Terrorist Incidents in India, 1998-2004: A Quantitative Analysis of Fatality Rates

Terrorist Incidents in India, 1998-2004: A Quantitative Analysis of Fatality Rates[+]

Vani K. Borooah[*]
University of Ulster
December 2008

Abstract

Using data from the University of Maryland's *Global Terrorism Database II*, this paper first provides information on the nature of terrorist incidents in India in the period 1998-2004: the Indian states that were worst affected by terrorist incidents and fatalities; the terrorist groups responsible for such incidents and their *modus operandi*. Next, the paper focuses on the issue of fatalities from terrorist incidents. It inquires into the extent to which the number of fatalities following an incident was influenced by the *type of attack* (bombings, armed assault etc.) and the extent to which it was influenced by the *type of terrorist group*. By examining the number of fatalities resulting from terrorist attacks in India, the paper disentangles the influence on this number of *attack type* and *attack group*. Lastly, the paper applies Atkinson's concept of equality-adjusted income to terrorism to arrive at the concept of equality-adjusted deaths from terrorist incidents: in order to avoid spectacular incidents resulting in the loss of a large number of lives – as in New York on September 11, 2001 and in Mumbai 26-29 November 2008 – "society" might be prepared to tolerate "low-grade" terrorism which resulted in a larger number of deaths in total but avoided a large number of deaths from a single iconic incident.

Keywords: Terrorism, Terrorist groups, Attack Type, India

[+] The data used in this paper are from the Global Terrorism Database II, 1998-2004 available from the Inter-University Consortium for Political and Social Research (ICPSR), http://www.icpsr.umich.edu. An earlier version of this paper was presented at a seminar at the Indira Gandhi Institute of Development Research (IGIDR). Comments from participants at this seminar and from two anonymous referees to this journal have vastly improved the paper. However, I am entirely responsible for the results reported, for their interpretation, and, indeed, for the paper's deficiencies.

[*] School of Economics, University of Ulster, Newtownabbey, Northern Ireland BT37 0QB. (Email: vk.borooah@ulster.ac.uk).

Terrorist Incidents in India, 1998-2004: A Quantitative Analysis of Fatality Rates

Abstract

Using data from the University of Maryland's *Global Terrorism Database II*, this paper first provides information on the nature of terrorist incidents in India in the period 1998-2004: the Indian states that were worst affected by terrorist incidents and fatalities; the terrorist groups responsible for such incidents and their *modus operandi*. Next, the paper focuses on the issue of fatalities from terrorist incidents. It inquires into the extent to which the number of fatalities following an incident was influenced by the *type of attack* (bombings, armed assault etc.) and the extent to which it was influenced by the *type of terrorist group*. By examining the number of fatalities resulting from terrorist attacks in India, the paper disentangles the influence on this number of *attack type* and *attack group*. Lastly, the paper applies Atkinson's concept of equality-adjusted income to terrorism to arrive at the concept of equality-adjusted deaths from terrorist incidents: in order to avoid spectacular incidents resulting in the loss of a large number of lives – as in New York on September 11, 2001 and in Mumbai 26-29 November 2008 – "society" might be prepared to tolerate "low-grade" terrorism which resulted in a larger number of deaths in total but avoided a large number of deaths from a single iconic incident.

Keywords: Terrorism, Terrorist groups, Attack Type, India

1. Introduction

This paper uses data from the LaFree and Dugan (2008) *Global Terrorism Database II* (see also, LaFree, Dugan, Fogg, and Scott, 2006) to study the nature of terrorist incidents in India in the seven-year period, 1998-2004. As LaFree and Dugan (2008) observe, although the heightened consciousness of the menace of terrorism of the past decade has led to a considerable increase in the literature on this subject, much of this literature has been based on non-quantitative evidence: informed opinion, intuition, and anecdotal evidence. In order, therefore, to provide a quantitative base for the study of terrorism, LaFree and Dugan (2008) and LaFree, Dugan, Fogg, and Scott (2006), under the auspices of the *National Consortium for the Study of Terrorism and the Response to Terrorism*, have provided two Global Terrorism Databases (GTD): GTD1 and GTD2 record, as far as is feasible, all known terrorist incidents in the world[1], along with ancillary information about the nature of these incidents, for, respectively, the periods 1970-1997 and 1998-2004.[2]

Silke (2001) has addressed the issue of methodological issues in research on terrorism. He argued that "most research [on terrorism] is based on secondary data analysis and more specifically on analysis based on archival records" and that, in particular, "over 80 per cent of all research on terrorism is based either solely or

[1] In order to be considered a "terrorist incident" by the GTD, the event had to have been committed by non-state actors, had to have been violent, and intentional. In addition the act must have met two of the following three criteria: (1) The act must have been aimed at attaining a political, economic, religious, or social goal. In terms of economic goals, the exclusive pursuit of profit did not satisfy this criterion. (2) There must have been evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims. (3) The action must have been outside the context of legitimate warfare activities, i.e. the act must have been outside the parameters permitted by international humanitarian law (particularly the admonition against deliberately targeting civilians or non-combatants). (LaFree and Dugan , 2008).

[2] To produce the GTD2 an administrative staff managed both paid and volunteer researchers who monitored a variety of open sources, identified potential cases for inclusion in the database and then coded these cases. Data in this collection contain 7,154 events .The main variable categories presented in these data include: Identification Numbers, Incident Date, Incident Location, Incident Information, Attack Information, Target Information, Perpetrator Information, Perpetrator Statistics, Perpetrator Claim of Responsibility, Weapon Information, Casualty Information, Consequences, Hostage/Kidnapping. (LaFree and Dugan , 2008).

primarily on data gathered from books, journals, the media (or media-derived databases), or other published documents." (p.5). However, within this research *genre,* Silke (2001) shows that there has been very little attempt to match data from secondary sources to the tools of statistical analysis: 5 percent of papers published in major terrorism journals in 2000 involved inferential analysis; 15 percent used descriptive statistics, and the remaining 80 percent did not involve any statistical analysis whatsoever.[3]

Against this background, the purpose of this paper is to undertake a quantitative analysis of deaths from terrorism using data from GTD2. The focus of the analysis is on India. GTD2 recorded 7,184 terrorist incidents between 1998 and 2004. The largest number of terrorist incidents occurred in India (784), followed by Colombia (571), the Russian Federation (435), and Algeria (426).[4] In terms of terrorist-related fatalities, India (3,008 deaths) again headed the list of countries followed by the USA ((2,385), Algeria (2,273), Iraq (2,203) and the Russian Federation (2,097).[5] Consequently, there is a strong justification for examining terrorist actions in India.[6] This justification has only been strengthened with the brutal and bloody terrorist attack on Mumbai's residents in November 2008.

The issue of terrorist related deaths has been addressed by Hultman (2007): employing monthly data on 60 rebel groups, involved in armed conflict in the period January 2002 to December 2004, she showed that rebels killed more civilians the

[3] By contrast, 86 percent of papers in forensic psychology and 60 percent of papers in criminology contained some form of statistical analysis with a majority of these employing inferential methods.
[4] Other countries in which a substantial number of terrorist incidents occurred were: the Philippines (380), Iraq (317), Spain (284), Northern Ireland (235), Turkey (224), Indonesia (214), Palestine (209), Federal Republic of Yugoslavia (202), Afghanistan (199), Israel (191), and Sri Lanka (158).
[5] Other countries in which a substantial number of terrorist-related fatalities occurred were: Colombia (1,696), Angola (1,464), Nepal (1,386), Sri Lanka (1,296), the Philippines (912), and Pakistan (878).
[6] More recently, only Iraq has had more terrorist incidents than India. Even so, there have been seven major terrorist incidents in India in 2008: Jaipur (May 13), Bangalore (July 25), Ahmedabad (July 26), Surat (July 27/28), New Delhi (September 13), Assam (October 30), and, most spectacularly, Mumbai (November 26-29): collectively, these have resulted in nearly 400 fatalities.

more fighters they lost in battle. Piazza (2009) has examined the hypothesis that Islamist terrorist groups are more dangerous than non-Islamist groups because they cause more casualties. The rise in the casualty rate from terrorism (the average number of dead and wounded from terrorist incidents), from 2.08 between 1968 and 1979 to 10.89 for the period 200 to 2005, is conventionally explained by the parallel rise in religious (i.e. Islamic) terrorism. Using data from the Terrorism Knowledge Base for 135 groups and 383 incidents he showed that such a sweeping conclusion needed to be tempered by the "ideological orientation" of the Islamist groups with groups associated with *al-Qaida* being much more lethal than other, more secular, Islamist groups.

