

Deprivation, Violence, and Conflict: An Analysis of Naxalite Activity in the Districts of India

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Deprivation, Violence, and Conflict: An Analysis of Naxalite Activity in the Districts of India

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This paper asks: is it a fact that there is more violence in districts affected by Naxalite (Maoist) activity compared to those which are free of Naxalite activity? And can the existence of Naxalite activity in some districts of India, but not in others, be explained by differences in economic and social conditions? This study identifies districts in India in which there was significant Naxalite activity and correlating the findings with district-level economic, social, and crime indicators. The econometric results show that, after controlling for other variables, Naxalite activity in a district had, if anything, a dampening effect on its level of violent crime and crimes against women. Furthermore, even after controlling for other variables, the probability of a district being Naxalite-affected rose with an increase in its poverty rate and fell with a rise in its literacy rate. So, one prong in an anti-Naxalite strategy would be to address the twin issues of poverty and illiteracy in India.

1. Introduction

The successful military campaign that Nepal's Maoists waged against the Nepalese monarchy and its political establishment has also drawn attention to the activities of Maoist groups in India (known, collectively, as "Naxalites", after Naxalbari, the district in West Bengal where the first Maoist-inspired insurgency began in 1967). The Indian Home Ministry estimates that 91 percent of violence in India, and 89 percent of deaths arising from violence, are the result of Naxalite action (Government of India 2005, p.39). Moreover, the growth of Naxalite activity in India has been phenomenal: from 55 districts afflicted by various degrees of Naxalite activity in eight states in November 2003 to 157 districts across 13 states in 2005 (Gill 2005). In response to the threat posed by Naxalites, the Indian government set up a high-powered committee—headed by the Union Home Minister and having as its members the chief

ministers of the worst-affected states (Andhra Pradesh, Maharashtra, Madhya Pradesh, Chattisgarh, Jharkhand, Bihar, Uttaranchal, Orissa, and Uttar Pradesh)—to address the problem.

Referring to the workings of this Committee, the Indian Prime Minister, Manmohan Singh, pointed out that Naxalite insurgency should not be viewed as a purely law and order problem: underlying this insurgency, and lending it support, was the social and economic deprivation experienced by a significant part of India's population. For example, as Bhatia observed (2005), a large part of Naxalite activities are, in fact, are "non violent" and that this feature of the Naxalite movement has received little attention. Moreover, many of these open and non-violent activities—*inter alia* meetings, boycotts, marches, road blocks—are in pursuit of basic economic and social rights: for example,

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land rights, minimum wages, right to use common property resources, the right of the “lower castes” to respect and dignity. In consequence, combating Naxalite violence, arguably, requires not just strong police and military action but also effective measures to alleviate political, social, and economic deprivation and injustice.¹

Against this background, this paper, after identifying districts in India in which there is significant Naxalite activity (hereafter, simply “Naxalite activity”), asks two questions: (1) Is it a fact that there is more violence in Naxalite-affected districts compared to districts which are free of Naxalite activity?² (2) Can the fact that Naxalite activity exists in some districts of India, but not in others, be explained by differences in economic and social conditions?

2. Naxalite Activity in Indian Districts

We identified, on the basis of Government of India (2005) and various websites (prominent among which was the South Asian Intelligence Review, <http://www.satp.org/satporgrp/sair/>) 88 districts in ten states in which there was Naxalite activity.³ This estimate lies between a low of 76 districts in nine states (Government of India, 2005) and a high of 157 districts in thirteen states (Gill, 2005). The Naxalite-affected districts we identified are listed in Table 1.

Table 1: Districts in India with Naxalite presence

State	District
Andhra Pradesh	Adilabad
Andhra Pradesh	Anantapur
Andhra Pradesh	East Godavari
Andhra Pradesh	Guntur
Andhra Pradesh	Karimnagar
Andhra Pradesh	Khammam

State	District
Andhra Pradesh	Kurnool
Andhra Pradesh	Mahbubnagar
Andhra Pradesh	Medak
Andhra Pradesh	Nalgonda
Andhra Pradesh	Nizamabad
Andhra Pradesh	Srikakulam
Andhra Pradesh	Visakhapatnam
Andhra Pradesh	Vizianagaram
Andhra Pradesh	Warangal
Bihar	Aurangabad
Bihar	Banka
Bihar	Darbhanga
Bihar	Gaya
Bihar	Jamui
Bihar	Jehanabad
Bihar	Kaimur (Bhabua)
Bihar	Khagaria
Bihar	Muzaffarpur
Bihar	Patna
Bihar	Rohtas
Bihar	Sitamarhi
Chhattisgarh	Bastar
Chhattisgarh	Dantewada
Chhattisgarh	Jashpur
Chhattisgarh	Kanker
Chhattisgarh	Kawardha
Chhattisgarh	Rajnandgaon
Chhattisgarh	Surguja
Jharkhand	Bokaro
Jharkhand	Chatra
Jharkhand	Dhanbad
Jharkhand	Garhwa
Jharkhand	Giridih

¹ The best predictors of civil war were low average incomes, low growth, and a high dependence on primary exports (“The Global Menace of Local Strife,” *The Economist*, May 22, 2003).

² The district is the smallest geographical unit for which a consistent set of data is available. There are 593 districts in India, with a District Commissioner (or District Collector) acting as the administrative head of each district. The median and mean populations of these districts were, respectively,

1.47 and 1.73 million persons: the most and the least populous districts were Medinipur in West Bengal (population: 9,638,473) and Yanam in Pondicherry (population: 31,362). By focusing on districts, the study is able to concentrate attention on pockets of deprivation instead of viewing deprivation as a phenomenon affecting a state or a region in its entirety (Misra 2001; Kurian 2001).

³ Information on Karnataka was obtained from Ramana (2005) and for Tamil

Nadu from Viswanathan (2002).

⁴ Naxalite activity in India is spearheaded by two groups: the Communist Party Marxist-Leninist—People’s War Group and the Maoist Communist Centre of India (Government of India 2005). For details of other groups and their histories see the South Asian Terrorist Portal (SATP), <http://www.satp.org>.

