allows w_n to be interpreted as agent n 's share of the country's wealth. The main conclusions are starkly demonstrated with a simple geometric distribution of initial wealth. Suppose $w_n = \Delta w_{n-1}$, $n = 1, \dots, N$. The parameter $\Delta \geq 1$ determines the degree of economic inequality inherent in the wealth distribution.

Agent n 's wealth may be written as a function of just agent 1's wealth as

$$w_n = \Delta^{n-1} w_1, \quad n = 1, \dots, N. \quad [1]$$

Summing together all agents and using [1], w_1 is solved as

$$w_1 = \frac{\Delta - 1}{\Delta^N - 1}. \quad [2]$$

Perfect equality occurs when $\Delta = 1$.³¹ As Δ diverges from unity, inequality increases. Thus, the parameter Δ determines the "distance" between the wealth of any two agents. The larger is Δ , the greater is the inequality as measured by any standard measure, for example, the Gini index or Esteban and Ray's (1994, 1999) measure of polarization. The wealth of agent n as a function of Δ is given as

$$w_n(\Delta) = w_1 \Delta^{n-1} = \frac{\Delta^{n-1} (\Delta - 1)}{\Delta^N - 1}. \quad [3]$$

Redistribution

Suppose agents are able to expend part of their wealth on activities directed at redistributing the country's wealth in their favor. Denote the resources spent on appropriation activity by agent n as $g_n \in [0, w_n]$. Governments must take steps to ensure that both the rich and the poor have equal access to institutions that redistribute. Otherwise, as we describe below, inequality may lead to a forcible and violent redistribution. That is, agent n 's activity towards

³¹ By L'Hopital's rule, $\lim_{\Delta \rightarrow 1} \frac{\Delta^N - 1}{\Delta - 1} = N$, and from [2] $Nw_1 = 1$ or $w_1 = 1/N$.

redistribution can take a form of violence if the institutionally requisite spending on such activity exceeds his available wealth, $g_n > w_n$.

The amount of the economy's wealth that is appropriable or redistributable depends on the extent of property rights laws and their enforcement. Denoting by $0 \leq \beta \leq 1$ the fraction of any agent's wealth that cannot be redistributed or contested, the redistributable wealth of the economy is

$$(1 - \beta) \sum_{i=1}^N (w_i - g_i). \quad [4]$$

All individuals have equal access to this redistributive wealth.³² Suppose the fraction of the contestable wealth captured by agent n is determined by agents n 's share of the resources devoted to redistribution, or $g_n / \sum_i g_i$.³³ Then agent n 's payoff, I_n , is the sum of his uncontested income and the amount of wealth he appropriates from the pool of contestable wealth:

$$I_n = \frac{g_n}{\sum_{i=1}^N g_i} (1 - \beta) \sum_{i=1}^N (w_i - g_i) + \beta (w_n - g_n). \quad [5]$$

Agent n chooses g_n to maximize this objective function. Milante shows that the optimal spending on redistributive activity by an agent is given by³⁴

$$g_n = g^* = \frac{(N-1)(1-\beta)}{N^2}, \quad n = 1, \dots, N. \quad [6]$$

Thus, the less contestable is other people's wealth, the lower is the per capita spending on redistributive activity.³⁵ At this optimal solution, the income of agent n is

³² In economies with weak legal institutions, this is not typically the case. In fact, agents in the position of power or with access to wealth have greater access to policy instruments that are used by politicians to redistribute wealth. In such cases, the wealth inequality is further exacerbated.

³³ Different models differ in this assumption. Esteban and Ray (1999) developed a full behavioral model in which the redistribution is a positive but a convex function of the amount of lobbying so that redistribution is expensive.

³⁴ In Esteban and Ray's (1999) more general behavioral model, different groups expend differently depending on the antagonism within that society. Antagonism is measured by the "distance" of the utilities of each group's preferred positions from every other group's preferred position.

$$I_n(\Delta) = (1 - \beta) \frac{1}{N} - g^* + \beta w_n(\Delta). \quad [7]$$

Define $r_n(\Delta)$ as the net change in agent n 's wealth (as a function of Δ). Then,

$$r_n(\Delta) \equiv I_n(\Delta) - g^* - w_n = (1 - \beta) \left[\frac{1}{N} - w_n(\Delta) \right]. \quad [8]$$

