IMPACT OF TERRORIST ARRESTS ON TERRORISM:

DEFIANCE, DETERRENCE, OR IRRELEVANCE

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In this paper, I test Sherman's theory of defiance (1993) at general levels to discern how arrests of different terrorist types and terrorist arrest types result into different types of reactions—defiance, deterrence, and irrelevance. Where terrorist types can be hardcore terrorists and peripheral terrorists and arrest types can be ordinary arrests or arrests by killings. I use 20 years' terrorism incidents and arrest data from eight regions of Punjab, the most populous province of Pakistan. Using fixed-effects cross-sectional-time-series (long panel) and Instrumental Variable approaches, I conclude that aggregated arrests increase terrorism incidence as well seriousness. Hardcore arrests lead to more increase in terrorism as compared to peripheral arrests. These findings are in accordance with the predictions of defiance theory. However, arrests through killings reduce terrorism incidence as well seriousness, therefore, rejecting what the defiance theory had predicted. It is argued to integrate defiance and backlash theories. The findings have theory, practice, and policy implications.

KEYWORDS: Sectarian Terrorism in Punjab, defiance, cross-sectional-time-series, long panels, terrorist types, arrest types

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THE IMPACT OF TERRORIST ARRESTS ON TERRORISM: DEFIANCE, DETERRENCE, OR IRRELEVANCE

In the aftermath of a terrorism incident, the immediate urge, most often, is to 'capture or kill' the terrorists involved in the attack. It is considered important not only to initiate the process of criminal justice but also to serve as a preventive measure to thwart future attacks. Whether arrests or killings really prevent further attacks, in fact, remains an issue seldom explored quantitatively. Despite some commendable research on what deters terrorists, if their arrests or killings reduce, increase, or show no effect on future terrorism is still to be learned. Terrorists are a unique type of criminals and as such are most likely to show a different reaction to their arrests and killings as compared to the criminals in general. Their reactions to government sanctions (arrests) may not only differ from criminals in general but among themselves too because of heterogeneity in arrests "caused by offender types, offense types, social settings, and level of analysis" (Sherman, 1993). For example, the arrested terrorists may be hardcore or peripheral and their arrests may have been executed through usual police procedures or through their killings. One possible effect of this heterogeneity on deterrence research may be the mutual cancellation of effects, and hence arrests showing weaker or no impact at all, in case the arrests are used as aggregations. This paper, taking clue from Sherman's theory of defiance (1993) clusters arrested terrorists into two homogenous groups—hardcore and peripheral—and studies differential impacts of their arrests on incidence and seriousness of terrorism in the future. In addition, it studies the diversity of effects caused by the mode of arrest made—ordinary arrest or arrest by killing. So, the study uses two outcomes (incidence and seriousness) and five predictors (all arrests, hardcore, peripheral, ordinary arrests, and killings).

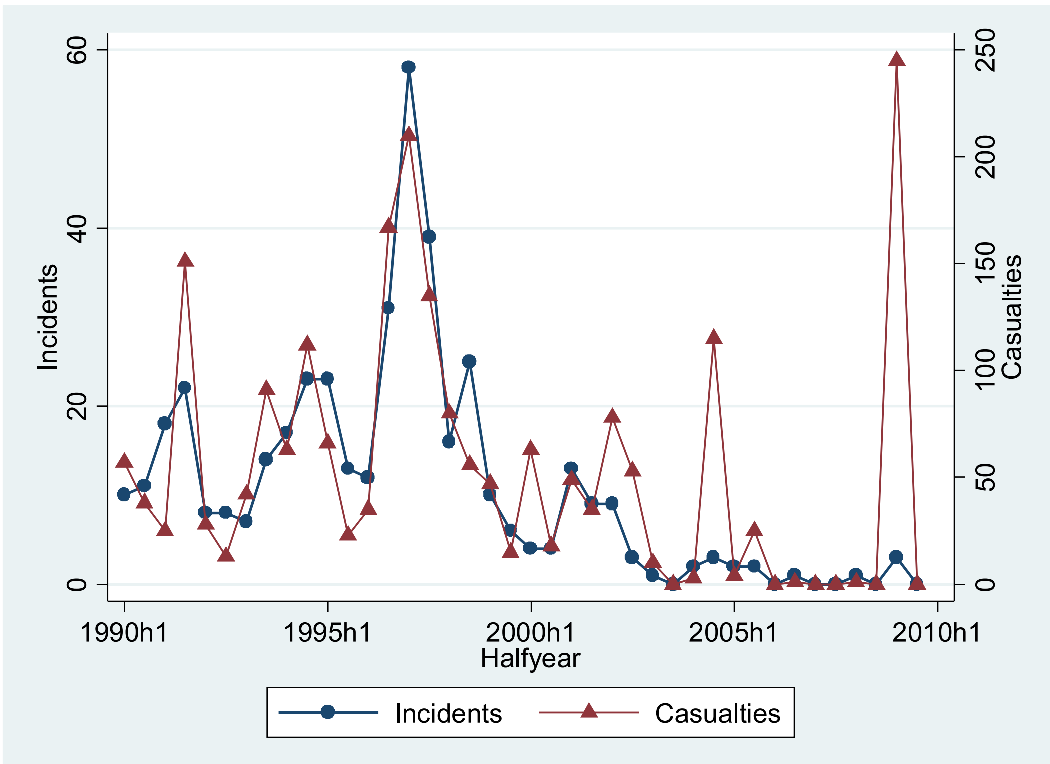
The available deterrence research on terrorism generally tests hypotheses about the deterrent effect of metal detectors; police and military expenditures; UN conventions and resolutions; military raids; targeted assassinations; and preemptive attacks. Only two studies (Landes, 1978; Dugan, LaFree, and Piquero, 2005) are about the effect of probability of arrests on airline hijackings. Indeed, the Campbell Systematic Review on Terrorism (Lum, Kennedy, and Sherley, 2006) reported that out of more than 20,000 studies on terrorism, only 150 were empirical and out of those 150 only one was on the relationship between arrests and terrorism. Hence, the deterrence research on terrorism shows a clear gap: the impact of terrorist arrests on the future terrorism has not been studied. Clearly, a research study is needed to discern the effects of arrests on future incidence and seriousness of terrorism keeping in view the diversity of terrorist types and mode of their arrests. The importance of the study for theory, policy, and practice is described in the conclusion section.