State	District	State	District
Jharkhand	Gumla	Orissa	Nabarangapur
Jharkhand	Hazaribag	Orissa	Rayagada
Jharkhand	Kodarma	Orissa	Sundargarh
Jharkhand	Lohardaga	Tamil Nadu	Dharmapuri
Jharkhand	Palamu	Tamil Nadu	Viluppuram
Jharkhand	Pashchimi Singhbhum	Uttar Pradesh	Chandauli
Jharkhand	Purbi Singhbhum	Uttar Pradesh	Mirzapur
Jharkhand	Ranchi	Uttar Pradesh	Sonbhadra
Karnataka	Bellary	West Bengal	Bankura
Karnataka	Bidar	West Bengal	Bardhaman
Karnataka	Chikmagalur	West Bengal	Hugli
Karnataka	Gulbarga	West Bengal	Medinipur
Karnataka	Kolar	West Bengal	Puruliya
Karnataka	Raichur	West Bengal	South Twentyfour Parganas
Karnataka	Shimoga		
Karnataka	Tumkur		
Karnataka	Udupi		
Madhya Pradesh	Balaghat		
Madhya Pradesh	Dindori		
Madhya Pradesh	Mandla		
Madhya Pradesh	Aurangabad		
Madhya Pradesh	Bhandara		
Madhya Pradesh	Chandrapur		
Madhya Pradesh	Gadchiroli		
Madhya Pradesh	Gondiya		
Madhya Pradesh	Nanded		
Madhya Pradesh	Yavatmal		
Orissa	Gajapati		
Orissa	Ganjam		
Orissa	Kandhamal		
Orissa	Kendujhar		
Orissa	Koraput		
Orissa	Malkangiri		
Orissa	Mayurbhanj		

District-level data on population from the 2001 Census of India and Debroy and Bhandari (2004) provided us with further data on a number of welfare indicators in the districts:

1. The *poverty rate*: the proportion of households in a district who are below the poverty line.⁵
2. The *literacy rate*: the percentage of persons (who were seven years of age or above) in a district who were literate.⁶
3. The *immunisation rate*: the proportion of 0–6 year olds in a district who were immunised against disease.⁷
4. The *infant mortality rate*: deaths per 1,000 live births.⁸
5. The *pupil-teacher ratio*: the number of pupils per teacher in primary schools.⁹
6. The *pregnancy attention rate*: the proportion of women receiving skilled attention during pregnancy.
7. The *sex ratio*: among 0–6 year olds, the number of females per 1,000 males.¹⁰
8. The *safe drinking water rate*: the proportion of habitations in a district with safe drinking water.

⁵ The district level poverty rates are based on Bhandari and Dubey (2003). These data are from the Government of India's National Sample Survey (NSS), carried out under the auspices of the National Sample Survey Organisation (NSSO), an autonomous agency of the Ministry of Statistics, Government of India. These surveys provide representative estimates, at a national level and for the major Indian states, for a range of socio-economic indicators (Tendulkar 2007).

⁶ These data were from the 2001 Census. The

literacy rate was made "gender sensitive" by adjusting for differences in male and female literacy rates. The 2001 Census was also the source for the sex ratio and the female participation rate.

⁷ Complete immunisation involves vaccination of children, within the first year of life, against six diseases: diphtheria, pertussis, tetanus, tuberculosis, poliomyelitis, and measles. Source: *National Commission on Population's District-wise Indicators*, 2001, Government of India: New Delhi. This

was also the source for data on pregnancy attention rate, safe drinking water, and pucca roads.

⁸ The infant mortality rates are from the Registrar General of India.

⁹ Source: Selected Educational Statistics, 2000–01, <http://www.educationforallindia.com/selected-educational-statistics-2000-2001.pdf>.

¹⁰ 2001 Census for India.

9. The *pucca road* rate: the proportion of villages in a district connected by *pucca* (motorable) road.
10. The *female participation* rate, defined as the proportion of women in a district's workforce.

When “backwardness” was measured by a district's poverty rate, 85 of the 100 worst performing districts were contained in just seven states (Assam, Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Orissa, and West Bengal) and 45 districts were in just three states (Bihar, Jharkhand, and Orissa). In terms of (il)literacy, five states (Bihar, Jharkhand, Rajasthan, Orissa, and Uttar Pradesh) contributed 75 districts. In terms of immunisation rates, seven states (Arunachal Pradesh, Assam, Bihar, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh) contributed 85 districts. In terms of infant mortality rates, four states (Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh) contributed 96 districts. In terms of the sex ratio of 0–6 year olds, five states (Gujarat, Haryana, Punjab, Rajasthan, and Uttar Pradesh) contributed 74 districts. Of the 100 districts with the lowest percentage of women receiving skilled assistance during pregnancy, 27 were in Uttar Pradesh and 25 were in Bihar. Lastly, of the 100 districts with the highest percentage of villages not connected to *pucca* roads, 30 were in Orissa and 22 were in Madhya Pradesh.¹¹

In addition to the above variables, some other variables were also relevant to the study of Naxalite behaviour. The first of these was the proportion of a district's area which was under *forest cover* because such cover provides a favourable environment for conducting armed insurrection. This information was provided by the Forest Survey of India (2003). The Forest Survey of India distinguishes between three types of forest cover: very dense, moderately dense, and open forest. In this study the three types were combined to provide an overall figure for forest cover.

Since the government of India reported that, “the main support for the Naxalite movement comes from *Dalits* (Scheduled Castes) and *Adivasis* (Scheduled Tribes)” (2008, 3), the second set of variables related to the proportion of a district's population that belonged to the lower social classes: scheduled tribes (ST), scheduled castes (SC), and the other backward classes (OBC).¹² These data were computed from the 61st round of the National Sample Survey (pertaining to 2004–05).

The rationale for the choice of the variables set out above is the Government of India's belief—as exemplified by the title of a report it commissioned into the causes of extremism, *Development Challenges in Extremist Affected Areas* (Government of India 2008)—that issues of high poverty, low education, and limited employment opportunities were, in significant part, responsible for the growth of extremism in India. In this context, many of the variables used in this study were “developmental” variables reflecting the level of economic, social, and personal development of a district's population.