Redistribution is a zero sum game since $\sum_n r_n(\Delta) = 0$. Let \bar{n} index the individual with the mean income. Since $w_{\bar{n}} = 1/N$, $r_{\bar{n}} = 0$. Denote by $R^+(\Delta)$ the total net wealth change accruing to the population with above-mean-income, and by $R^-(\Delta)$ the total net wealth change accruing to the population with below-mean-income. Then

$$R^+(\Delta) = \sum_{n=\bar{n}}^N (1 - \beta) \left[\frac{1}{N} - w_n(\Delta) \right], \quad [9]$$

$$\text{and } R^-(\Delta) = \sum_{n=1}^{\bar{n}} (1 - \beta) \left[\frac{1}{N} - w_n(\Delta) \right]. \quad [10]$$

Clearly, in the no inequality case ($\Delta = 1$), $R^+ = R^- = 0$. With inequality however, Milante shows

$$\frac{\partial R^+}{\partial \Delta} < 0, \quad [11]$$

$$\text{and } \frac{\partial R^-}{\partial \Delta} > 0. \quad [12]$$

³⁵ Multiplying both sides of [6] by N yields total spending on redistributive activity as $Ng^* = (1 - 1/N)(1 - \beta)$. Thus, the fraction of the economy's total wealth devoted to redistribution increases and is concave in N .

Table 1: Variables' Definition and Basic Statistics (N = 3857)

| VARIABLE | Definition | Mean | Std. Dev. |
|-------------------------------|---|------|-----------|
| KILLINGS | No. of people killed by the Maoists in the villages (1996–2003) | 0.68 | 3.72 |
| GINI | Consumption GINI Index | 0.24 | 0.04 |
| POLARIZATION ($\alpha=1$) | Polarization Index when $\alpha = 1$ (see Section 3) | 0.15 | 0.01 |
| POLARIZATION ($\alpha=1.5$) | Polarization Index when $\alpha = 1.5$ | 0.17 | 0.03 |
| FARMERGRP | Social capital/network index of farmers | 0.04 | 0.10 |
| WATERUSERGRP | Social capital/network index of water-user group | 0.06 | 0.12 |
| FORESTUSERGRP | Social capital/network index of forest-user group | 0.10 | 0.21 |
| CREDITGRP | Social capital/network index of credit-user group | 0.02 | 0.08 |
| WOMENGRP | Social capital/network index of women | 0.12 | 0.27 |
| GOVTGRANT | Per capita grant (Rupees 100) [district level] | 0.43 | 0.56 |
| POVERTY | % below poverty line | 0.44 | 0.18 |
| POPDENSITY | Population POPDENSITY 100 persons per sq km | 2.93 | 3.66 |
| FARMER | % farmers | 0.34 | 0.14 |
| EDUCATION | Average years of schooling in each village (VDC) | 3.61 | 1.09 |
| RURAL | 1 if rural, 0 otherwise | 0.98 | 0.12 |
| MOUNTAIN | 1 if Mountain, 0 otherwise | 0.13 | 0.33 |
| HILL | 1 if Hills, 0 otherwise | 0.52 | 0.50 |
| TERAI | 1 if Terai, 0 otherwise | 0.36 | 0.48 |
| ETHNICITY | Percentage of people who speak Nepali as primary language | 0.51 | 0.38 |
| EMPLOYMENT | Mean months of employment | 5.60 | 1.35 |
| INCOME | Mean income (Rupees '000) | 9.24 | 3.46 |

Notes:

1. Data Sources:
 - a. KILLINGS compiled from Informal Sector Service Center (INSEC): Nepal Human Rights Yearbooks (1996-2004).
 - b. GINI, POLARIZATION, POVERTY, INCOME, FARMERGRP, WATERUSERGRP, CREDITGRP, CREDITGRP, and WOMENGRP constructed from data obtained from Central Bureau of Statistics, 1996 Nepal Living Standards Survey (NLSS), and Nepal Population Census 2001; Variables measured using survey-to-census imputation.
 - c. POPDENSITY, FARMER, EDUCATION, RURAL, MOUNTAIN, HILL, TERAI, ETHNICITY, EMPLOYMENT obtained from Nepal Population Census 2001, Central Bureau of Statistics, Kathmandu. Variables measured in 2001.
2. All variables measured at the village level except GOVTGRANT, FARMERGRP, WATERUSERGRP, CREDITGRP, CREDITGRP, and WOMENGRP which are at the district level and replicated at the village level.