THE CONTEXT—SECTARIAN TERRORISM IN PUNJAB, PAKISTAN

Punjab is a most suitable place to study the possible relationship between arrests and terrorism because of some theoretical, practical, and methodological reasons. The reasons would be enlisted at the conclusion of this section but an introduction to Punjab is needed here. Punjab is the most populous province of Pakistan with an estimated population of 81 million and an area of 205, 344 km square. Shias are estimated to be about 20%, Sunnis (Deobandis, Barelvis, and Ahal-e-Hadith) 79%, and non-Muslims 1% (Nasr, 2002: 86). Traditional Shia and Sunni differences became more intense here after 1979 because of three factors: the Iranian Revolution of 1979 and the Afghan Jihad (1979) against the Soviet Union. After the Iranian Revolution, with the Iranian support, Shias formed Tehrik-Nifaz-Fiqah-Jaferia (TNFJ) later named as Tehrike-Jafaria Pakistan (TJP). Shias laid siege to Islamabad, the capital of Pakistan, against *Zakat and Usher Ordinance 1980* (Islamic tax law) enforced by General Zia-ul-Haque—a military dictator attempting to Islamize Pakistan. General Zia had to accept Shia demand of Shia jurisprudence for Shias. However, to counter the Shia rise, General Zia-ul-Haque helped form a Deobandi organization Anjuman-e-Sipah-e-Sahaba (ASS) (Haqqani, 2006) later named Sipah-e-Sahaba Pakistan (SSP). Further complexity was added by the Iran Iraq war of 1980's; parties to the war made Pakistan a proxy theater (Fair, 2004: 104). The SSP was funded by both Saudi Arabia and Iraq (Stern, 2000: 124) by the USA (Barshied, 2005; Abbas, 2005) making it a "cash rich organization" (Kamran, 2008: 80).

Till 1989, the clashes between the groups remained confined to firebrand speeches against each other and assassination of prominent Shias like the first two presidents of TJP. In 1990, the founder of the SSP was murdered in the city of Jhang, not exactly by Shias but by a local political rival Sheikh family. But this murder was blamed on Iranian diplomat Sadiq Ganji, and the local Shias. Ultimately, the Iranian diplomat was also murdered in 1990 in Lahore, the capital of the province of Punjab. As the momentum increased, the TJP, in 1994, gave birth to a more militant splinter group Sipah-e-Muhammad Pakistan (SMP), as did the SSP in 1996 to Lashkar-e-Jhangvi (LeJ). The TJP/SMP and the SSP/LJ targeted people from the other sect and the government officials whom they resented. The SSP/LJ killed Iranian diplomats on two occasions. Four hundred and twenty eight terrorism incidents took place from 1990 to 2009 with 2067 casualties (people killed and wounded), 1997 being the worst year with 97 incidents and 345 casualties. Attacks consisted of targeted killings (368 attacks) of prominent individuals or mass killings (60 attacks) in religious gatherings. There were 26 cases of explosive use including suicide attacks, and 402 of firearms mostly AK-47 rifle. Figure 1 presents graph of sectarian incidents and casualties on half-year basis.

Figure 1. Sectarian Incidents and Casualties in Punjab (1990-2009)



Initially, the government responded by usual police set up to arrest the accused and prosecute them. But when the problem spread beyond Jhang, its birth place, the government set up a provincial Criminal Investigation Department (CID) in February 1995 with a mandate to collect, analyze, and disseminate intelligence on sectarian terrorism and further to arrest and interrogate the arrested terrorists. During 1990 and 2009, the police arrested 615 terrorists and killed 70.

Theoretical, methodological, and practical reasons for choosing Punjab for the study of impact of arrests on terrorism would become clearer in methodology section but a few points are mentioned here. First, Punjab was the birth place of sectarian terrorism and it remained the Punjab problem, at least until 1996. It spread to the other parts of Pakistan later on. Second, Punjab had it everywhere whereas in the other provinces, it was confined only to major cities like Quetta, Karachi, and D.I. Khan. As a methodological necessity it was easier to make cross-sections (8 regions) here. Third, the Punjab CID collected data from 1990 to 2009 and it was reliable and sufficient to make inferences. While in the other provinces, except for NWFP, the CID's were established at a later stage and they have data for only a limited number of years. Fourth, identifying an incident as sectarian is comparatively easier in Punjab than in the other provinces of Pakistan. In other provinces, sometimes, the sectarian incidents are mingled with the incidents of tribal feuds or language-based violence. Lastly, being resident of Punjab and having served in the Punjab Police for almost 12 years, I have a reasonable insight into the dynamics of sectarian terrorism here.

LITERATURE REVIEW

DETERRENCE RESEARCH

Deterrence research is primarily based on the ideas of Cesare Beccaria (1738-1794) and Jeremy Bentham (1748 –1832). They believed that criminal decisions were based on a few simple factors: humans have free will; humans are rational creatures; and humans are able to weigh prospective outcomes of their actions. The resultant theory of deterrence postulates that offenders are rational actors who seek to minimize costs and maximize benefits. Utilitarianism advanced by Bentham, proposes that as the individuals act in their own self-interest, effective punishments will deter them from engaging in specific actions that serve their self-interest. The deterrence perspective maintains that an individual's propensity to engage in violence or crime including terrorism can be altered by the actions of the government (LaFree, Dugan, and Korte, 2009). Deterrence theory suggests that government intervention—for example arrest—will decrease terrorism by increasing *fear* caused by the threat or imposition of punishment.

I divide empirical research studies based on the deterrence theory into two categories: terrorism studies, and crime studies. Terrorism studies focus on the impact of different counterterrorism strategies on terrorism. Counterterrorism strategies studied till now include metal detectors (Cauley and Im, 1988; Enders, Sandlers, and Cauley, 1990; Enders and Sandlers, 1993, 2000), probability of apprehension, the conditional probability of incarceration, and sentences (Landes, 1978), police and military expenditures (Barros, 2003), UN conventions and resolutions (Cauley and Im, 1988; Enders, Sandlers and Cauley, 1990; Enders and Sandlers, 1993), military raids (Brophy-Baermann and Conybeare, 1994; Enders, Sandlers, 2000, Nevin, 2003), and preemptive attacks (Sheehan, 2006). Criminologists, Dugan, LaFree, and Piquero (2005) estimated the deterrent impact of several certainty-based and severity-based counter hijacking strategies on the likelihood of differently motivated hijacking events. They found support for deterrence caused by certainty of apprehension.

The results of these studies are mixed: probability of apprehension, large police expenditures, and metal detectors supporting deterrence model; UN conventions showing no effect; and preemptive raids and political efforts increasing terrorist incidents. In short, the existing studies are not about the deterrent effect of arrests on terrorism except that the studies on metal detectors especially of Landes (1978) and Dugan, LaFree, and Piquero (2005) tell us that the terrorists want to avoid arrest. But the variables used in these studies are not exactly ‘arrests.’