Crime statistics. The National Crime Records Bureau has, since 1953, provided crime statistics in India (relating to the number of reported crimes which fell under the purview of the Indian Penal Code) by state and district. We had available to us district level crime statistics for 1998. From these data, we defined three broad categories of crime:

1. *Violent crime*, comprising murders, attempted murders, rapes, kidnappings, *dacoities*, robberies, burglaries, thefts, riots, sexual harassment, dowry deaths, and cruelty by husband and relatives.
2. *Anti-women crime*, comprising rapes, kidnapping and abduction of women and girls, sexual harassment, dowry deaths, and cruelty by husband and relatives.

¹¹ It should be noted that in peripheral areas, with difficult terrain, data may be less reliable than data for say urban areas.

¹² In response to the burden of social stigma and economic backwardness borne by persons belonging to some of India's castes, the Constitution of India allows for special provisions for members of these castes. Articles 341 and 342 include a list of castes and

tribes entitled to such provisions and all those groups included in this list—and subsequent modifications to this list—are referred to as “Scheduled Castes” (SC) and “Scheduled Tribes” (ST) respectively. Reservations for the SC were designed to assist groups who had known centuries of discrimination; reservations for ST were designed to assist groups who were traditionally isolated from the modern world and from mainstream society. Article 340

of the Indian Constitution empowers the government to create another deprived group designated as “other backward classes” (OBC) and in 1955, following the report of the Kalelkar Commission, 2,339 groups were designated as belonging to the OBC.

3. Public order crime, comprising riots and arson.

From the numbers of offences under each of the above categories we constructed the *violent crime rate* as the number of violent crimes in a district, per 10,000 of its adult population, and the *anti-women crime rate* as the number of crimes against women in a district, per 10,000 of its adult female population.

In terms of rates of violent crime, 23 and 22 districts of the 100 worst districts were in Madhya Pradesh and Rajasthan respectively, while, of the 100 worst districts in terms of rates of crime against women, 34 and 25 districts were in Madhya Pradesh and Rajasthan respectively. In terms of the *number* of crimes, 17 of the worst districts in terms of violent crime and crimes against women were in Maharashtra, with Andhra Pradesh and Rajasthan providing the next highest concentrations of violent crime districts. In terms of crimes against public order, 26 of the 100 districts with the largest number of such crimes were in Rajasthan, with Bihar, Kerala, and Tamil Nadu contributing, respectively, 13, 12, and 11 districts.

Table 2: Indicators of deprivation and rates of crime in Naxalite-affected versus Naxalite-free districts

	Naxalite-affected districts	Naxalite-free districts
Poverty rate (%)	32	24
Literacy rate	60.1	66.6
Infant mortality rate	72.3	73.4
Immunisation rate	51.8	52.8
Pregnancy assistance	43.0	50.5
Safe drinking water	68.1	73.5
<i>Pucca</i> roads	44.4	35.4
Number of violent crimes	1,655	1,592
Number of crimes against women	217	198
Number of crimes against public order	222	169

Poverty rate: Percentage of population below the poverty line.

Literacy rate: Percentage of adult population which is literate.

Infant mortality rate: Deaths before the age of one per 1,000 live births.

Immunisation rate: Percentage of children fully immunised, 0–6 years of age.

Pregnancy assistance: Percentage of women receiving skilled assistance during pregnancy.

Safe drinking water: Percentage of habitations covered by safe drinking water.

Pucca roads: Percentage of villages not connected by *pucca* road.

Number of violent crimes: Number of murders, attempted murders, rapes, kidnappings, *dacoities*, robberies, burglaries, thefts, riots, sexual harassments, dowry deaths, and cruelty by husband and relatives, in the district in 1998.

Number of crimes against women: Number of rapes, kidnappings and abductions of women and young girls, molestations, sexual harassments, dowry deaths, and cruelty by husband and relatives, in the district in 1998.

Number of crimes against public order: Number of riots and cases of arson.

Table 2 compares, with respect to each of the deprivation indicators and crime indicators listed above, districts in which there was, and was not, Naxalite activity. It shows that the average poverty rate in Naxalite-affected districts was considerably higher than that in districts which did not have Naxalite activity (32 versus 24 percent) and the literacy rate in Naxalite-affected districts was considerably lower than that in districts which did not have Naxalite activity (60 versus 67 percent). Furthermore, the average numbers of violent crimes, crimes against women, and public order crimes were all higher in Naxalite-affected districts than in Naxalite-free districts.

3. Estimation Results for the Crime Equations

Naxalite activity is not the only form of armed insurrection in India. However, political violence in Jammu and Kashmir and in the north-eastern states of India—the two areas most affected by *non-Naxalite* insurrection—is driven by separatist motives rather than by reasons of socio-economic oppression. In order not to confuse the two differently motivated insurrection types—Naxalite and non-Naxalite—the states of Jammu and Kashmir and all the north-eastern states were excluded from the estimation sample both for the crime equations (this section) and for the Naxalite activity equations (next section).¹³ Both sets of equations—crime and Naxalite activity—were estimated over all the districts in India and also over all the districts in the Naxalite-affected Indian states.¹⁴

The preceding section raises the question of whether the level of violent crime in a district can be explained by its characteristics, where these characteristics include the presence or absence of Naxalite activity in the district.¹⁵ In order to examine this hypothesis we estimated, using district-level data for the whole of India, three econometric equations whose dependent variables were, respectively, the number in every district of: (1) violent crimes, (2) crimes against women, (3) crimes against public order. The equations were estimated, over all the Indian districts, as a system of Seemingly Unrelated Regression Equations (SURE) in order to allow for correlation between the error terms of the three equations.

¹³ Excluded north-eastern states are: Arunachal Pradesh, Assam, Meghalaya, Mizoram, Manipur, Nagaland, and Tripura.

¹⁴ Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, and West Bengal.

¹⁵ Of course, there is the possibility that, rather than violent crime being engendered by Naxalite activity, Naxalities operate in districts where there is already a high level of violence.