Table 2: Conflict and (i) Inequality, (ii) Social Capital, and (iii) Government Policy
Dependent Variable: Number of persons killed by Maoists
 Estimates from 2-level Hierarchical Negative Binomial Model

| | | GINI | POL ($\alpha = 1$) | POL ($\alpha = 1.5$) |
|----------------|--------------------------------|--------------------|----------------------|------------------------|
| INEQUALITY | GINI | 6.33*** (1.98) | - | - |
| | POLARIZATION($\alpha = 1$) | - | 12.16*** (6.24) | - |
| | POLARIZATION($\alpha = 1.5$) | | | 5.79*** (2.16) |
| SOCIAL CAPITAL | FARMERGRP | -2.55*** (1.06) | -2.72*** (1.05) | -2.69*** (1.04) |
| | WATERUSERGRP | -0.80 (0.91) | -0.70 (0.90) | -0.76 (0.89) |
| | FORESTUSERGRP | 0.87 (0.56) | 0.91 (0.55) | 0.93 (0.55) |
| | CREDITGRP | -0.37 (1.11) | -0.18 (1.10) | -0.16 (1.09) |
| | WOMENGRP | -0.60** (0.35) | -0.55* (0.34) | -0.51* (0.34) |
| GOVT. POLICY | GRANT | -0.57*** (0.23) | -0.54*** (0.23) | -0.56*** (0.23) |
| | POVERTY | 3.07*** (0.85) | 3.19*** (0.85) | 3.10*** (0.85) |
| | INCOME | 0.11*** (0.04) | 0.14*** (0.04) | 0.15*** (0.04) |
| | EDUCATION | 0.02 (0.09) | 0.05 (0.09) | 0.06 (0.09) |
| | EMPLOYMENT | -0.02 (0.07) | -0.004 (0.07) | 0.004 (0.07) |
| | FARMER | -0.33 (0.95) | -0.35 (0.95) | -0.25 (0.95) |
| | POPENSITY | -0.11*** (0.03) | -0.12*** (0.03) | -0.12*** (0.03) |
| | ETHNICITY | 0.72*** (0.29) | 0.78*** (0.29) | 0.75*** (0.29) |
| | RURAL | -2.03*** (0.57) | -2.18*** (0.57) | -2.07*** (0.57) |
| | MOUNTAIN | 0.83** (0.42) | 0.76** (0.42) | 0.73** (0.41) |
| | HILL | 0.62** (0.31) | 0.60** (0.31) | 0.56** (0.30) |
| | CONSTANT | 0.83 (0.61) | 1.02 (0.61) | 0.93 (0.61) |
| | σ^2_i | 0.18 (0.09) | 0.16 (0.08) | 0.15 (0.08) |
| | N | 3857 | 3857 | 3857 |

Notes: 1. Standard errors in parentheses; ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively. For issue variables (Inequality, Social Capital, Government Policy) statistical significance is based on one-tailed tests as per hypotheses H1-H4. For all other variables, statistical significance is based on two-tailed tests.

2. Estimates are from the underlying log-link function and are therefore to be interpreted as coefficients from a log-linear model.

Table 3: Models with Interactions of GINI and POL with (i) Income and (ii) Social Capital
Dependent Variable: Number of persons killed by Maoists
 Estimates from 2-level Hierarchical Negative Binomial Model

| | GINI | POL ($\alpha=1.5$) |
|-------------------|---------------------------------|----------------------|
| INEQ | GINI | 6.43*** (2.15) |
| | POLARIZATION ($\alpha = 1.5$) | - 4.60* (2.84) |
| SOCIAL CAPITAL | FARMERGRP | -2.61*** (1.03) |
| | WATERUSERGRP | -2.47*** (1.02) |
| | FORESTUSERGRP | -0.41 (0.89) |
| | CREDITGRP | 0.85 (0.54) |
| | WOMENGRP | 0.60 (0.54) |
| | INCOME | -0.44 (1.10) |
| INTERACTIONS | INEQ*INCOME | -0.11 (1.07) |
| | INEQ*FARMERGRP | -0.50* (0.35) |
| | INEQ*WATERGRP | 0.16*** (0.05) |
| | INEQ*FORESTGRP | 0.19*** (0.04) |
| | INEQ*CREDITGRP | -0.96** (0.50) |
| | INEQ*WOMENGRP | 1.85** (0.74) |
| | INEQ*POLARIZATION | -2.24 (19.06) |
| INEQ*WATERGRP | -21.50 (18.83) | |
| INEQ*FORESTGRP | 13.93 (11.19) | |
| INEQ*CREDITGRP | -9.93 (21.45) | |
| INEQ*WOMENGRP | -5.74 (6.30) | |
| INEQ*POLARIZATION | -1.10 (23.95) | |
| INEQ*FORESTGRP | -33.07** (15.88) | |
| INEQ*CREDITGRP | 1.80 (23.63) | |
| INEQ*WOMENGRP | 7.03 (9.42) | |

Notes

1. See notes to Table 1.
2. All other variables in Table 2 are also included but not reported. Their coefficients are qualitatively similar.