This paper complements existing (quantitative) studies of the number of victims (dead and wounded) from terrorism by taking a different, but not unrelated, line. It hypothesises that the number of fatalities following a terrorist incident would be influenced by the *type of attack* (bombing, armed assault etc.) and by the *type of terrorist group* carrying out the attack. For example, *ceteris paribus* armed assaults might, on average, result in more deaths than bombings but the number of deaths might also be influenced by whether the armed assault or bombing was carried out by Islamic *jihadists* or by Marxists. By examining the number of fatalities resulting from terrorist attacks in India, it disentangles, using the decomposition methodology of Blinder (1973) and Oaxaca (1973) – hereafter, the B-O decomposition - the influence on this number of *attack type* and *attack group*.

The second strand of this paper is concerned with the "price" society might be prepared to pay to avoid spectacular (and iconic) terrorist incidents. Weinberg *et. al*. (2008) have drawn attention to the restrictions on civil liberties that followed the 9/11 attack in New York; in a similar vein, 26/11 in Mumbai was followed by a

clamour for war with Pakistan.[7] In order to avoid such political and social (and economic) turbulence, "society" might be prepared to tolerate a higher number of terrorist-related deaths, provided these were sufficiently evenly distributed between incidents as to obviate any particular incident being viewed as iconic.[8]

This strand is grounded in Atkinson's (1970) concept of equality-adjusted income: being averse to inequality, society regards a smaller level of national income, which is equally distributed, as yielding the same amount of social welfare as a larger, but unequally distributed, income; the reduction in income that society is prepared to countenance depends upon its aversion to inequality. In this paper the concept is extended to terrorism by developing the idea of the "equality-adjusted number of deaths" from terrorist incidents: in order to avoid the social and political fall-out from spectacular incidents resulting in the loss of a large number of lives – as in New York on September 11, 2001 and in Mumbai 26-29 November 2008 – "society" might be prepared to tolerate "low-grade" terrorism which resulted in a larger number of deaths in total but avoided a large number of deaths from a single iconic incident. Estimates of such equality-adjusted deaths, under different degrees of inequality aversion, are provided.

2. An Overview of Terrorist Incidents in India

This section provides information on the nature of terrorist incidents in India in the period 1998-2004: the Indian states worst affected by terrorist incidents and fatalities and the terrorist groups responsible for such incidents and their *modus*

[7] The *Financial Times* reported a former Indian ambassador to the United Nations as demanding that "if there is another attack we should go in and bomb the daylights out of them" (Indian hawks call for strike on Pakistan, 19 December 2008)

[8] Frey (2004) has drawn attention to the economic effects of terrorism. The targeting of tourism means that a typical terrorist attack deters nearly 140,000 tourists (Enders, Parise, and Sandler, 1992). Terrorism reduces the inflow of foreign direct investment into a country (Enders and Sandler, 1996), bilateral trade flows with other countries (Nitsch and Schumacher, 2004), and the share price of companies, and levels of income, in terrorist-affected regions (Abadie and Gardeazabal, 2003

operandi. Over the period 1998-2004, there were, according to GTD2, 784 terrorist incidents in India which resulted in 3,008 deaths. Table 1 shows that 61 percent of these incidents (480 in number) and 55 percent of these fatalities (1,658 in number) occurred in Jammu and Kashmir followed by: 11 percent of incidents (85) and 13 percent of fatalities (376) in Assam; 6 percent of incidents (48) and 3 percent of fatalities (90) in Andhra Pradesh; and 3 percent of incidents in Bihar and Tripura (26 and 25 respectively) but with 5 percent of fatalities (156) in Bihar and 3 percent (25) in Tripura. If one considers the North-East of India in its entirety – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura – then 123 incidents (16 percent of the all-India total of 784 incidents) and 682 fatalities (23 percent of the all-India total of 3,008 fatalities) occurred in this region. Thus, between 1998 and 2004, the states of Jammu and Kashmir, Andhra Pradesh, and Bihar and the North-East of India collectively accounted for 86 percent of terrorist incidents and of incident-derived fatalities in India.[9]

None of these three theatres of conflict – Jammu and Kashmir, the North-East of India, and Bihar and Andhra Pradesh – should be viewed as isolated conflicts, independent of events on the international stage and of each other. Haleem (2004) has argued that, apart from home grown terrorists, the Kashmir dispute has attracted al-Qaida fighters who view the dispute as part of a larger Islamic strategy. The Lashkar-e-Taib's agenda, as outlined in a pamphlet titled, "Why are we waging jihad," includes the restoration of Islamic rule over all parts of India; the pamphlet also declares the United States, Israel, and India as existential enemies of Islam (Haqqani, 2005). Similarly, Mehra (2000) has drawn attention to the absence of agrarian reform

[9] The largest number of fatalities from a *single* incident were: 52 in Mumbai, 25 August 2003; 35 in Pahalgam (J&K),1 August 2000 and Chadisinghpoora (J&K), 21 March 2000; 34 in Kaluchak (J&K), 14 May 2002, 32 in Sinari (Bihar), 18 March 1999. Apart from the Mumbai bombing, the other incidents were armed assaults.

in India, and Borooah (2009) to poverty and illiteracy in Indian districts, as factors explaining the rise in Marxist violence in certain parts of India. Lastly, Saikia (2003) has linked the ethnic-based and non-Islamic terrorist movements in the North-East of India to a wider Islamic agenda in which al-Qaida operatives in Bangladesh are fomenting the creation of a "Greater Bangladesh" (*Brihot Bangladesh*) and are subordinating the traditional pro-Hindu loyalties of the United Liberation Front of Assam (ULFA) to this end.

Table 2 shows terrorist incidents, and fatalities resulting from such incidents by the main terrorist groupings. In the Indian context there were three main groups of terrorists: Islamic; Marxist; and North-Eastern terrorist groups. These three groups collectively accounted for 298 (38 percent of the total of 784) incidents and 1,667 (55 percent of the total of 3,008) fatalities in India.[10] The main Islamic groups were the *Lashkar-e-Taiba* (47 incidents, 371 fatalities), *Hizb-ul-Mujahidin* (34 incidents, 173 fatalities), and *Jaish-e-Mohammad* (11 incidents, 39 fatalities).[11] The main Marxist groups were the *People's War Group* (46 incidents, 189 fatalities) and the *Maoist Communist Centre* (14 incidents, 98 fatalities).[12] The main North-East groups were

[10] The perpetrators of the remaining incidents were either unknown (399 out of 784) or small, isolated groups.