Table 3: Regression estimates of the crime equations

	District number of crimes for all states			District number of crimes for Naxalite-affected states		
	Violent crimes	Crimes against women	Crimes against public order	Violent crimes	Crimes against women	Crimes against public order
Naxalite activity	-236.917 (1.43)	-41.421** (2.19)		-57.814 (0.31)	-26.562 (1.35)	
District poverty rate			-3.051*** (4.00)			-0.465 (0.76)
Proportion of the district's population which is rural	-42.310*** (9.71)	-1.348*** (2.72)		-55.342*** (9.72)	-1.343** (2.17)	
District literacy rate	34.225*** (3.57)	13.681*** (3.81)	7.377*** (4.38)	6.499 (0.54)	11.706** (2.38)	-1.585 (1.28)
District literacy rate squared		-0.070** (2.35)			-0.076* (1.74)	
District ratio of female to male literates	-33.324*** (3.32)	-3.890*** (3.33)	-9.663*** (5.42)	-4.605 (0.33)	-0.298 (0.20)	1.887 (1.28)
District coverage of safe drinking water	-4.404* (1.67)	-0.494 (1.64)	-1.869*** (4.03)	-2.690 (0.80)	-0.079 (0.22)	-0.316 (0.90)
District male population	10.341*** (3.77)	2.686*** (8.59)	2.229*** (11.45)	6.087* (1.75)	2.487*** (6.55)	1.674*** (11.47)
District male population squared	0.031*** (3.91)	-0.002** (1.99)		0.033*** (3.63)	-0.002* (1.77)	
Proportion of district under forest cover	0.923 (0.22)	-0.219 (0.46)	-0.505 (0.71)	-2.790 (0.48)	-0.174 (0.28)	-0.079 (0.14)
Proportion of district population belonging to the Scheduled Tribes	13.051*** (2.65)	2.318*** (4.16)	2.977*** (3.20)	7.897 (1.13)	1.687** (2.25)	0.157 (0.20)
Proportion of district population belonging to the Scheduled Castes	-2.542 (0.37)	-0.363 (0.46)	2.086* (1.69)	-1.338 (0.15)	-0.825 (0.87)	2.470*** (2.64)
Proportion of district population belonging to the Other Backward Classes	8.737** (2.51)	0.235 (0.60)	1.629*** (2.63)	3.897 (0.80)	-0.533 (1.03)	0.697 (1.35)
Constant	3,783.779*** (4.47)	-176.841 (1.24)	274.215** (2.50)	5,092.557*** (4.71)	-243.786 (1.42)	-48.865 (0.59)
R2	0.615	0.487	0.293	0.637	0.510	0.402
LR test:	$\chi^2(11)=747$	$\chi^2(12)=451$	$\chi^2(9)=190$	$\chi^2(11)=586$	$\chi^2(12)=352$	$\chi^2(9)=225$
Observations	463	463	463	334	334	334

Notes:

Seemingly Unrelated Regression Equations (SURE) estimates. Numbers in parentheses are z-scores.

*** significant at 1 percent level; ** significant at 5 percent level; * significant at 10 percent level;

The chi-squared statistics report the result of testing the null hypotheses that all the slope coefficients are zero against the alternative hypothesis that some are non-zero.

Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, and West Bengal.

The estimation results from the three crime equations are shown in Table 3. Some variables whose associated coefficients had *z* scores which were less than 1 were omitted from the equation specification: as is well known, the omission of such variables enhances the explanatory power of the equation.¹⁶ The equations for violent crime, crimes against women, and crimes against public order explain, respectively, 62, 49, and 29 percent of the inter-district variation (over all the Indian districts) in the numbers of such crimes for India in its entirety, and 64, 51, and 40 percent of inter-district variation for the Naxalite-affected states.

The first point to make about the estimation results is that, after controlling for other factors, districts with Naxalite presence (listed in Table 1) had *ceteris paribus* lower numbers for violent crime and crimes against women compared to districts in which there was no Naxalite activity. As is well known, the Naxalite movement in India pays special regard to the economic and social position of disadvantaged groups (Dalits, Adivasis, and women) from whom it gets most of its support. However, it should be stressed that the coefficients associated with the Naxalite variable were not significantly different from zero. It is difficult to say why, *after controlling for other factors*, normal criminal activity is lower in Naxalite districts; judging from the experience of say, Northern Ireland, it is plausible that Naxalites—like the Loyalist and Republican paramilitary forces in Northern Ireland—also enforce law and order in their areas of influence (Knox 2001).

The second point is that districts in India (whether Naxalite or non-Naxalite), with a larger proportion of their population living in rural areas had lower levels of violent crime and of crimes against women compared to more urbanised districts: a percentage point increase in the proportion of a district's rural population would lead, on average, the number of violent crimes in a district to fall by 42 and crimes against women to fall by one for India in its entirety,

and by 55 and one for the Naxalite-affected states (figures per 10,000 population).

The third point is that the poverty rate (i.e. the proportion of households in the district who were poor), whether or not the district was Naxalite-affected, had no bearing on the number of violent crimes, or on the number of crimes against women. However, the level of poverty did have a significant effect on the number of crimes against public order (riots and arson): the *smaller* the proportion of households in the district who were poor, the *larger* the number of crimes against public order.¹⁷

The fourth point is that, for India in its entirety, higher levels of literacy were associated with a higher number of crimes, of all three types, in a district. A percentage point increase in the literacy rate was associated with an additional 34 violent crimes, 14 crimes against women, and 7 crimes against public order (figures per 10,000 population). However, in Naxalite-affected states, literacy rates did not exercise a significant effect on the number of violent crimes, or on the number of crimes against public order, in a district but they did exert a significant upward influence on the number of crimes against women in a district. However, partially offsetting this “bad” literacy effect, a rise in the ratio of female to male literacy rates served to reduce the number of all three types of crime, with the largest impact being on violent crime and the smallest on crimes against women.

The fifth point is that the absence of safe drinking water in a district, whether Naxalite or non-Naxalite, was associated with higher numbers of all three types of crime, with the effect being highest for violent crimes: a percentage point increase in the number of habitations receiving safe drinking water would lead to the number of violent crimes in a district falling by four per 10,000 population. The association between safe drinking water and violence is not surprising:

¹⁶ One exception was the variable “forest cover.” This variable is important in explaining Naxalite activity because it presumably offers a suitable physical environment for armed activity. Since

it might also be favourable for criminal activity, it was retained on grounds of consistency.