Table 4: Models with Instrumented GINI and POLARIZATION
Dependent Variable: Number of persons killed by Maoists
 Estimates from two-stage 2-level Hierarchical Negative Binomial Model

| | | GINI | POL ($\alpha=1$) | POL ($\alpha=1.5$) |
|----------------|-------------------------------|--------------------|---------------------|----------------------|
| INEQUALITY | GINI | 32.55** (15.26) | - | - |
| | POLARIZATION ($\alpha=1$) | - | 165.04** (94.27) | - |
| | POLARIZATION ($\alpha=1.5$) | - | - | 50.88** (29.34) |
| SOCIAL CAPITAL | FARMERGRP | -2.38*** (1.00) | -2.72*** (1.01) | -1.96** (1.11) |
| | WATERUSERGRP | -1.75** (0.97) | -1.93** (1.14) | -1.86* (1.15) |
| | FORESTUSERGRP | 1.29 (0.58) | 1.25 (0.59) | 0.90 (0.54) |
| | CREDITGRP | -1.77* (1.23) | -0.74 (1.12) | -0.08 (1.07) |
| | WOMENGRP | -0.73** (0.33) | -0.42 (0.35) | -0.25 (0.40) |
| GOVT. POLICY | GRANT | -0.72*** (0.24) | -0.79*** (0.27) | -0.87*** (0.30) |
| | POVERTY | 3.42*** (0.84) | 2.69*** (0.90) | 1.23 (1.48) |
| | INCOME | -0.05 (0.10) | 0.07 (0.06) | 0.18*** (0.05) |
| | EDUCATION | 0.02 (0.09) | 0.02 (0.09) | 0.01 (0.09) |
| | EMPLOYMENT | -0.02 (0.07) | -0.12 (0.11) | -0.13 (0.11) |
| | FARMER | 1.71 (1.42) | 2.54 (2.12) | 1.44 (1.62) |
| | POPDENSITY | -0.03 (0.05) | -0.06 (0.05) | -0.12 (0.03) |
| | ETHNICITY | 0.30 (0.39) | 0.98*** (0.30) | 0.90*** (0.30) |
| | RURAL | -1.16 (0.76) | -1.22 (0.83) | -0.65 (1.09) |
| | MOUNTAIN | 1.37*** (0.50) | 1.08*** (0.46) | 0.45 (0.44) |
| | HILL | 1.04*** (0.38) | 1.10*** (0.43) | 0.52* (0.30) |
| | CONSTANT | -0.36 (0.940) | -0.24 (1.00) | -0.41 (1.08) |
| | σ^2_i | 0.12 (0.07) | 0.11 (0.07) | 0.12 (0.08) |
| | N | 3857 | 3857 | 3857 |

Note:

1. Standard errors in parentheses; ***, **, * indicate statistical significance at 1%, 5%, and 10% respectively.

Table 5: Models with Instrumented GINI and POLARIZATION and their interactions
Dependent Variable: Number of persons killed by Maoists
 Estimates from two-stage 2-level Hierarchical Negative Binomial Model

| | | GINI | POL ($\alpha=1.5$) |
|----------------|-------------------------------|--------------------|----------------------|
| INEQ | GINI | 30.39** (14.78) | - |
| | POLARIZATION ($\alpha=1.5$) | - | 63.29*** (26.52) |
| SOCIAL CAPITAL | FARMERGRP | -2.26*** (0.96) | -2.51*** (1.10) |
| | WATERUSERGRP | -1.31* (0.94) | -1.74** (1.04) |
| | FORESTUSERGRP | 1.18 (0.57) | 1.12 (0.53) |
| | CREDITGRP | -2.00* (1.35) | -2.66** (1.27) |
| | WOMENGRP | -0.75** (0.34) | 0.43 (0.41) |
| | INCOME | 0.07 (0.11) | 0.23*** (0.05) |
| INTERACTIONS | INEQ*INCOME | -1.45*** (0.55) | 1.54 (1.93) |
| | INEQ*FARMERGRP | 3.31 (29.84) | -67.79 (99.48) |
| | INEQ*WATERGRP | - | 101.84 (78.91) |
| | INEQ*FORESTGRP | -3.52 (17.61) | -17.06 (51.32) |
| | INEQ*CREDITGRP | -1.65 (39.00) | 306.09** (136.51) |
| | INEQ*WOMENGRP | - | 104.24*** (32.67) |

Notes:

1. See notes to Table 1.
2. All other variables in Table 4 are also included but not reported. Their coefficients are qualitatively similar.
3. INEQ in the interactions refers to the instrumented GINI or POLARIZATION.
4. Including GINI*WATERGRP and GINI*WOMENGRP cause the Hessian to be near-singular and are therefore dropped from the first model.