[11] *Lashkar-e-Taiba* (Soldiers of the Pure) rose to prominence nearly 10 years ago and has often been blamed by the Indian authorities for carrying out armed attacks, not only in Kashmir, but also elsewhere in India.. It is held responsible for the Mumbai bombings of August 2003 and of the attack on the Indian Parliament in December 2001(http://news.bbc.co.uk/1/hi/world/south_asia/3181925.stm). *Hizb ul-Mujahidin*, the largest Kashmiri militant group, was founded in 1989 and officially supports the liberation of Jammu and Kashmir and its accession to Pakistan, although some cadres are pro-independence. The group is the militant wing of Pakistan's largest Islamic political party, the *Jamaat-i-Islami*. It currently is focused on Indian security forces and politicians in Jammu and Kashmir and has conducted operations jointly with other Kashmiri militants (http://www.fas.org/irp/world/para/hm.htm).

[12] The *People's War Group*, which was formed in Southern Indian State of Andhra Pradesh in 1980, traces its ideology to the Chinese leader Mao Tse Tung's theory of organised peasant insurrection. It rejects parliamentary democracy and believes in capturing political power through protracted armed struggle based on guerrilla warfare. This strategy entails building up of bases in rural and remote areas and transforming them first into guerrilla zones and then as liberated zones, besides the area-wise seizure and encircling cities. The eventual objective is to install a "people's government" through the "people's war" (http://www.satp.org/satporgtp/countries/india/terroristoutfits/PWG.htm). *The Maoist Communist Center* is a major force in rural Bihar. In some parts it ran a parallel judicial system, with a system of people's courts. The expansion of the party occurred as it became one of several caste-based armed groups in the area. The party mobilized lower-caste Biharis and frequently clashed with various

the *United Liberation Front of Assam* (36 incidents, 165 fatalities), the *National Liberation Front of Tripura* and the *All Tripura Tiger Force* (collectively, 27 incidents, 196 fatalities), the *National Democratic Front of Bodoland* and the *Bodo Liberation Tigers* (collectively, 20 incidents, 141 fatalities).[13]

Of the 126 incidents for which the Islamic groups were responsible, 12 were suicide attacks and, of these 12 suicide attacks: six were by the *Lashkar-e-Taiba*, two were by its surrogate, *Al-Mansurian [LeT front]*, and two were by the *Jaish-e-Mohammad*. The Marxist and North-Eastern groups were responsible for one suicide attack each by, respectively, the *People's War Group* and the *United Liberation Front of Assam*.

3. Fatalities, Attack Type, and Terrorist Groups

For each of the 784 terrorist incidents in India between 1998 and 2004, GTD2 provided details of the incident's *primary* type of attack: bombing (378 incidents); armed assault – that is, an attack whose primary objective was to cause physical harm, including death, to individuals by means other than explosives (298); assassination – that is, an attack whose primary objective was to kill one or more prominent persons (52); infrastructure attack – that is, an attack whose primary objective was to damage non-human targets using non-explosive means like arson (35); hostage taking – that is, an attack whose primary objective was to obtain concessions in exchange for

---

militia groups (like the *Ranvir Sena*) defending upper-caste interests (http://en.wikipedia.org/wiki/Maoist_Communist_Centre_of_India#Dakshin_Desh).

[13] The *United Liberation Front of Assam* is a militant group from Assam, among many other such groups in North-East India. It seeks to establish a sovereign Assam via an armed struggle. The Government of India had banned the organization in 1990 and classifies it as a terrorist group. (http://en.wikipedia.org/wiki/United_Liberation_Front_of_Asom). The *National Democratic Front of Bodoland* aims to get a sovereign Bodoland north of the Brahmaputra River. It was very active during the 1990s. However, under an agreement on May 24, 2005 with the Government of India, it has been maintaining a ceasefire (http://en.wikipedia.org/wiki/National_Democratic_Front_of_Bodoland). The *National Liberation Front of Tripura* was formed in December 1989 to create an independent state of Tripura. It has conducted a systematic and violent campaign for secession from India and has been declared by the Government of India as a terrorist organization (http://en.wikipedia.org/wiki/National_Liberation_Front_of_Tripura).

release of hostages (20). It should be emphasised that these were the primary types of attack; some incidents involved more than one type of attack.

GTD2 also provided details of the target of attack. If one collapses its information into military/police (MP) and non-military/police targets (NMP), then of the total of 784 terrorist incidents in India, in the period 1998-2004, 394 incidents (40 percent) were directed towards MP targets. Islamic terrorists directed 56 percent of their incidents (71 out of 126) towards MP targets, followed by Marxists and North-Eastern terrorists who directed, respectively, 37 and 27 percent of their incidents towards MP targets.

The number of fatalities resulting from an incident depended upon both the type of attack. Table 3 shows that armed assaults resulted in 6.05 fatalities per incident, followed by 2.78 fatalities for bombings. However there was hardly any difference in fatality rates in respect of the target of attack: it was 3.75 for MP targets (1,164 deaths from 310 incidents) and 3.80 for NMP targets (1,844 deaths from 474 incidents). Table 4 shows that average fatalities were: 6.21 per incident when Islamic group carried out attacks; 5.63 per incident for North-Eastern groups; and 4.52 for Marxist groups. Consequently, the number of fatalities from a terrorist incident would depend upon the type of attack and upon the group responsible for the attack. Table 5 combines Tables 3 and 4 to show the modes of attack in terrorist incidents in India, between 1998 and 2004, for which Islamic, Marxist and North-Eastern groups were responsible

Table 6 shows the estimates from a regression equation in which the number of fatalities following a terrorist incident is “explained” by the type of attack

(bombing, armed assault, "other" attack types[14]) and by the type of terrorist group (Islamic, Marxist, North-Eastern, "residual"[15]).

Terrorist groups differ in the quality of their "equipment" where this may be psychological (ruthlessness, commitment, preparedness to die) as well as physical (quality of weapons and training, the size and quality of the support group).[16] It is, therefore, possible that the fatalities resulting from a particular attack type (say, armed assault) might be different if it was carried out by an Islamic group compared to a North-Eastern group. In order to account for this, the fatalities equation was estimated allowing the coefficients on the bombing and armed assault terms to vary by terrorist group.[17]

Table 6 shows that an incident caused by a residual group (that is, one which was not Islamic/Marxist/North-Eastern), using a type of assault which was neither bombing nor an armed assault, would result in (an average of) 1.11 casualties; a bombing would have *added* 0.74 fatalities, and an armed assault would have *added* 3.79 fatalities, to this number. When, however, an Islamic group carried out an armed assault, the average number of fatalities would *rise* by a further 2.07+1.01=3.08 reaching a total of 7.98. Table 7 sets out more succinctly the fatalities implied by the regression estimates of Table 6.

The results shown in Tables 6 (and its derivative, Table 7) raise the question of why the number of fatalities (fatality rates), following a terrorist incident, differed according to the terrorist group responsible. Was it due to inter-group differences in "equipment" (as defined earlier)? For example, as Table 7 shows, the fatality rate

[14] Assassination, infrastructure attack, hostages. This "other" type of attack was the residual.
[15] Identified and unidentified perpetrators.
[16] They differ also in the quality of the opposition that they face: dealing with the might of the Indian army and Indian paramilitary forces in Kashmir is a different proposition from dealing with the district police in Bihar and Andhra Pradesh.
[17] The technical appendix to this paper provides details of the estimating equation.

from terrorist incidents, under an armed assault, was: 7.98 when Islamic groups were responsible, 5.54 when Marxist groups were responsible and 7.94 when North-Eastern groups were responsible. Or could the inter-group difference in fatality rates be explained by the fact that different groups were disposed towards different types of attack? For example, as Table 5 shows, 41 percent of Islamic incidents involved armed assault as the primary mode of attack, compared to 35 percent for Marxist groups, and 58 percent for North-Eastern groups. The next section addresses this question.