¹⁷ A percentage fall in the poverty rate would lead to the number of crimes against public order to increase by three.

in villages and in the poorer urban areas of India, waiting to obtain water from a shared source (for example river, pond, tap) is a feature of daily life and provides a flash-point for arguments and quarrels and, in particular for inter-caste disputes as upper caste persons attempt to prevent lower caste persons from drawing water.

The sixth point is that the number of crimes in a district (whether Naxalite or non-Naxalite), was positively related to the number of adult males in a district. If adult males are viewed as the main perpetrators of crime, then an increase of 10,000 in their number was associated with an additional ten violent crimes; three crimes against women; and two crimes against public order (figures per 10,000 population).¹⁸

Lastly, the presence of persons from the Scheduled Tribes in a district was associated with a higher average number of crimes in a district, in particular for violent crimes: for India in its entirety, a percentage point increase in the proportion of persons from the Scheduled Tribes would lead the average number of violent crimes in a district to go up by thirteen per 10,000 population. Given the level of violence

against persons from the Scheduled Tribes it is, perhaps, not surprising that Naxalite activity is focused in such areas.

4. Estimation Results for the Naxalite Activity Equation

Using the district-level data, described above, we estimated a logit model in which the dependent variable (*naxal*) took the value 1 if a district had Naxalite activity (see Table 1) and the value 0 if it did not. This variable was defined for *all the districts* in the Indian states analysed here. Table 4 shows the results of estimating such a model, firstly on data for *all the districts* in India (but, as discussed earlier, excluding Jammu and Kashmir and the north-eastern states) and, then, on data *restricted to the ten Indian states*—Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, and West Bengal—containing districts affected by Naxalite activity. The columns of Tables 4 show the estimated odds ratios: a coefficient estimate greater than 1 implies that the probability of a district having Naxalite activity ($\Pr(naxal=1)$) rises with an increase in the value of that variable while an estimate less than 1 implies that the probability falls.¹⁹

¹⁸ The square of the adult male population was included to make the population effect non-linear.

¹⁹ The logit equation is $\frac{\Pr(naxal_j = 1)}{1 - \Pr(naxal_j = 1)} = \exp\left\{\sum_{k=1}^K X_{jk} \beta_k\right\} = \exp\{z_j\}$ for M coefficients, $\beta_j, j=1 \dots M$

and for values, X_{jk} on $k=1 \dots K$ variables. The columns of Table 9 report report

$\frac{\partial}{\partial X_{jk}} \left(\frac{\Pr(naxal_j = 1)}{1 - \Pr(naxal_j = 1)} \right) = \beta_k \exp(\sum X_{jk} \beta_k)$, which is the the change in the odds ratio, given a change

in the value of the k^{th} variable, where $\Pr(naxal_j = 1) = e^z / (1 + e^z)$

Table 4: Logit estimates of Naxalite activity

	All states	States affected by Naxalite activity*
Proportion of the district's population which is rural	1.024* (1.65)	1.038** (2.38)
District poverty rate	1.031*** (2.89)	1.013 (1.16)
District literacy rate	0.937*** (4.06)	0.952*** (2.91)
District female work participation	1.080*** (4.20)	1.069*** (3.46)
District coverage of safe drinking water	0.989* (1.82)	0.989* (1.66)
District male population	1.033*** (4.38)	1.030*** (3.82)
District male population squared	1.000* (1.80)	1.000* (1.68)
Proportion of district under forest cover	1.063*** (5.60)	1.061*** (4.98)
Proportion of district population belonging to the Scheduled Tribes	1.020 (1.62)	1.020 (1.37)
Proportion of district population belonging to the Scheduled Castes	1.014 (0.73)	1.005 (0.28)
Proportion of district population belonging to the Other Backward Classes	1.023** (2.31)	1.015 (1.42)
Pseudo-R2	0.32	0.28
LR test: $\chi^2(11)$	147	107
Observations	472	343

Notes:

Numbers in parentheses are z-scores

*** significant at 1 percent level; ** significant at 5 percent level; * significant at 10 percent level

* Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, and West Bengal.

Table 4 shows that whether the equation was estimated over all the Indian states, or whether the estimation was confined to the Naxalite-affected states, the probability of there being Naxalite activity in a district increased with a rise in its poverty rate and decreased with a rise in its literacy rate. Focusing on the results as they pertain to all the Indian districts, the column headed "All States" in Table 4 shows that,

in addition to poverty and literacy rates, five further factors affected the likelihood of Naxalite activity in districts:

- (i) More populous districts, as measured by the number of adult males in a district, were more likely to have Naxalite activity than less sparsely populated states.
- (ii) The greater the female participation in the workforce of a district, the more likely it was to have Naxalite activity.²⁰

- (iii) Districts with a smaller coverage of safe drinking water were more likely to have Naxalite activity compared to districts where it was more usual for habitations to have safe drinking water.
- (iv) Districts with a larger coverage of forests were more likely to have Naxalite activity compared to districts with smaller forest cover.
- (v) Districts with a larger proportion of persons belonging to the Scheduled Tribes and to the Other Backward Classes were more likely to have Naxalite activity than districts containing a smaller proportion of persons from these groups but, for reasons discussed below, the relation between Scheduled Tribes and the probability of Naxalite activity was not significantly different from zero.

Results (iv) and (v) require some amplification. Persons belonging to the Scheduled Tribes in India tend to live in areas which have relatively high forest cover. In consequence, there would be a high degree of collinearity between the extent of a district's forest cover and the proportion of its population that are from the Scheduled Tribes. After controlling for forest cover, there was still a weak, non-significant, relationship between the probability of Naxalite activity in a district and the share of Scheduled Tribe members in the district's population. Second, as is well known, as the upper castes have abandoned farming as their traditional occupations to move into professional jobs, they have been replaced as small cultivators by persons from the Other Backward Classes: it is friction between the Other Backward Classes and the lower classes (Scheduled Tribes and Castes) that now largely provides the basis of inter-caste violence in India.

For some of these variables, one cannot discount the possibility of reverse causality. For example, poverty may lead to Naxalite activity but, conversely, Naxalite activity in a district, by discouraging business and agricultural investment, may contribute to a district's poverty. We were unable to disentangle the extent to which poverty leads to Naxalite activity and Naxalite activity leads to poverty.