But the second category of studies, addressing a parallel but broader question of whether arrests reduce *crime,* is more relevant and insightful. Using a variety of ways to operationalize the concepts of arrest and crime[1], using different datasets on a variety of offence categories, these studies offer several important findings helping us to understand the possible effect of arrests on terrorism. First, that the relationship between crime and arrests is two-way: crime impacts arrests (Decker and Kohfeld, 1986) and arrests deter crime (Chamlin et al., 1992; Cloninger and Sartorius, 1979; Levitt, 1998). Second, that the impact of number of incidents on the number of arrests is contemporaneous, but the impact of arrests on the reported crime is lagged (Levitt, 1998). Contemporaneous relationship between reported crime and arrests is positive but there is no feedback relationship between dependent (number of crimes reported) and independent variable (the frequency of arrest) (D'Alessio and Stolzenberg, 1998). Third, that the arrests must reach a certain critical level (tipping point) before they reduce crime (Tittle, 1973) and this tipping point is an attribute of smaller cities because deterrent effect of arrest certainty is stronger in smaller cities and counties than in larger ones (Brown, 1978; Chamlin et al., 1992). Crime especially terrorism have cycles; they peak after some period of time (Im, Cauley, and Sandler, 1987) and then start falling sharply.

Studies generally are correlational in nature and the time-series analysis seems to be the preferred way of studying relationship over time. But within this generic statistical procedure, techniques kept on changing with the availability of newer and more relevant procedures, like panel models. To discern the relationship between crime and arrests appropriately, these studies underscore the importance of aggregating crime data in proper time intervals (how much time does it take incidents to influence arrests and vice versa), using proper time lags, and selecting proper level of geographic region.

In short, the missing topics from the above described deterrence research include the

[1]Crime in general or of a specific nature like robbery, burglary, and larceny. Number of arrests and number of crime incidents in a raw form; or in terms of rates of arrests and rates of crime; or taking log of number of arrests and log of number of incidents.

relationship of terrorism and arrests and the differential effects of the heterogeneity present in arrests. The two categories of studies discussed above helped me in designing a comprehensive study keeping in mind the issues of moderating effects, time lag, time aggregation, and space selection. I will discuss these concepts in detail in methodology section.

BACKLASH RESEARCH

Although, deterrence models have been applied to a wide variety of criminal behavior including terrorism, there is an influential group of researchers in terrorism studies, psychology, and criminology who do not agree with this model of deterrence. Instead, they believe that threat or punishment does not always reduce crime but may in some cases increase it. LaFree, Dugan, and Korte (2009) cite McCauley (2006), Nevin (2003) as terrorism scholars, Sherman (1993), Pridemore and Freillich (2007) as criminologists, and Brehem and Brehem (1981), and Tyler (1990) as psychologists who argue that backlash is the likely result in many cases. They quoting many researchers (Collins, 2004; Geraghty, 2000; Kenny, 2003; Lichbach, 1987; Malvesti, 2002; Nevin, 2003; Soule, 1989; Turk, 2002) agreed that the imposition of harsh criminal justice and military interventions to reduce terrorism may well be counterproductive given the studies testing deterrence theory with regard to terrorism often show no or negative effect.

An important study by criminologists deserves greater attention. LaFree, Dugan, and Korte (2009) studied the impact of two criminal justice and four military strategies aimed at reducing political violence in Northern Ireland from 1969 to 1992 and found the strongest support for backlash models, except for the one. The two criminal justice interventions were “the internment” and “criminalization and Ulsterization.” During the internment, a total of 1,981 suspected terrorists were detained by the authorities. Criminalization revoked the special rights of the terrorists as political detainees and started treating them instead as an ordinary criminal. The four military interventions were the Falls Curfew, Operation Motorman, and the Loughall and Gibralter. The Falls Curfew was a 36-hour military curfew and search operation designed to locate IRA members and weapons stockpiles. Operation Motorman was a British military deployment of 30,000 launched, aiming at eliminating “no go” areas in Londonderry and Belfast. Loughall and Gibralter were incidents of targeted assassinations of terrorists. Except for the Operation Motorman, all the other strategies support the backlash perspective. Operation Motorman was followed by significant declines in the risk of new attacks. The results underscore the importance of considering the possibility that antiterrorist interventions might both increase and decrease subsequent violence. But they do not discuss conditions under which it would happen so. These conditions are detailed in Sherman’s theory of defiance.

SHERMAN’S (1993) THEORY OF DEFIANCE

Sherman (1993: 445) claims that it has been a wrong question to ask “does punishments control crime?” because sanction effects vary widely depending on type of offenders, offences, social settings, and level of analysis. According to him, a more useful question to ask is, “under what conditions does each type of sanctions reduce, increase, or have no effect on future crimes?” And he gives four necessary conditions under which sanctions will result into defiance: offender perceives criminal sanctions as unfair, offender defines sanctions as stigmatizing personae, offender is poorly bonded to punishing community or agent, and the offender refuses to accommodate shame.

Defiance is “the net increase in the prevalence, incidence, or seriousness of future offending against a sanctioning community caused by a proud, shameless reaction to the administration of a criminal sanction” (Sherman, 1993: 459). Defiance may be specific or general: specific defiance is by the individual punished and general defiance is the reaction of a group to the punishment of any of its members. Sherman (1993) adds another dimension of direct and indirect defiance. Defiance shown directly to the punishing agent is direct, while defiance shown to the community is indirect.

Theory of defiance states that there are four necessary conditions under which sanctions cause defiance, predicting increase in incidence or seriousness of future crime. Judged on these criteria, terrorists are more likely to meet these conditions as compared to the common criminals. Although there is no study known to the author which establishes that terrorists really meet these conditions but a few examples which may lead us to assume so are narrated.

Yousef Ramzi was tried in the U.S. District Court for the Southern District of New York during January 1998 and convicted of planning a terrorism plot. On his conviction, the judge Kevin Duffy remarked "You adored not Allah but the *evil* (emphasis added) you had become. I must say as *an apostle of evil* (emphasis added), you have been most effective.” It is a good example of sanctions as stigmatizing personae. In response, the convict proclaimed: "Yes, I am a terrorist and *proud* (emphasis added) of it as long as it is against the U.S. government, and against Israel, because you are more than terrorists; you are the one who invented terrorism and using it every day. You are butchers, liars and hypocrites." Ramzi’s example illustrates the three criteria of stigmatizing personae and the terrorists’ refusal to accommodate shame and their pride of what they do. Another example of pride is the wife of the suicide bomber who attacked

Central Intelligence Agency agents in Afghanistan. She said: "I am proud of him, my husband has carried out a great operation in such a war. May God accept his martyrdom."