4. The Decomposition of Fatalities from Terrorist Incidents

The B-O method (Blinder, 1973; Oaxaca, 1973) of decomposing differences between groups, in their respective mean values, into "discrimination" and "characteristics" components is, arguably, the most widely used decomposition technique in economics. In this section, this method is applied to decomposing the average number of fatalities from terrorist incidents into an "attack type" and a "group type" effect.

The basic idea behind this decomposition is as follows, the details being provided in the technical appendix to this paper. The difference between average fatalities from, say, Islamic and Marxist terrorist incidents could be due to, *at least*, two reasons. First, the two groups employed, on average, different attack types: as Table 3 shows, the fatality rate was different between incidents in which the primary modes of attack were bombing and armed assaults. Second, the two groups differed in terms of their residual factors: that is all those factors not explicitly controlled for in the regression equation. At the risk of simplification, we identify this residual largely with differences in the mental and physical equipment of the terrorist groups:

as Table 4 shows, the fatality rate was considerably higher in incidents for which Islamic, compared to Marxist, groups were responsible.

There is evidence establishing the rigours of *jihadist* training. Lia (2008)'s study of such training argues that there is considerable agreement among *jihadists* about the importance of training - "training and preparation is an integral part of jihad and therefore an individual religious duty…ideological indoctrination and spiritual preparation takes precedence over physical and military training. Moreover, since *jihad* is such a painful and brutal process, the preparatory process must accustom the recruit to this reality: they must learn determination, patience, and self-sacrifice; they should learn to endure the brutality of war, but also to employ its savagery against Islam's enemies." (p. 519).

In addition to the rigours of training, Pakistani jihadists appeared to have the full support of their families. Fair (2008) surveyed 141 Pakistani families whose male members had become *shaheed* (martyrs) in Kashmir and Afghanistan. As Fair (2008, p. 60) notes "Pakistan, like Palestine and other theatres for Islamist conflict, has a rich martyrdom culture wherein the community confers an important status to families of *shaheed*." Fair (2008) argues that, contrary to popular belief, Pakistani terrorists operating in Kashmir and Afghanistan, and their households, were very well educated by Pakistani standards. So, in terms of equipment, there is evidence that Islamic *jihadists* operating in India were sufficiently well educated and motivated to readily absorb the high quality of training they received.

We can disentangle these influences by considering a hypothetical situation in which the "equipment" factor is held constant. This is done by answering the (hypothetical) question: what would the average number of fatalities *have been* if, in incidents for which Marxists were responsible, *the "attack type" had been carried out*

using Islamic "equipment"? Call this the "Marxist [Islamic]" fatality rate. The difference between the average fatality rate from incidents for which Islamic groups were responsible and the "Marxist [Islamic]" fatality rate isolates the effect of attack type: *holding "equipment" constant at Islamic levels*, this difference represents the inter-group difference in fatality rates due to differences between the two groups in their attack types. Call this the inter-group *attack type difference*.

The hypothetical question could, of course, have been posed differently: what would the average number of fatalities *have been* if, in incidents for which Islamic groups were responsible, *the "attack type" had been carried out using Marxist "equipment"*? Call this the "Islamic [Marxist]" fatality rate. The difference between the average fatality rate from incidents for which Islamic groups were responsible and the "Marxist [Islamic]" fatality rate *also* isolates the effect of attack type: *holding "equipment" constant at Marxist levels*, this difference *also* represents the inter-group difference in fatality rates due to differences between the two groups in their attack types.

The gap between the *observed* inter-group difference in fatality rates and the attack type difference is the *residual* difference. It represents that part of the (observed) difference in average fatality rates between Islamic and Marxist terrorist incidents that *cannot be explained* by differences between them in their attack type. By default, this residual is then attributed to differences between them in their "equipment". It is important to point out that the two separate conceptions of inter-group attack type difference – the first based on the "Marxist [Islamic]", and the second on the "Islamic [Marxist]", fatality rate - need not be equal. Consequently, the residual effects, from the two formulations of the hypothetical question, need not be equal. Indeed, this a well-known problem with the B-O decomposition: the relative

sizes of the two attribute ("attack type") effects will be different depending upon the choice of a common set of coefficients (Islamic or Marxist) for comparing the effects of the two different sets of attributes ("attack types").

Table 8 shows the results from the B-O decomposition of fatality rates by the three main terrorist group types operating in India: Islamic, Marxist, and North-Eastern. The first row panel of the Table compares Islamic with Marxist groups. The second column item in this row shows that the difference in average fatality rates between Islamic (6.21) and Marxist (4.52) terrorist incidents was 1.69. The column following this shows that if Marxist terrorist incidents had been carried out using Islamic "equipment", the fatality rate from Marxist incidents would have risen to 5.75, narrowing the Islamic-Marxist fatality rate gap to 0.46.

In other words, 27 percent of the observed difference in fatality rates between Islamic and Marxist groups (0.46 of 1.69) could be explained by the fact that, compared to Islamic terrorists, Marxists, on average, adopted a different attack type: as Table 5 shows, 41 percent of Islamic, compared to 35 percent of Marxist, incidents involved armed assault as the primary mode of attack. The remaining difference (73 percent: 1.23 of 1.69) was explained by "equipment" differences between Islamic and Marxist terrorist groups.

The last panel of Table 8, under the column headed "attack type difference", shows that if Islamic terrorist incidents had been carried out using Marxist "equipment", the fatality rate from Islamic incidents would have fallen to 5.19 narrowing the gap between Islamic and Marxist fatality rates to 0.67. Thus, on this reckoning, 40 percent of the observed difference in fatality rates between Islamic and Marxist groups (0.67 of 1.69) could be explained by the fact that, compared to Islamic terrorists, Marxists, on average, adopted a different attack type; by corollary, 60

percent was explained by "equipment" differences between Islamic and Marxist terrorist groups.

The middle row panel of Table 8 compares Islamic with North-Eastern groups. There was a difference of 0.58 in the average number of fatalities resulting from incidents for which the two groups were responsible (Islamic: 6.21; North-Eastern: 5.63). If North-Eastern terrorist groups had carried out their attacks using Islamic "equipment" the fatality rate from such incidents would have risen to 6.65, higher than the average fatality rate of 6.21 from Islamic terrorist incidents. Similarly, as the last panel of Table 8 shows, if Islamic terrorists had carried out their attacks using North-Eastern levels of "equipment", the average fatality rate from Islamic incidents would have fallen to 4.95, lower than the average fatality rate of 5.63 from North-Eastern terrorist incidents.

The reason for this is two-fold. First, as Table 3 shows, the fatality rate from armed assault was substantially higher than that from other attack forms. Second, as Table 5 shows, 58 percent of North-Eastern - compared to 44 percent of Islamic - incidents, involved armed assault as the primary mode of attack. Consequently, what keeps the fatality rate from terrorist incidents perpetrated by North-East groups lower than those perpetrated by Islamic groups is that the former do not operate with the "equipment" of Islamic terrorists: had they received the training and weapons of, and been as ruthless and committed as, Islamic terrorists, the fatality rate in the North-East from terrorist incidents would have been much higher than it was.

It is possible to offer some justification for the above statement. First, the quality of training received by Islamic jihadists, operating mainly in Kashmir but also in other parts of India, has been commented upon. Second, as is widely accepted, the Inter-Services Intelligence (ISI) of the Pakistani army has played a not inconsiderable

role in providing such training and the ancillary guns and explosives.[18] Of the countries neighbouring the north eastern states of India, the role of Bhutan and Nepal has largely been to provide safe havens for terrorists from these states: indeed, ULFA and the National Democratic Front of Bodoland have had their headquarters in Bhutan. However Saikia (2002) reports that the ISI is operating camps in Bangladesh providing training in terrorist activities to North-Eastern groups collectively known as the United Liberation Front of the Seven Sisters.[19] Indeed, as long ago as March 1994 the Assam Assembly was told that about 200 ULFA members had received training from the ISI (Verghese, 1996, p. 60).