The explanatory power of the logit equations is shown in terms of the "Pseudo-R²." The "Pseudo-R²" is a popular measure of the model's performance in binary models and compares the maximised log-likelihood value of the full model ($\log L$) to that obtained when all the coefficients except the intercept term are set to zero ($\log L_0$) and is defined as: $1 - (\log L / \log L_0)$. The measure has an intuitive appeal in that it is bounded by 0 (all the slope coefficients are zero) and 1 (perfect fit). By the standards of discrete choice models, the R² values reported in Table 4—0.32 and 0.28 respectively—are high.

5. Assessing the Model's Predictive Power

One way of assessing the predictive ability of a model with a binary dependent variable is by constructing a 2x2 table of the "hits" and "misses" emanating from a prediction rule such that a district is regarded as being Naxalite-affected ($naxal=1$) or Naxalite-free ($naxal=0$) if, for a cut-off probability p^* , the *estimated* probability $\Pr(naxal=1) > p^*$. Given a cut-off point p^* , the sensitivity and the specificity of an equation are, respectively, the proportions of positive and negative cases that are correctly classified.

²⁰ In this connection it is important to note that both Maoist parties in India are explicitly concerned with issues relating to women at work (fair wages and freedom from harassment) and in the home (domestic violence and the role of marriage in women's

oppression). Consequently, there has been a significant increase in the number of women coming into the movement in Andhra Pradesh (Kannabiran et al. 2004). Bhatia (2005) observes that an important aspect of the Naxalite movement in central India has

been to fight for the dignity of India's lower castes: as a direct consequence of Naxalite action the incidence of rape of lower caste women has fallen, lower caste children are able to attend school, and arbitrary beatings of lower caste persons are no longer tolerated.

Table 5: Predictions from the logit model of Table 9 (estimated over all districts in India)

Classified	True		Total
	D	~D	
+	35	13	48
-	53	371	424
Total	88	384	472

Classified + if predicted Pr(D) >= .5
 True: naxal=1; False: naxal=0
 Correctly classified: 86.02%

Sensitivity Pr(+ D)	39.77%
Specificity Pr(- ~D)	96.61%
Positive predictive value Pr(D +)	72.92%
Negative predictive value Pr(~D -)	87.5%

Table 6: Predictions from the logit model of Table 9 (estimated over all districts in Naxalite-affected States in India)

Classified	True		Total
	D	~D	
+	40	17	57
-	48	238	286
Total	88	255	343

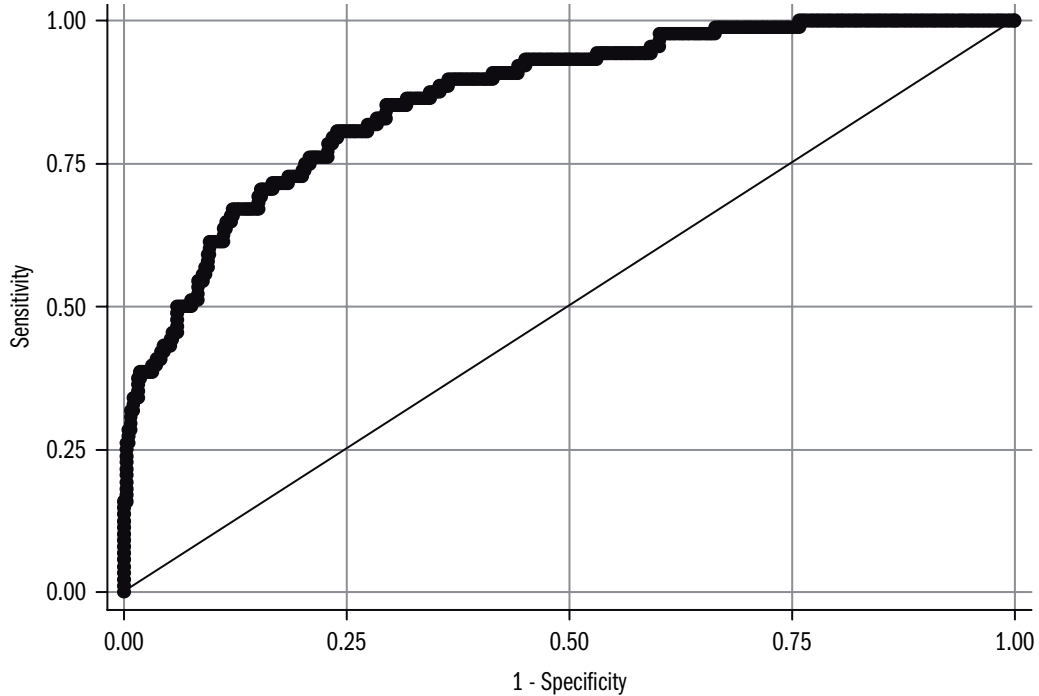
Classified + if predicted Pr(D) >= .5
 True: naxal=1; False: naxal=0
 Correctly classified: 81.05%

Sensitivity Pr(+ D)	45.45%
Specificity Pr(- ~D)	93.33%
Positive predictive value Pr(D +)	70.18%
Negative predictive value Pr(~D -)	83.22%

Table 5 shows that with $p^*=0.5$, 86 percent of the districts were correctly classified when the equation was estimated over all the districts and Table 6 shows that 81 percent of the districts were correctly classified when the equation was estimated over all the districts in the Naxalite-affected states. The model correctly identified districts with Naxalite activity in 40 percent of the cases (35 out of 88 districts, Table 5: Pr(+|D)) when it was estimated over all the districts in India and in 46 percent of the cases (40 out of 88 districts, Table 6: Pr(+|D)) when it was estimated over all the districts in the ten Naxalite-affected states.