The above examples support assumptions in this study that the terrorists are proud of what they do and they refuse to accommodate shame and even the governments' attitude towards them is that of stigmatizing. The terrorists specifically studied in this paper are poorly bonded to the punishing community or the government agents as proved by their killing many government functionaries and the police officers. For example, they killed a former minister Mohammad Siddique Kanju and attacked Prime Minister Mr. Nawaz Sharif but he survived. They killed senior superintendents of police, Muhammad Ashraf Marth, (brother-in-law of Prime Minister, Chaudhry Shujaat Hussain), Ejaz Ahmed Langerial, and deputy superintendent Tariq Kamboh who was promoted to the rank in recognition of his work against sectarian outfits, just to mention a few. These officers were killed because they had arrested and interrogated important terrorists. Presumption that the terrorists were poorly bonded to the community is supported by the fact most of the terrorists, especially hardcore ones, were (proclaimed offenders) fugitives of law.

Under the strong presumption that the terrorists meet with the four necessary conditions listed in defiance theory, I hypothesize that controlling for other variables, terrorist arrests are likely to be associated with increase in the incidence or seriousness of terrorism in future. But, as the terrorist organizations have hierarchies in which terrorists have different roles, a wide diversity in this effect is expected. The arrests of hardcore terrorists are likely to be linked with more increase in terrorism than the arrests of peripheral terrorists. Defiance theory also suggests differential impacts caused by the mode of arrests made. Presumably, the arrests executed through killings are likely to be perceived more unfair as compared with the arrests affected through the usual police procedures. Therefore, the arrests made through killings of terrorists are likely to cause more increase in terrorism than the arrests through ordinary means.

DATA AND METHODS

RESEARCH DESIGN

According to Sherman (1993: 467), the best test of defiance theory will be randomized experiments. However, in the context of the present study this design may not be feasible, as terrorists could not be randomized to be arrested or not to be arrested. An alternative design mentioned by Sherman (1993) was the longitudinal cohort design, mainly meant for studying specific deterrence. To study general defiance, I use cross-sectional-time-series (panel design) with fixed effects, instead of using longitudinal cohort design, which is almost the same except for the difference in level of analysis. According to Allison (2009: 2), “using fixed-effects methods, it is possible to control for all possible characteristics of the individuals in the study—even without measuring them—so long as those characteristics do not change over time.” By using this design, Allison (2009) claims that we can get closer to the benefits of randomized experiments even with non-experimental data, only the data should be cross-sectional time series.

DATA

To test my hypotheses, I use data from January 1990 to December 2009 from the province of Punjab in Pakistan collected by the CID[2].

VARIABLES

Terrorism, Terrorism Incidents, and Terrorism Seriousness

Terrorism is defined as “the threatened or actual use of illegal force and violence by a non state actor to attain a political, economic, religious or social goal through fear, coercion or intimidation” (LaFree and Dugan, 2007: 184). For the specific purposes of this paper, in the context of sectarian terrorism, I take a terrorist incident as an incident in which unlawful use or threatened use of force is committed by a sectarian group against the other sect for their differences in ideology or against the law enforcement agency for its actions against the terrorists. The intention is of intimidating or coercing them. I include successful incidents (in which somebody was killed or wounded) only and exclude incidents against property, if any. As the defiance theory postulates that defiance may increase the incidence or seriousness of future crime, therefore, for the purpose of this study, I measure terrorism in two ways: by counting the

[2] The police sources generally have reliability problems, because many researchers have confirmed the underreporting of crime. But research finds that underreporting is mostly for the minor offences. In case of serious offences, Cloning and Sartorius (1979) found that underreporting was not a serious issue. They considered for their analysis two crimes—homicide and auto theft—primarily because being serious offences, these crimes showed no appreciable reporting errors in national surveys. LaFree (1999) quotes Gove et al. (1985) and O’Brien (1996) reporting that data are probably most accurate for murder and robbery, two serious offences. In case of the terrorist incidents, I argue that non-reporting of incidents is nearly impossible because of the sensitivity of the incidents, their sensational nature, and proactive behavior of the affected religious organizations. So, for all practical purposes, incidents are fairly reported.

number of terrorism incidents and by counting the number of causalities[3].

Terrorist Arrests

Arrest is defined as the taking or detaining in custody by authority of law (Gove and Merriam-Webster, 2002) especially, in response to a criminal charge. The date of arrest is not the date on which terrorists are officially declared to be arrested but the date on which they actually came into custody of the law enforcement agency and lost their freedom of action. Arrests on criminal charges are included and not the preventive ones. Sometimes, in the process of arrest, terrorists are killed. I count it as arrest because of two reasons: the terrorists have ceased to take action and law considers it as an arrest. Generally, the terrorists are involved in more than one incident of terrorism and at various geographical regions. Once arrested in one place, the same arrest date is recorded in all the regions where that terrorist has committed terrorism. So, this study makes a difference between arrests and arrestees.

Terrorist Types

Fraser and Fulton (1984) posit that terrorist groups have four levels of hierarchy: command, active cadre—people actually carrying out terrorist activity, active supporters, and passive supporters. In case of the Shia-Sunni organizations I study, hierarchy is almost the same but with a slight difference. The commanders are active cadres too, and the passive supporters do

[3] Because of three reasons, I use casualties as a measure of seriousness instead of the casualties per incident. 1) It is more intuitive to count total casualties than to count casualties per incident. If it can be an indication of terrorists' intentions, then they would be more concerned about increasing the number of casualties in a time frame than to be intentionally counting the number of casualties per incident. 2) Poisson models predicting casualties and casualties per incident are exactly the same except for one thing. In model predicting casualties incidents are a predictor variable and population is exposure. But in the model predicting casualties per incident, the predictors remain the same including incidents because outcome variable is still the same as in case of casualties, only it has been offset by incidents. According to MacDonald and Pamela (2008), a predictor cannot be an offset variable. 3) Hoffman (2006: 86) mentions the number of casualties as a measure of seriousness.

not count because they are not the arrestees. Therefore, I categorize terrorists as hardcore or peripheral. Hardcore terrorists are the terrorists who have some leadership role in their organization, or they have committed more cases than the others or are involved in some high profile cases. Generally the government fixed head money for the arrest of hardcore terrorists. Peripheral terrorists are terrorists except for hardcore ones. Sherman (1993) quoted Hood and Spanks as saying that contradictory effects in heterogeneous samples cancel each other out. The division of arrested terrorists into two terrorist types makes the two resultant groups comparatively homogenous and hence the danger mentioned by Hood and Spanks is decreased.