The last panel of Table 8 compares fatality rates between North-Eastern and Marxist group incidents. The average number of fatalities rates from Marxist incidents was 1.11 fewer than from North-Eastern incidents. Of this difference, 60 percent could be explained by differences in attack type between the two groups if Marxist incidents were carried out using North-Eastern "equipment" (0.68 of 1.11); on the other hand, if North-Eastern incidents were carried out using Marxist "equipment", 51 percent of the North-Eastern-Marxist difference in fatality rates (0.57 of 1.11) could be explained by differences in attack type between the two groups.

5. Inequality Analysis of Deaths from Terrorist Incidents in India

The previous discussion was based on an analysis of the average number of fatalities from incidents for which terrorist groups in India were responsible. However, focusing exclusively on the average ignores the distribution of the total number of deaths across incidents: the total that results from a few spectacular incidents producing a large number of deaths, with the majority of incidents being

[18] The ISI, with its headquarters in Islamabad and headed by a lieutenant general of the Pakistani army, is in complete charge of all covert operations outside Pakistan.
[19] The north east of India comprises seven states.

relatively light on fatalities, might also be the result of a relatively equal distribution of fatalities across incidents.

In order to address the distributional issue, we computed the Gini coefficient for the distribution of fatalities, in incidents for which the three main terrorist groups in India – Islamic, Marxist, and North-Eastern - were responsible, for the two major types of attack: armed assault and bombing. Applied to the distribution of fatalities from terrorist incidents, if N is the number of incidents, and F_i is the number of (non-terrorist) deaths from incident i $(i=1...N)$, and $\mu = \sum_{i=1}^{N} F_i / N$ represents the average number of deaths, the Gini coefficient is defined as:

$$G = \frac{1}{2N^2\mu} \sum_{i=1}^{N} \sum_{j=1}^{N} | F_i - F_j |$$

In other words, the Gini coefficient is computed as half the mean of the difference in the number of deaths between pairs of incidents, divided by the average (μ). So, $G=0.45$ implies that the *difference in the number of deaths between two incidents chosen at random* will be 90 percent of the average number of deaths: if $\mu=1$, this difference will be 0.9 fatalities.

Table 9 shows that, judging by the values of the Gini coefficient, the distributions of the 415 deaths resulting from the 52 armed assault incidents for which Islamic groups were responsible, and the 144 deaths resulting from the 26 armed incidents for which Marxist groups were responsible, displayed similar degrees of inequality (Gini coefficient of 0.534 and 0.538, respectively); however, the inter-incident distribution of the 445 deaths resulting from the 56 armed assault incidents for which the North-Eastern groups were responsible was much more equal (Gini coefficient of 0.35). On the other hand, as Table 9 shows, there was considerable inequality in the distribution of fatalities of the deaths resulting from bombing: the

values of the Gini coefficient for bombing deaths were 0.7229 for Islamic groups; 0.607 for Marxist groups; and 0.619 for North-Eastern groups.

What is the social loss from terrorist incidents? If the number of fatalities is used as an indicator of loss, then both the average number of deaths and the inter-incident distribution of deaths serve to determine the size of social loss. In his seminal paper on income inequality, Atkinson (1970) argued that "society" would be prepared to accept a reduction in average income, *provided the lower income was equally distributed*, from a higher average income which was unequally distributed.[20] The size of this reduction depended upon our degree of "inequality aversion" which Atkinson (1970) measured by the value of an "inequality aversion" parameter $\varepsilon \geq 0$.[21]

In a similar vein, Anand and Sen (1997) compared the Honduras (with an average literacy rate of 75%, distributed between men and women as 78%, 73%) with China (with an average literacy rate of 80%, distributed between men and women as 92%, 68%) and asked which country should be regarded as having the "better" achievement with regard to literacy: China with a higher overall rate or the Honduras with greater gender equality?

These ideas can, equally well, be applied to the measurement of the social loss from terrorism. If one is to averse to spectacular, high-profile incidents – 9/11 in New York, 26/11 in Mumbai – in which a large number of innocent lives are lost, with the consequence that the prevailing socio-political mood becomes one of fear, insecurity, and paranoia, then one might "prefer" low-grade terrorism with several low-fatality incidents, and no high-fatality ones, to an iconic incident(s) which inflicts death on a

[20] In the language of economics, the two situations would yield the same level of social welfare, i.e. be 'welfare equivalent'.

[21] When $\varepsilon = 0$, we are not at all averse to inequality implying that we would not be prepared to accept even the smallest reduction in average income in order to secure an equitable distribution. The degree of inequality aversion increases with the value of ε: the higher the value of ε, the more averse we would be to inequality and, in order to secure an equitable distribution of income, the greater the reduction in average income we would find acceptable.

large scale. We can increase the average number of deaths from terrorist incidents in a country, $\bar{F}$, by the amount of inter-incident inequality in fatalities, to arrive at F^e, an "equity sensitive" fatality rate for the country, $F^e \geq \bar{F}$.. We refer to F^e as the *equally distributed equivalent fatality rate*: when *every* terrorist incident results in exactly F^e deaths, F^e is welfare equivalent to $\bar{F}$.

Following from this, Atkinson's (1970) index, defined with respect to the parameter,ε, as applied to differences between terrorist incidents in their number of deaths, yields:

$$A_\varepsilon = (F^e / \bar{F}) - 1 = \left[\sum_{i=1}^{N} N^{-1} \left(\frac{F_i}{\bar{F}} \right)^{1+\varepsilon} \right]^{1/(1+\varepsilon)} - 1$$

When $\varepsilon=0$, society is indifferent about the inter-incident distribution of a given total of deaths from terrorist incidents and $F^e = \bar{F}$; for ε>0, $F^e > \bar{F}$ and $A_\varepsilon > 0$. The higher the value of the inequality aversion parameter, ε, the greater will the value of F^e and hence of A_ε.

The above points can be illustrated diagrammatically in Figure 1. If there are two incidents, each point on *QQ* represents a (F_1, F_2) combination that yields the same (given) total of deaths, $F=F_1+F_2$ and, therefore the same (given) value of $\bar{F}=F/2$: *QQ* is the fatality-possibility locus corresponding to *F* and its slope is -1.

For *N* incidents, the loss function is:

$L = L(F_1, F_2, ..., F_N),\ L \geq 0,\ L = 0,$ if $F_i = 0\ \forall i$ and $\partial L_i / \partial F_i > 0, \forall i$. In additively decomposable form, the loss function becomes: $L = \sum_{i=1}^{N} \Phi(F_i),$ where $\Phi(.) \geq 0$ represents society's loss from incident *i* resulting in F_i deaths. If $\Phi(.)$

is strictly convex then social marginal loss increases for increases in F_i. Consequently, for a given total of deaths, *F*, *social loss will be minimised* when: $F_1 = F_2 = .. = F_N$.

For *N=2*, the indifference curves associated with the loss function, with curves further away representing higher levels of loss, are superimposed upon *QQ* . Social loss is minimised at a point where an indifference curve is tangential to QQ and this will occur, by convexity of the loss function, when $F_1=F_2$. Consequently, tangency between the indifference curve and *QQ* occurs at a point (A) on the 45^0 line: equilibrium occurs when both incidents result in an identical number of deaths.

If, however, the outcomes with respect to the two incidents are at *T*, then the total number of deaths, *AB*, if distributed according to *T*, is welfare-equivalent to a larger total *RS*, where *RS* is equally distributed between the two incidents. The degree of inequality in the inter-incident distribution of the number of deaths is *(RS/AB)-1* and this is also the percentage amount by which the social loss from locating at *T* exceeds its minimum value at *A*. The greater the aversion to inequality, the more bowed will be the indifference curves, the higher will *R* be along the 45^0 line, and the greater will be the social loss associated with the point *T*.