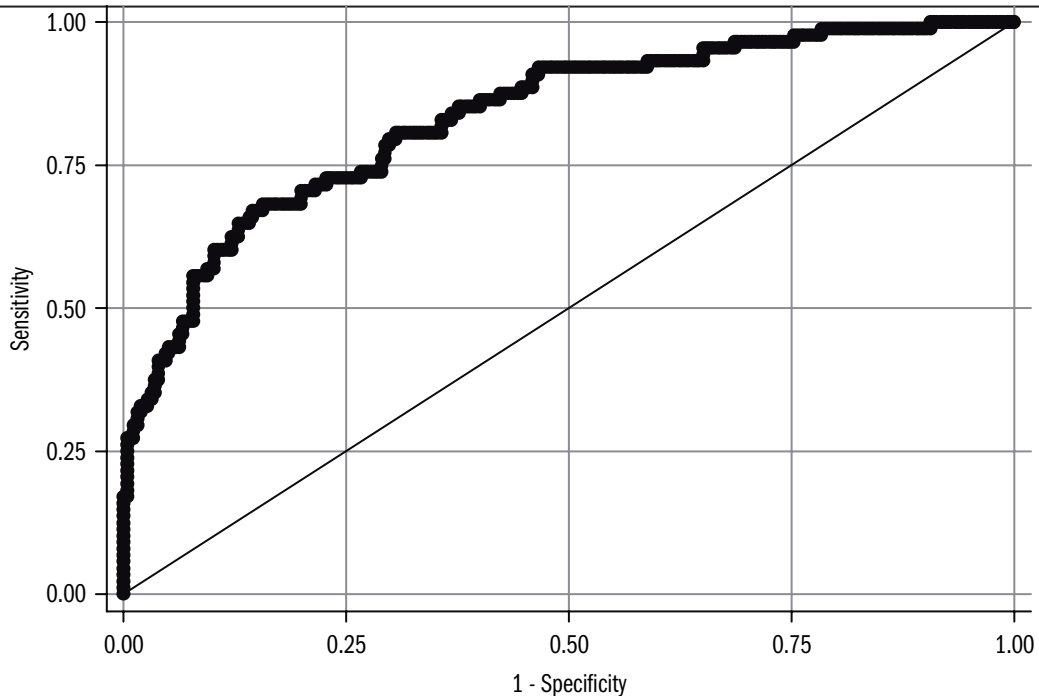
From a different perspective, the likelihood of a district that was identified by the model as being Naxalite-affected actually being Naxalite-affected was 73 percent when the model was estimated over all the districts in India (35 out of 48 districts, Table 5: Pr(D|+)) and 70 percent when it was estimated over all the districts in the ten affected states (40 out of 57 districts, Table 6: Pr(D|+)). However, the likelihood of a district identified by the model as not being Naxalite-affected actually not being Naxalite-affected was 88 percent when the model was estimated over all the districts in India (371 out of 424 districts, Table 5: Pr(~D|-)) and 83 percent when it was estimated over all the districts in the ten affected states (238 out of 286 districts, Table 6: Pr(~D|-)).

Figure 1: Sensitivity versus 1-specificity when the cutoff point is varied (all districts in India)



Area under ROC curve = 0.8632

Figure 2: Sensitivity versus 1-specificity when the cutoff point is varied (all districts in Naxalite-affected states of India)



Area under ROC curve = 0.8338

One can also plot the graph of sensitivity versus (1-specificity) as the cut-off point p^* is varied. The curve starts at (0,0) corresponding to $p^*=1$: no positive case is correctly classified (sensitivity=0) and every case is classified negative (specificity =1 or 1-specificity=0); it ends at (1,1) corresponding to $p^*=0$: every positive case is correctly classified (sensitivity=1) and no case is classified as negative (specificity =0 or 1-specificity=1). A model with no predictive power would be the 45° line connecting the two extreme points (0,0) and (1,1). The more bowed the curve, the greater the predictive power. Hence the area under the ROC curve (the receiver operating characteristic curve)—is a measure of the model's predictive power: a model with no predictive power has an area of 0.5, while perfect predictive power implies an area of 1 (StataCorp 2001). Figures 1 and 2 show the ROC curves for, respectively, all districts in India and all districts in Naxalite-affected states: both curves are considerably bowed, with 86 percent of the area under the curve in Figure 1 and 83 percent in Figure 2, suggesting that the model has considerable predictive power.

6. Structural Effects

A feature of Naxalite activity in India is that it affects districts belonging to “poor” states (Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, and Uttar Pradesh: 48 out of 216 districts) as well as districts belonging to “rich” states (Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and West Bengal: 40 out of 133 districts). Rich states differ from poor states in two respects.

1. In respect of variables not included in the econometric equations (the residual term), they may have different levels of infrastructure in terms of roads, schools, security forces, etc. We refer to such differences as structural differences

2. In terms of the variables included in the equation, they may have different values for the included variables: for example, poverty rates may be lower and literacy rates may be higher in rich (Naxalite-affected) states compared to poor (Naxalite-affected) states. We refer to such differences as attribute differences.

Even if two districts had the same values of the included variables (poverty rates, literacy rates, forest cover), the fact that one was in a rich state and the other was in a poor state might mean that they would have different likelihoods of Naxalite activity. The reason for this is that the districts differ in terms of structure and, in econometric terms, this would manifest itself in coefficient differences between rich and poor states. Poverty rates, for example, might have different coefficients for rich-state districts compared to poor-state districts because these rates would be embedded in different structures.

In order to test for structural effects on the likelihood of Naxalite activity, we defined a dummy variable, D , which took the value 1 if a district belonged to a rich (Naxalite-affected) state and 0 if it belonged to a poor (Naxalite-affected) state. All the explanatory variables were multiplied by this dummy variable and the resulting interaction variables were included in the equation as *additional* variables. If the coefficient on a interaction variable (say the rich-state literacy rate interaction) was significantly different from zero, then this would mean that the same value of the literacy rate would affect the probability of Naxalite activity differently, depending upon whether it pertained to a poor state district or a rich state district.

Table 7: Logit estimates of Naxalite activity in districts of Naxalite-affected states with interaction terms

	Odds ratio	z
Proportion of district population which is rural	0.991	-0.39
Rich state x rural interaction	1.087	3.27
District poverty rate	1.037	2.11
Rich state x poverty rate interaction	0.956	-1.72
District literacy rate	0.949	-2.34
Rich state x poverty rate interaction	0.954	-1.36
District female work participation	1.026	0.83
Rich state x female work participation interaction	1.050	0.94
District coverage of safe drinking water	0.992	-0.93
Rich state x coverage of safe drinking water interaction	0.977	-1.28
District male population	1.033	1.72
Rich state x male population interaction	0.990	-0.45
District male population squared	0.999	-0.62
Rich state x male population interaction squared interaction	1.000	0.51
Proportion of district under forest cover	1.076	3.82
Rich state x forest cover interaction	0.968	-1.23
Proportion of district population belonging to the Scheduled Tribes	1.038	1.5
Rich state x Scheduled Tribes interaction	0.977	-0.59
Proportion of district population belonging to the Scheduled Castes	1.005	0.16
Rich state x Scheduled Castes interaction	1.038	0.88
Proportion of district population belonging to the Other Backward Classes	1.040	1.7
Rich state x Other Backward Classes interaction	0.984	-0.59

Rich states: Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and West Bengal.