Control Variables

Localized Conflict. Sectarian terrorism in the early years of 1990s was mostly confined to the city of Jhang where SSP had their headquarters. Then the SMP established their headquarters in Lahore in 1994. Both of these periods when the SSP was operating from Jhang and the SMP from Lahore are likely to have different effects on the course of terrorism in Punjab. To control for this differential effect, Localized Conflict as a dummy variable has been included as a control.

Type of Weapon. Sectarian terrorists in Punjab have been using many types of weapons—blunt, firearms, or explosives. As the number of casualties in an incident depends a lot on the type of weapon, in the model predicting casualties (to be discussed later), I use type of weapon as a control.

Type of Target. It is just not the type of weapon which determines the number of causalities; it is also the attack type—assassination or mass killing. A dummy variable of whether it was targeted assassination or a case of mass killing is included in models predicting casualties.

Interaction of Target Type and Weapon Type. An AK-47 rifle used for assassination of a single person would produce less casualties as compared to an incident in which the same rifle was used on a mob. So it is just not the target type alone or the weapon alone which actually predicts casualties, it is their interaction. Therefore, I have included interaction term of weapon types and target types[4].

Population. To convert the counts to rates, I use population as an exposure variable.

The descriptive statistics of outcome variables (incidents, casualties) and their likely predictors are shown in table 1. The data, as the next section would show the rationale, are aggregated on half-yearly basis for eight regions[5]. The table shows that the mean of incidents in a region for six months is 1.34 with a standard deviation of 2.76 and the minimum and the maximum values are 0 and 24, respectively. The mean of casualties is 6.46 with a standard deviation of 16.87 and the minimum and the maximum values are 0 and 142 respectively. The mean of population is 8.80 million with a standard deviation of 3.13. The statistics of mean, standard deviation, the minimum, and the maximum, show that the data as count are skewed to the right. Hence Poisson distribution would most likely be a good choice to use for modeling. The predictor variable of interest (arrests) is also skewed to the right with a mean of 2.77 and a

[4]Some variables (Specialized Hardliner Groups, 9/11, and leader killed) were supposed to influence the events of sectarian terrorism. They were included in the regressions as dummy variables but did not show significant effect. Perhaps time dummies have served for them as proxies. So they were dropped from analysis.

[5] Punjab traditionally has eight regions (Lahore, Faisalabad, Multan, Bahawalpur, D.G. Khan, Rawalpindi, Gujranwala, and Sargodha) each headed by a deputy inspector general. Regions are further subdivided into districts having police stations ranging in number from 10 to 100 plus.

standard deviation of 4.39 with the minimum and maximum values of 0 and 26 respectively. The dispersion in incidents and arrests shows that arrests have the potential to explain the variation in incidents. Whereas variance in casualties is almost 40 time the mean indicating that some variable in addition to the arrests is needed to count for that dispersion. And may be the two variables, which can explain so much of variation are the weapon type and the attack type. Table 1 also gives summary statistics for ordinary arrests and killings, and hardcore arrests and peripheral arrests.

Table 1. Descriptive Statistics of Incidents, Casualties, and their likely Predictors

Variable	**Mean**	**Standard Deviation**	**N**	**Sum**	**Minimum**	**Maximum**
Dependent variables						
Incidents	1.3375	2.764276	312	428	0	24
Casualties	6.459375	16.86843	312	2067	0	142
Exposure						
Population (million)	8.795625	3.12895	312	28146	3.5	16.6
Predictors						
Arrests all types	2.771875	4.385194	312	887	0	26
Arrests Hardcore	.83125	1.644681	312	266	0	12
Arrests Peripheral	1.6375	3.156299	312	524	0	21
Arrests ordinary	2.46875	4.103553	312	790	0	26
Killings	.303125	1.096585	312	97	0	9
Firearms	1.253125	2.656097	312	401	0	23
Explosions	.084375	.3392869	312	27	0	3
Localized conflict	.0625	.2424406	312	20	0	1

STATISTICAL ANALYSES

Spatial Aggregations

Earlier studies on deterrence concluded that the results were found very sensitive to the levels of spatial aggregation used (Chamlin et al., 1992). found evidence for bias in the state estimates. They preferred city instead of state as an aggregation level because the mutual influence of crime rates and sanction levels on one another was felt at the city rather than the state level. They considered heterogeneity of bigger units like states a factor making them unfit as a proper unit for analysis in deterrence studies. I have chosen a police region as the unit of analysis for four reasons. First, a police region is 1/8th part of Punjab, having a separate police administration, and a generally homogenous culture. Second, most of the terrorists worked in cells having police regions as their area of operations, making it easy to know the effect of their arrests on terrorism in that area. Third, if data were aggregated on province levels, there would be no panel data possible as n would be one. Finally, if data were aggregated on district levels, the number of n would be 36 but many districts will be without incidents. To make panels possible, according to Allison (2009), there should be at least two different values for a panel.

Temporal Aggregation

To properly discern the nature of relationship between crime and arrests, researchers have advised to aggregate crime and arrest data in proper time intervals. In deterrence research, for the first time, temporal aggregation bias was noted by Greenberg, Kessler, and Logan (1981). Then, Barros (2003) warned that time aggregation may blur the lag structure and thus restrict the causal interpretation. Chamlin et al. (1992) considered panel designs of yearly lags and yearly aggregations of arrests and crimes in macro-level research as questionable.