Table 10 shows the equally distributed equivalent (*ede*) number of deaths and the *ede* fatality rate for the three main terrorist groups in India (Islamic, Marxist, North-Eastern), for the two main attack types (armed assault and bombing) under different degrees of inequality aversion. When $\varepsilon=0.25$ (mildest inequality aversion), "society" would be prepared to tolerate 466 deaths (as compared to the actual number of 415 deaths) from the 53 Islamic-engendered armed assault attacks, and 396 deaths (as compared to the actual number of 313 deaths) from the 56 Islamic-engendered bombing attacks, *provided these higher numbers were equally distributed between the incidents*.

For deaths caused by incidents for which North-Eastern groups were responsible, "society" would be prepared to tolerate 468 deaths (as compared to the actual number of 445 deaths) from the 56 armed assaults carried out by North-Eastern groups, and 108 deaths (as compared to the actual number of 93 deaths) from the 27 bombing attacks carried out by North-Eastern groups, *provided these higher numbers were equally distributed between the incidents*.

As inequality to aversion increased, the *ede* number of deaths and, by corollary, the *ede* fatality rate rose: in order to compensate for the unequal distribution of deaths between the different terrorist incidents, "society" would be prepared to tolerate increasingly larger numbers of deaths, *provided these were equally distributed between the incidents*.

6. Conclusions

This paper analysed fatality rates from terrorist incidents in India between 1998 and 2004 with respect to the terrorist groups responsible for such incidents. The two main conclusions to emerge from this study are that, of the three main terrorist groups in India, Islamic terrorists are best "equipped" - by way of temperament, weapons, training - to cause the maximum number of fatalities. On the other hand, in terms of "attack type", North-Eastern terrorist groups, whose favoured mode of attack was armed assault, were best placed to cause fatalities. That the number of fatalities from terrorist incidents in the North-East of India was not still higher was due to North-Eastern terrorist groups not possessing the "equipment" of Islamic terrorists: many cases of armed assault in the North East involved traditional weapons like bows and arrows or machetes. If terrorist groups in the North East were equipped to Islamic terrorist standards, the fatality rate in the North East would be considerably higher.

Conversely, Islamic groups did not engage in armed assault to the same degree as the North-Eastern groups. If Islamic terrorist groups showed the same proclivity towards armed assault as North-Eastern terrorist groups then, in consequence of their superior "equipment", fatality rates from terrorist incidents bearing an Islamic stamp would rise sharply. The death toll from the Mumbai attacks of 26-29 November 2008 - when modern weaponry, meticulous planning, rigorous training were all harnessed to a cold-blooded disregard for human life – might then be a precursor of further carnage in the years to come.

Lastly, the paper then applied Atkinson's (1970) concept of equality-adjusted income to terrorism to arrive at the concept of equality-adjusted deaths from terrorist incidents: in order to avoid spectacular incidents resulting in the loss of a large number of lives – as in New York on September 11, 2001 and in Mumbai 26-29 November 2008 – "society" might be prepared to tolerate "low-grade" terrorism which resulted in a larger number of deaths in total but avoided a large number of deaths from a single iconic incident.

References

Abadie, A., Gardeazabal, J. (2003), "The Economic Costs of Conflict": a Case Study for the Basque Country", American Economic Review, vol. 93, pp. 113-32.

Blinder, A.S. (1973), "Wage Discrimination: Reduced Form and Structural Estimates", Journal of Human Resources, vol. 8, pp. 436-455.

Anand, S. and A. Sen (1997). Concepts of Human Development and Poverty: A Multidimensional Perspective, Human Development Report 1997 Papers, New York, UNDP.

Atkinson, A.B. (1970). "On the Measurement of Inequality." Journal of Economic Theory vol. 2, pp. 244-263.

Enders, W., Parise, G.F., and Sandler, T. (1992), "An Econometric Analysis of the Impact of Terrorism on Tourism", Kyklos, vol. 45, pp. 531-54.

Enders, W. and Sandler, T. (1996), "Terrorism and Foreign Direct Investment in Greece and Spain", Kyklos, vol. 49, pp. 331-52.

Frey, B.S. (2004), Dealing with Terrorism – Stick or Carrot?, Cheltenham: Edward Elgar.

Haqqani, H. (2005), "Casting the Wrong Blame", Wall Street Journal, July 22.

LaFree, G; Dugan, L; Fogg, H. V.; Scott, J., (2006) "Building a Global Terrorism Database." NCJ 214260, United States Department of Justice, National Institute of Justice, Apr 27, 2006. (http://www.ncjrs.gov/pdffiles1/nij/grants/214260.pdf).

LaFree, G, and Dugan, L. (2008),. Global Terrorism Database II, 1998-2004 [Computer file]. ICPSR22600-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2008-10-23. doi:10.3886/ICPSR22600

Nitsch, V. and Schumacher, D. (2004), "Terrorism and international trade: an empirical investigation", European Journal of Political Economy, vol. 20, pp. 423-33.

Oaxaca, R. (1973), "Male-Female Wage Differentials in Urban Labor Markets", International Economic Review, vol. 14, pp. 693-709.

Table 1: Terrorist Incidents in India by State: 1998-2004

State	Number of Incidents	Percentage of Total Incidents	Number of Fatalities	Percentage of Total Fatalities
Andhra Pradesh	48	6.12	90	2.99
Arunachal Pradesh	1	0.13	1	0.03
Assam	85	10.84	376	12.5
Bihar	26	3.32	156	5.2
Chandigarh	1	0.13	0	0
Chhattisgarh	2	0.26	21	0.70
Delhi	14	1.79	25	0.83
Goa	1	0.13	0	0
Gujarat	8	1.02	2	0.07
Himachal Pradesh	4	0.51	46	1.53
Jammu and Kashmir	480	61.22	1658	55.11
Jharkhand	11	1.40	86	2.89
Karnataka	2	0.26	0	0
Kerala	3	0.38	0	0
Madhya Pradesh	1	0.13	22	0.74
Maharashtra	14	1.79	93	3.09
Manipur	17	2.17	94	3.12
Meghalaya	1	0.13	12	0.40
Mizoram	1	0.13	8	0.27
Nagaland	1	0.13	12	0.40
Orissa	3	0.38	7	0.23
Punjab	4	0.51	10	0.33
Tamil Nadu	18	2.3	72	2.39
Tripura	25	3.19	179	9.95
Uttar Pradesh	4	0.51	23	0.76
Uttaranchal	1	0.13	2	0.07
West Bengal	5	0.64	11	0.37
Unknown	3	0.38	2	0.07
Total	784	100	3008	100

Source: LaFree and Dugan (2008)