Poor states: Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, and Uttar Pradesh.

Table 7 shows the results of estimating the Naxalite activity equation (Table 4) with interaction terms. This shows that the coefficients associated with two variables—the proportion of a district's population that was rural and the district poverty rate—differed significantly between rich and poor states: a given rate of poverty in a district was more likely to result in Naxalite activity if the district belonged to a rich than to a poor state. For all other variables there were no significant coefficient differences between districts in rich and poor states.

7. Conclusions

This paper posed two questions: (1) is it a fact that there is more violence in Naxalite-affected districts compared to

districts which are free of Naxalite activity? (2) can the fact that Naxalite activity exists in some districts of India, but not in others, be explained by differences in their economic and social conditions?

The rapid spread of Naxalite activity in India, and the Maoist movement in Nepal, has made finding answers to these questions a matter of urgency. The raw data showed that there was more violent crime, crimes against women, and crimes against public order in Naxalite-affected districts. However, our econometric results showed that, after controlling for other variables, Naxalite activity in a district had, if anything, a dampening effect on its level of violent crime and crimes against women.

The raw data also showed that Naxalite-affected districts had higher poverty rates and low literacy rates than districts which were Naxalite-free. This time however, our econometric results showed that, even after controlling for other variables, the probability of a district being Naxalite-affected rose with an increase in its poverty rate and fell with a rise in its literacy rate. So, one prong in an anti-Naxalite strategy would be to address the twin issues of poverty and illiteracy in India.

In this context, however, there are two features of the Indian polity that are worrying. First, The Administrative Reforms Commission in its report “Combating Terrorism” has called for Naxalites to be dubbed “terrorists,” on a par with Islamic jihadis, rather than, as hitherto, “left-wing extremists” who resort to violence in pursuit of an ideology.²¹ Second, the village defence force, Salwa Judum, created by the Chattisgarh government to combat Naxalite activity in the state, may have to be scrapped after the National Human Rights Commission accused it of grave human rights abuses.²² Both features—labelling Naxalites as “terrorists” and human rights violations in combating them—fly in the face of the conclusions arrived at in this paper.

References

- Bao, Shu Ming, Gene Hsin Chang, Jeffrey D. Sachs, and Wing Thye Woo. 2002. Geographic Factors and China's Regional Development Under Market Reforms, 1978–98. *China Economic Review* 13:89–111.
- Cai, Fang, Dewen Wang, and Yang Du. 2002. Regional Disparity and Economic Growth in China: The Impact of Labor Market Distortions. *China Economic Review* 13:197–212.
- Cowell, Frank. A., and Stephen. P. Jenkins. 1995. How Much Inequality Can We Explain? A Methodology and an Application to the United States. *Economic Journal* 105:421–30.
- Debroy, Bibek, and Laveesh Bhandari. 2004. *District Level Deprivation in the New Millennium*. New Delhi: Rajiv Gandhi Institute for Contemporary Studies.
- Demurger, Sylvie, Jeffrey D. Sachs, Wing Thye Woo, Shu Ming Bao, Gene Hsin Chang, and Andrew D. Mellinger. 2001. Geography, Economic Policy, and Regional Development in China. NBER Working Paper No. W8897 (April).
- Bhandari, Laveesh, and Amaresh Dubey. 2003. Incidence of Poverty and Hunger in the Districts of India, RGCS Working Paper. New Delhi: Rajiv Gandhi Institute for Contemporary Studies.
- Forest Survey of India. 2003. *State of Forest Report, 2003*. Dehradun: Government of India Ministry of Environment and Forests.
- Fujita, M., and D. Hu. 2001. Regional Disparity in China 1985–1994: The Effects of Globalization and Economic Liberalization. *The Annals of Regional Science* 35:3–37.
- Gill, K. S. 2005. Enormous Threat of Extremism. *The Pioneer*, October 30, 2004. <http://www.satp.org/satporgtp/kpsgill/security/04Oct30Pio.htm>.
- Government of India (2005), Annual Report 2004-2005, Ministry of Home Affairs, New Delhi: Government of India
- Government of India. 2008. *Development Challenges in Extremist Affected Areas: Report of an Expert Group to the Planning Commission*. New Delhi: Government of India.
- Misra, Bijayanand. 2001. New Millennium Strategies for Reduction of Poverty and Regional Disparity in India. In *New Regional Development Paradigms*, vol. 4, ed. James E. Nickum and Kenji Oya, 73–91. Westport, CT: Greenwood.
- Kannabiran, V., and K. Kannabiran. 2004. Women's Rights and Naxalite Groups. *Economic and Political Weekly* 39:4874–77.
- Knox, C. G. 2001. The “Deserving” Victims of Political Violence: “Punishment” Attacks in Northern Ireland. *Criminal Justice: The International Journal of Policy and Practice* 1:181–99.
- Kurian, N. J. 2001. *Regional Disparities in India*. New Delhi: Planning Commission of India. <http://planningcommission.nic.in/reports/sereport/ser/vision2025/regdsppty.pdf>.
- Ramana, P. V. 2005. Naxalism in Karnataka: Swift Remedy Needed. *Deccan Herald*, February 27. <http://www.observerindia.com/analysis/A386.htm>.
- Viswanathan, S. 2002. A Crackdown in Tamil Nadu. *Frontline* 19 (25). <http://www.frontlineonnet.com/fl1925/stories/20021220005003800.htm>.
- Tendulkar, S. 2007. National Sample Surveys. In *The Oxford Companion to Economics in India*, ed. K. Basu, 367–70. New Delhi: Oxford University Press.

²⁰ *Times of India*, September 18, 2008.

²² *Times of India*, September 20, 2008.