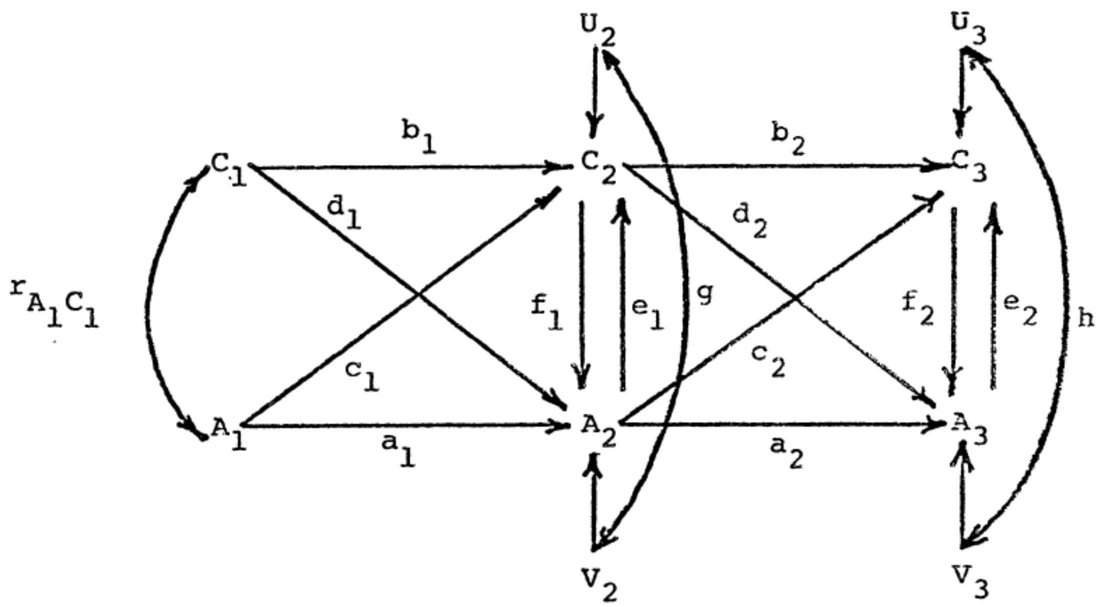
I aggregate data at half-yearly levels because of three reasons. First, terrorism is a rare event and data aggregated at monthly and quarterly levels show 84.90 % and 68.41% zeros, respectively, making data analysis problematic. Data aggregated at half-yearly basis show reasonable percentage of zeros (55.63%). Second, a half-year should be enough time for terrorist organizations to respond to arrests of their members making the effect, if any, discernable. Lastly, data aggregated on half-year basis will give sufficient time periods (T) useful in giving our hypothesis tests a power to discern the effect. So, a half-year is better than a year where there is a more likelihood of effect being lost and a month where the effect still may not be visible.

Model Specification Issues

A best graphical illustration of possible relations between crime (in our case terrorism) and arrests is presented by Greenberg, Kessler, and Logan (1979: 845). According to their illustration, per capita crime rate at time t is determined by crime rate at time t-1 and arrests at time t and t-1. It is not only the arrests determining crime rates but also crime rates at times t and t-1 determining arrests at time t. They have presented a three-wave two variable model where I am interested in C2 in figure 2.

Figure 2. Greenberg, Kessler, and Logan's (1979) Illustration of Relationship between Crime Rates and Arrest Rates

CRIME RATES AND ARREST RATES 845



[a] Lower case letters represent standardized regression coefficients and correlations among residuals.
Figure 1. Three Wave, Two-Variable Panel Model for Crime Rates and Clearance Rates[a]

The Poisson regression model can be expressed as the logarithm of the expected count outcome according to the following form:

$$\log (E(\mu|\lambda)) = \alpha + x'\beta \tag{1}$$

In Equation 1, the expected average count of terrorism, μ, conditioned on λ is denoted by (E(μ |λ)), which is a function of the intercept (α) plus a set of linear predictor variables (X'). To make this generic formulation of Poisson model specific to variables in this paper, the model can be rewritten in a modified form in equations 2 and 3:

$$\log (E(\lambda i\text{=terrorist incidents})) = \alpha + y_{it-1} + A_{it}\beta + A_{it-1}\beta + R_i\beta_{Region} + T_i\beta_{Time} + ß_{CONTROLS}$$

(2)

$$\log(E(\lambda i\text{=casualties})) = \alpha + y_{it-1} + A_{it}\beta + A_{it-1}\beta + R_i\beta_{Region} + T_i\beta_{Time} + \beta_{CONTROLS}$$

(3)

In Poisson regression, the rate is estimated by adding (log*exposure) to the right-hand side of the equation, with the parameter estimate constrained to equal 1. ‘y’ in the equation is the expected count of terrorism events in case of equation (2) and the expected count of casualties in case of equation (3) that half-year, α is the intercept, A is the number of terrorist arrests, β is the effect on terrorist events, t-1 shows the lagged variable, R is the police region having K-1 dummies for the K regions. β_{Region} is a vector of the effects of each of these regions. T represents time having T-1 dummies to control for various time effects and to serve as a proxy for some unmeasured variables. β_{Time} is a vector of the effects of each of these time dummies. To maximize confidence in the results, I sought to control for a variety of competing explanations and hence have included some controls. Equations 2 and 3 state that terrorism incidents and casualties respectively at time t is predicted by terrorism and arrests at time t-1 and arrests at time t and by some control variables. I assume that a significant increase in the number of terrorism incidents/casualties is consistent with a defiance effect, and that a significant decrease is consistent with a deterrence model. A null effect suggests that no relationship exists.

Model Estimation Issues

To estimate this model, I conducted some preliminary analyses using STATA version 10. The first analysis was of within and between variation in dependent and predictors. The results are given in Appendix 1. The most important finding from this summary is that for all variables, within variation (variation across time) is much higher than the between variation (across regions) suggesting the suitability of fixed effects models. This is important because “fixed-effects model coefficient of a regressor with little within variation will be imprecisely estimated and will not be identified if there is no within variation at all" (Cameron and Trivedi, 2009: 238). To handle the individual fixed-effects for regions, I included dummy variables for each region. This technique assists in controlling for unobserved heterogeneity when this heterogeneity is constant over time and correlated with independent variables[6].

To control for time trends, seasonal variation, and to serve as a proxy for variables changing slowly but not explicitly measured, it is advisable to include a time variable as predictor. It's done in two ways, by including time dummies or by taking advantage of the natural ordering of time and simply including a linear or quadratic trend in time (Cameron and Trivedi, 2009: 267). In this paper, I used time dummies to control for long term effects.

Earlier studies have mentioned the simultaneity of relationship between crime rates and arrests rates. There is a strong possibility of this simultaneous relationship between terrorism incidents and arrests too. To solve this problem and to isolate the impact of arrests on terrorism incident rates, I used structural-model (control function) approach as described by Cameron and Trivedi (2009: 593-595) using establishment of the CID as instrumental variable. The CID has a correlation of 0.3148 with arrests but only -0.1098 with incidents. The CID impacts incidents only through arrests of terrorists. Therefore, I considered it a valid instrument to use. The results of the two-step estimation are given in appendix 2. The results show the coefficient for residual

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[6] However, it is much difficult to assume that heterogeneity is constant over time or in Allison's words (2005: 2) characteristics of the regions do not change over time once the data are for twenty years as in the present study. However, there are remedies. First, it is advisable to include some predictors which may be causing between-variation. Second, dependent variable lags may be included in the model. Putting lagged dependent variable in the model brings in the correlates from the previous year. Where, a stronger correlation between the dependent variable and its lag shows that previous dynamics of the phenomenon are continuing over time. I used both these techniques. Third, panel design primarily was developed for data when regions are greater in number than the time periods. However, the use of long panels (cross-sectional time series) with fixed effects is very common. It's becoming popular even in many disciplines and Cameron and Trivedi (2009) have discussed them separately, although in a summarized form.