Table 2: Terrorist Incidents in India by Major Groups Responsible, 1998-2004

Group	Number of Incidents	Number of Fatalities
Al-Arifeen	1	6
Al-Badr	1	0
Al-Hamas Mujahideen	1	0
Al-Madina [LeT Front]	3	4
Al-Mansoorian	1	4
Al-Mansurian [LeT Front]	3	13
Al-Omar Mujahedin	2	13
Al-Shuda Brigade of Jammu and Kashmir	1	8
Harakat ul-Mujahidin	2	1
Harkatul Jihad-e-Islami	3	38
Hizb-ul-Mujahidin	34	173
Islamic Fateh	1	1
Islamic Militants	1	1
Jaish-e-Mohammad	11	39
Jamaat-ul Mujahideen	4	25
Kashmir Freedom Force	1	0
Lashkar-e Taiba	47	371
Save Kashmir	1	1
Save Kashmir Movement	2	9
Students Islamic Movement of India	4	63
Tehreek-ul-Mujahedeen	1	2
The Islamic Front	1	10
Total Islamic Groups	***126***	***782***
Marxist Groups		
Bengali Tiger Force	1	2
Communist Party of India - Maoist (CPI-M)	2	4
Communist Party of India (Marxist Leninist)	1	6
Maoist Communist Center	14	98
Naxalites	8	31
People's Liberation Army	1	8
People's War Group	46	189
Porattom	1	0
Praveen Dalam	1	1
Total Marxist Groups	***75***	***339***
North-East Groups		
All Tripura Tiger Force	6	56
Bodo Liberation Tigers	6	42
Dima Halao Daoga (DHD)	5	1
Kamtapur Liberation Organization	1	4
Kanglei Yawol Kanna Lup	2	8
Karbi National Volunteers	2	10
Kuki Liberation Army	1	0
Kuki Revolutionary Army	1	11
National Democratic Front of Bodoland	14	99
National Liberation Front of Tripura	21	140
National Socialist Council of Nagaland	1	10
United Liberation Front of Assam	36	165
United People's Democratic Solidarity	1	0
Total North-East Groups	***97***	***546***

Table 3: Fatalities by Attack Type

Assault Type	Number of Incidents	Number of Fatalities	Fatalities-to-Incidents
Bombings	378	1049	2.78
Armed Assault	298	1803	6.05
Assassination	52	85	1.63
Infrastructure Attack	35	45	1.29
Hostages	20	26	1.30
Unknown	1	0	0
Total	***784***	***3008***	***3.84***

Table 4: Fatalities by Terrorist Group

Groups	Number of Incidents	Number of Fatalities	Fatalities-to-Incidents
Islamic	126	782	6.21
Marxist	75	339	4.52
North-Eastern	97	546	5.63
Other Groups	87	210	2.41
Unknown	399	1131	2.83
Total	***784***	***3008***	***3.84***

Table 5: Type of Terrorist Attack in India, 1998-2004

Group	Armed Assault	Bombing	Other	Total
Al-Arifeen	0	0	1	1
Al-Badr	0	1	0	1
Al-Hamas Mujahideen	0	0	1	1
Al-Madina [LeT Front]	0	0	3	3
Al-Mansoorian	0	1	0	1
Al-Mansurian [LeT Front]	1	1	1	3
Al-Omar Mujahedin	1	1	0	2
Al-Shuda Brigade of Jammu and Kashmir	0	1	0	1
Harakat ul-Mujahidin	1	0	1	2
Harkatul Jihad-e-Islami	2	1	0	3
Hizb-ul-Mujahidin	11	20	3	34
Islamic Fateh	0	1	0	1
Islamic Militants	0	1	0	1
Jaish-e-Mohammad	6	5	0	11
Jamaat-ul Mujahideen	2	2	0	4
Kashmir Freedom Force	0	0	1	1
Lashkar-e Taiba	27	13	7	47
Save Kashmir	0	0	1	1
Save Kashmir Movement	0	2	0	2
Students Islamic Movement of India	0	4	0	4
Tehreek-ul-Mujahedeen	1	0	0	1
The Islamic Front	0	1	0	1
Total Islamic Groups	***52***	***55***	***19***	***126***
Marxist Groups				
Bengali Tiger Force	1	0	0	1
Communist Party of India - Maoist (CPI-M)	2	0	0	2
Communist Party of India (Marxist Leninist)	1	0	0	1
Maoist Communist Center	7	3	4	14
Naxalites	5	1	2	8
People's Liberation Army	1	0	0	1
People's War Group	9	23	14	46
Porattom	0	0	1	1
Praveen Dalam	0	0	1	1
Total Marxist Groups	***26***	***27***	***22***	***75***
North-East Groups				
All Tripura Tiger Force	6	0	0	6
Bodo Liberation Tigers	4	1	1	6
Dima Halao Daoga (DHD)	0	0	5	5
Kamtapur Liberation Organization	1	0	0	1
Kanglei Yawol Kanna Lup	1	1	0	2
Karbi National Volunteers	2	0	0	2
Kuki Liberation Army	0	0	1	1
Kuki Revolutionary Army	1	0	0	1
National Democratic Front of Bodoland	9	4	1	14
National Liberation Front of Tripura	18	2	1	21
National Socialist Council of Nagaland	1	0	0	1
United Liberation Front of Assam	13	18	5	36
United People's Democratic Solidarity	0	1	0	1
Total North-East Groups	***56***	***27***	***14***	***97***

Table 6: Regression Estimates, by Group, of the Number of Fatalities from Terrorist Attacks in India, 1998-2004

Type of Assault	Coefficient Estimate	t-value
Intercept	1.111	1.50
Islamic groups	2.065	1.37
Marxist groups	0.508	0.36
North-Eastern groups	-0.540	-0.33
Bombing	0.743	0.91
Islamic bombing	1.772	1.04
Marxist bombing	3.601	2.03
North-East bombing	2.130	1.08
Armed Assault	3.791	4.45
Islamic armed assault	1.014	0.58
Marxist armed assault	0.129	0.07
North-East armed assault	3.584	1.96

772 observations, 1998-2004

Table 7: Number of Fatalities by Terrorist Group and Attack Type

	Residual Group	**Islamic Groups**	**Marxist Groups**	**North-Eastern Groups**
Bombing	1.85	5.69	5.96	3.44
Armed assault	4.90	7.98	5.54	7.94
Other attack type	1.11	4.29	1.62	0.57

Table 8
The Decomposition of Fatality Rates by Terrorist Group:
"Blinder-Oaxaca" Method

	Sample Average	*Group s treated as group r*		*Group r treated as group s*	
	$F^r - F^s$	Attack Type Difference*	Residual	Attack Type Difference**	Residual
***r*=Islamic *s*=Marxist**	**6.21 – 4.52 = 1.69**	**6.21 – 5.75 = 0.46**	**5.75 – 4.52 = 1.23**	**5.19 – 4.52 = 0.67**	**6.21 - 5.19 = 1.02**
***r*=Islamic *s*=North Eastern**	**6.21 – 5.63 = 0.58**	**6.21 – 6.65 =-0.44**	**6.65 – 5.63 = 1.02**	**4.95 – 5.63 = -0.68**	**6.21 – 4.95 = 1.26**
***r*=North-Eastern *s*=Marxist**	**5.63 – 4.52 = 1.11**	**5.63 – 4.95 = 0.68**	**4.95 – 4.52 = 0.43**	**5.09 – 4.52 = 0.57**	**5.63 – 5.09 = 0.54**

F^r and F^s are the average number of fatalities (fatality rates) from terrorist incidents for which group *r* and group *s* were, respectively, responsible.

*Attack type difference: *holding "equipment" constant at group r levels*, this difference represents the inter-group difference in fatality rates due to differences between the two groups, r and s, in their attack types.

** Attack type difference: *holding "equipment" constant at group s levels*, this difference represents the inter-group difference in fatality rates due to differences between the two groups, r and s, in their attack types.

Table 9: Gini Coefficients by Terrorist Group and Type Attack

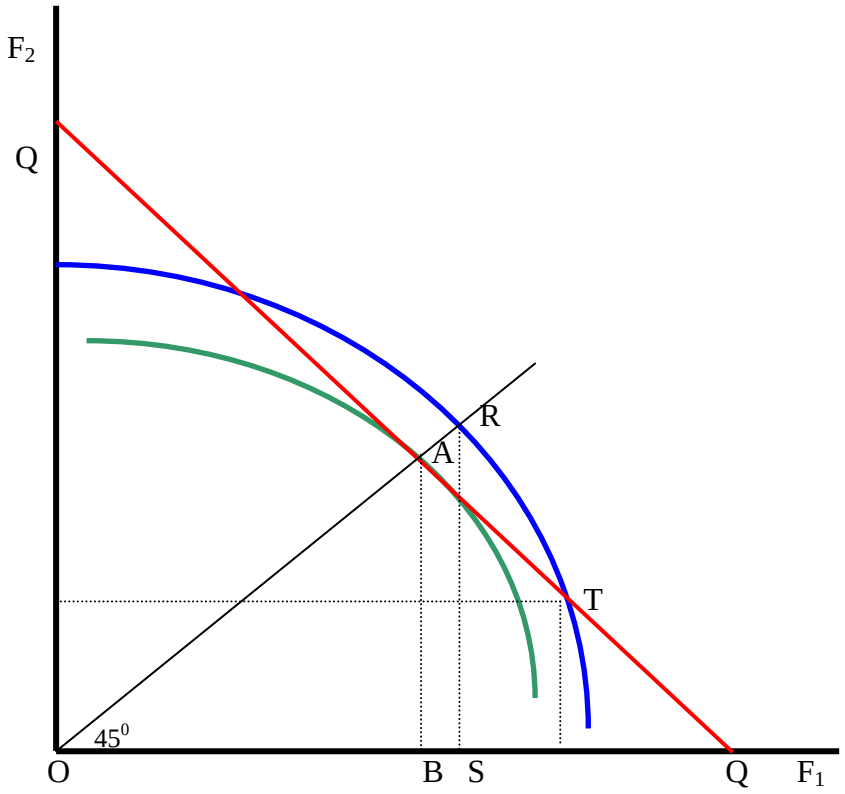
	Armed Attack Incidents	Bombing Incidents	Maximum Deaths from Armed Assault Incident	Maximum Deaths from Bombing Incident
Islamic	**0.534**	**0.729**	**52**	**35**
Marxist	**0.538**	**0.607**	**26**	**32**
North-Eastern	**0.350**	**0.619**	**12**	**26**

Table 10: Equally Distributed Equivalent Number of Deaths and Fatality Rates for Terrorist Groups in India: Armed Assault and Bombing

	Armed assault			*Bombing*		
	Islamic	***Marxist***	***North-East***	***Islamic***	***Marxist***	***North-East***
Number of Incidents	**53***	**26**	**56**	**56***	**27**	**27**
Number of Deaths	**415**	**144**	**445**	**313**	**161**	**93**
Deaths per Incident: Fatality Rate	**7.98**	**5.54**	**7.95**	**5.69**	**5.96**	**3.44**
Inequality Aversion: ε=0.25						
Equally distributed equivalent (ede) number of deaths	466	163	468	396	187	108
Equally distributed equivalent (ede) fatality rate	8.96	6.27	8.36	7.20	6.93	4.00
Inequality Aversion: ε=0.5						
Equally distributed equivalent (ede) number of deaths	516	182	491	478	209	122
Equally distributed equivalent (ede) fatality rate	9.92	7.00	8.77	8.69	7.74	4.52
Inequality Aversion: ε=0.75						
Equally distributed equivalent (ede) number of deaths	563	202	513	560	230	133
Equally distributed equivalent (ede) fatality rate	10.82	7.77	9.16	10.18	8.52	4.93
Inequality Aversion: ε=1.0						
Equally distributed equivalent (ede) number of deaths	608	222	535	640	248	143
Equally distributed equivalent (ede) fatality rate	11.69	8.54	9.55	11.64	9.19	5.30

***Number of deaths was not recorded for an armed assault and a bombing incident: hence divisorss are 52 and 55 for (Islamic) armed assault and bombing, respectively.

Figure 1
The Distribution-Sensitive Fatality Rate



Technical Appendix

Derivation of the attack-type/attack-group interaction equation

Define the variables $I_j, M_{j,}$ and N_j to take the value 1 if incident j was caused by, respectively, Islamic, Marxist, or North-Easter groups, and the value 0 otherwise. Then the regression equation estimated over *M* terrorist incidents, *j=1…M*, was:

$$\begin{aligned} &Fatalities_j = \alpha + \alpha_B(bombing_j) + \alpha_A(armed\_assault_j) \\ &+\beta_B(bombing_j \times I_j) + \beta_A(armed\_assault_j \times I_j) \\ &+\gamma_B(bombing_j \times M_j) + \gamma_A(armed\_assault_j \times M_j) \\ &+\delta_B(bombing_j \times N_j) + \delta_A(armed\_assault_j \times N_j) \end{aligned}$$

The coefficients α_B and α_A in the above equation are the fatalities associated with bombings and armed assault, respectively, when a non-Islamic/Marxist/North-Eastern group was responsible for the incident; the β_B and β_A are the *additional* fatalities associated with bombings and armed assault, respectively, when an Islamic group was responsible for the incident; the γ_B and γ_A are the *additional* fatalities associated with bombings and armed assault, respectively, when a Marxist group was responsible for the incident; and the δ_B and δ_A are the *additional* fatalities associated with bombings and armed assault, respectively, when a North-Eastern group was responsible for the incident.

Derivation of the Blinder-Oaxaca decomposition as applied to terrorism

There are *K* incidents (indexed, *k=1…K*) of which K_I are by Islamic groups, K_M by Marxists, and K_N by North-Eastern groups. *j=I (Islamic), M (Marxist.), j=N (North-East).* Let $\mathbf{X}_s^j = \left\{ X_{ks}^{\ j}, s = 1...S \right\}$ represents the vector of observations, for incident *k* of group *j*, on *S* variables which determine the number of fatalities, Y_k, from

that incident, and let $\hat{\boldsymbol{\beta}}^j = \left\{\beta_s^j, s = 1...S\right\}$ represent the associated vector of coefficient estimates for persons from group *j*.

Then the average number of fatalities from terrorist incidents for which group *j* was responsible, *j=I, M, N*, is:

$$\bar{Y}^j = K_j^{-1}\sum_{k=1}^{K_j}\left[\sum_{s=1}^{S} X_{ks}^j \hat{\beta}_s^j\right] j = I, M, N$$

So that:

$$\bar{Y}^I - \bar{Y}^M = K_I^{-1}\sum_{k=1}^{K_I}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^I\right] - K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^M\right]$$

$$= \left(K_I^{-1}\sum_{k=1}^{K_I}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^I\right] - K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^I\right]\right) \qquad \text{(A)}$$

$$+\left(K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^I\right] - K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^M\right]\right) \qquad \text{(B)}$$

Alternatively:

$$\bar{Y}^I - \bar{Y}^M = K_I^{-1}\sum_{k=1}^{K_I}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^I\right] - K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^M\right]$$

$$= \left(K_I^{-1}\sum_{k=1}^{K_I}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^M\right] - K_M^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^M \hat{\beta}_s^M\right]\right) \qquad \text{(C)}$$

$$+\left(K_I^{-1}\sum_{k=1}^{K_I}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^I\right] - K_I^{-1}\sum_{k=1}^{K_M}\left[\sum_{s=1}^{S} X_{ks}^I \hat{\beta}_s^M\right]\right) \qquad \text{(D)}$$

The term (A), above, represents the *attack type difference* when Marxist attack types are evaluated at Islamic equipment; the term (C) represents the *attack type difference* when Islamic attack types are evaluated at Marxist equipment. The terms (B) and (D) are the residual terms. By definition, $\bar{Y}^I - \bar{Y}^M = A + B = C + D$. However, this does not imply that *A=C* and *B=D*: that is, it does not imply that the size of the attribute ("attack type") and coefficient ("residual") effects are invariant to choices of a common coefficient vector.