(lpuhat) as 0.00979 with a p-value of 0.852 indicating no difference between regression with instrumental variable and without it. It leads me to conclude that either the feedback relationship is too weak to be detected or it has been removed with the use of lags of dependent and independent variables. Another possible explanation might be that as in "the fixed-effects models, individual specific effects are allowed to be correlated with the regressors xit, this allows a limited form of endogeneity with the time invariant component of the error αi" (Cameron and Trivedi, 2009).

An important question to ask is what estimates of the standard errors to use when the number of regions is small and the number of time periods is large. Cameron and Trivedi (2009: 328) recommend using heteroskadastcity and autocorrelation-consistent estimate of the standard errors. Another complexity could be added by heterogeneity generated by spatial correlation of regions as the regions are adjacent and not randomly sampled. But as the number of regions is just eight, it is possible to relax the assumption that µit is independent over i (Cameron and Trivedi, 2009: 267). Terrorism incidents being count show a standard deviation of 2.764276 as compared to mean of 1.3375. In the presence of significant over-dispersion, Berk and MacDonald (2008) advise to look for the sources of dispersion: omitted predictors, incorrect functional form specified, random variation in the conditional expectations, and dependence between the events and not to opt for negative binomial, unless really needed. Cameron and Trivedi (2009: 561) recommend that instead of using negative binomial, one way to modeling is to use Poisson with robust standard errors option. I used Poisson with robust standard errors.

Postestimation Tests

Many alternative estimation methods are available and choosing between them involves trade-offs between fit, parsimony, and ease of interpretation. The criteria, I used to assess my models included tests of omitted variables, goodness-of-fit, and squared correlation between observed and fitted values. I also checked whether results were also consistent with a priori expectations. Berk and MacDonald (2008 :272) state that if the "model is on sound footing, the conditional expectations estimated by the fitted values will be the same as the residual variances around those fitted values, save for random error introduced by the Poisson process itself." In other words, "what one wants to see is whether the estimated mean from the regression model equals the variance" (MacDonald and Pamela, 2008). According to them, the assumption that the conditional mean and variance are equal is rarely met with observational data in criminology.

RESULTS

I estimated eight fixed-effects Poisson regression models using regional dummies, time dummies, robust standard errors, and population as exposure variable. Eight models, I estimated are presented in table 2. The results of models through IV method and through usual procedure using arrests as predictor were similar. Therefore, I present and discuss results of six models estimated through usual

Table2. Eight Estimated Models for Incidence and Seriousness of Terrorism

Incidence	Seriousness (casualties)

Incident rate on arrests through IV method	Casualty rate on arrests through IV method
Incident rate on arrests	Casualty rate on arrests
Incident rate on ordinary arrests vs. killings	Casualty rate on ordinary arrests vs. killings
Incident rate on hardcore vs. peripheral	Casualty rate on hardcore vs. peripheral

Poisson regression for cross-sectional-time-series (panel) and include the results of estimates through IV method as appendix 2 and Appendix 3. These are the models which have been found best fit through various Postestimation procedures. The results are placed in table2 and table3. Table 2 presents the results of three models predicting rates of terrorism incidents per half year per million people. Table 3 presents the results of three models predicting casualties per incident with different operationalizations of arrests.

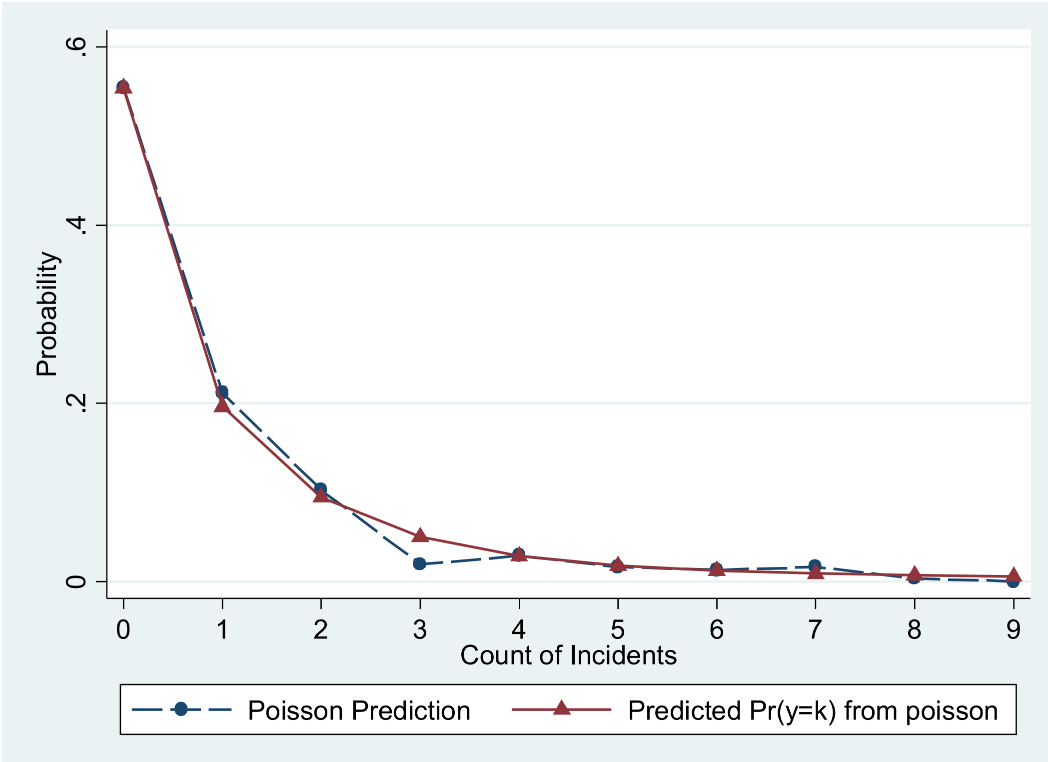
Poisson regression coefficients are not as straight to interpret as the ordinary least square regression coefficients are. Three ways exist to interpret the Poisson coefficients: as a difference between the logs of expected counts, as incidence rate ratios, and as the marginal effects. In this study, I use incidence rate ratios approach as described by MacDonald and Pamela (2010). This interpretation tells to what percentage a predictor increase or decreases the expected count or incidence of crime; such that 1.7 would be interpreted as increasing the expected count by 70%, and 0.6 would be interpreted as reducing the expected count by 40% (MacDonald and Pamela, 2010).

ARRESTS AND INCIDENCE OF TERORISM

Arrests all

Model 1 in table 3 shows the relationship between incidents as outcome and arrests and lagged arrests as predictors. The coefficient of arrests of 1.066 indicates that one more arrest is associated with a 6.6% increase in the number of terrorism incidents. The coefficient of lagged arrests of .95 indicates that one more prior arrest is associated with a 5.0% decrease in the number of terrorism incidents. In simple terms, controlling for prior period, the current level of terrorism are correlated positively with current arrest levels and negatively correlated with prior arrest levels. Coefficients estimated through two-stage least square IV approach are almost equal to the coefficients estimated through simple Poisson regression: 0.064 for arrests and 0.050 for prior arrests and the coefficient of residual (lpuhat) is not significant eliminating the need for IV approach in this case. Predicted mean of 1.339786 is almost equal to the observed mean of 1.3375 suggesting a good fit. Variance of the predicted counts of 5.942232 is more than the predicted mean but it is reasonable. R2 is 0.54 and squared correlation of coefficient between observed rates of incidents and expected is .77 which are quite high indicating a good fit of the model, given that the data are panel. On testing, goodness-of-fit chi2 equal to 279.3891 with Prob > chi2(262) = 0.2199 confirms this finding. The results of this model support the hypothesis that controlling for other variables, the increased number of arrests are associated with a significant increase in the rate of terrorism incidents and this was what was predicted by the defiance theory (Sherman, 1993). Tests for omitted variable suggest no omitted variable and VIF levels for predictors not more than 3.50 where some authors consider 10 as the limit but MacDonald and Pamela (2010) set the limit to 4. The graph of predicted and observed counts is given in figure 3.

Figure 3. Observed vs. Predicted Counts of Incidents



Ordinary Arrests vs. Killings

Model 2 in table 3 shows the relationship of ordinary arrests and arrests through killings with terrorist incidents. The table also shows association of their priors with the current levels of incidents. The coefficient of ordinary arrests of 1.086 indicates that one more ordinary

Table 3. Fixed-Effects Cross-Sectional Time-Series Poisson Estimates of Impact of Terrorist Arrests on Terrorism Incidence

	Model 1		**Model 2**		**Model 3**	
Incidents	IRR	Robust	IRR	Robust	IRR	Robust

		Std. Err.		Std. Err.		Std. Err.
Arrests	1.066016***	.0183478				
L1.	.9514013**	.0183591				
Ordinary			1.086203***	.017762		
L1.			.9600003	.0210585		
Killings			.8466877	.0897299		
L1.			.8731503	.0766264		
Hardcore					1.102049***	.0298641
L1.					.9833673	.0343181
Peripheral					1.068208***	.0200394
L1.					.9440803*	.0258224
L.Incidents	1.050988	.0221694	1.041343	.0216949	1.049485	.0225141
Localized conflict	2.401983	.6105556	2.818199	.680039	2.620336	.652011
Faisalabad	1.697677	.3271494	1.595206	.3108642	1.632492	.314937
Multan	1.423785	.3527135	1.402608	.3513543	1.481895	.3893684
Bahawalpur	1.413175	.3518777	1.362337	.3465058	1.481176	.3778169
D.G. Khan	1.164425	.3442679	1.118804	.3225042	1.224964	.3568523
Rawalpindi	.9064685	.2522641	.7773355	.2161424	.9447363	.2669148
Gujranwala	.4876415	.1714124	.4716708	.1599997	.5229984	.1877464
Sargodha	.6666742	.2436704	.6490401	.2325938	.720228	.2670257
Population	*Exposure*					
N	312		312		312	
R2	0.5450		0.5536		0.5489	

NOTES: Time dummies included in regression but not shown in the table.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ stars only for relevant IRR

arrest is associated with a 8.6% increase in the number of terrorism incidents. The coefficient of lagged ordinary arrests of .960 shows that one more prior usual arrest is linked with a 4.0% decrease in the number of terrorism incidents. This coefficient is statistically significant at a significance level of 0.10 but not at a significance level of 0.05, as the coefficient of ordinary arrests in the contemporary period was. The coefficient of arrests through killings of .846 signifies that one more killing is associated with about 17.0% reduction in the number of terrorism incidents. The coefficient of lagged killings of .873 shows that one more prior killing is connected to a 14.0% decrease in the number of terrorism incidents. Despite high association of killings with incidents, the coefficients both for the killings and the prior killings are not statistically significant at a significance level of 0.05 or even of 0.10. One possible explanation for coefficients not turning out statistically significant could be stated as the *sparseness* of the predictor killings. Killings are concentrated in a few years; one in 1991, one in 1992, eight in 1998, 42 in 1999, one in 2000, 33 in 2002, four in 2004, three in 2007, and three in 2008. R2 of the model is 0.55 and the squared correlation between incidents and their expected values is .80 showing a high fit as substantiated by a formal goodness of fit test showing goodness-of-fit chi2 = 267.3015 with a Prob > chi2(260) equal to 0.3645. Against an observed mean of 1.3375 and variance 7.641223, mean of the expected values is 1.3397 and variance 6.009586. This is another proof of goodness of fit. Tests show no omitted variable and VIF levels for all variables are ≤ 3.55. Test of equivalency of ordinary arrests and killings show chi2(1) equal to 4.80 with Prob > chi2 = 0.0284 suggesting that the association between killings and terrorism and ordinary arrests and terrorism are not equal.

Hardcore vs. Peripheral

Model 3 in table 3 shows the association of arrests of hardcore terrorists and arrests of peripheral terrorists with terrorist incidents. The table also shows association of their lags with the incidents in the current period. The coefficient of hardcore arrests of 1.102 indicates that one more hardcore arrest is associated with a 10.2% increase in the number of terrorism incidents. The coefficient of lagged hardcore arrests of .983 (0.631) shows a non significant relation. The coefficient of arrests of peripheral terrorists of 1.068 indicates that one more peripheral arrest is associated with a 6.8% raise in the number of terrorism incidents. The coefficient of prior peripheral arrests of .944 shows that one more prior peripheral arrest is related to a 5.6% decrease in the number of terrorism incidents. Goodness-of-fit chi2 is equal to 273.8899 with a Prob > chi2(260) = 0.2651. R2 is 0.55 and the squared correlation between observed and expected values is .78443105. The predicted mean and variance are 1.339697 and 7.641223 respectively against the observed mean of 1.3375 and variance 5.968196. All these tests show a good fit between the observed and fitted counts. Test of omitted variable shows no omitted variable and the maximum VIF is 3.53 for any predictor. Test of equivalency of coefficients of hardcore and peripheral shows chi2(1) = 0.88 with Prob > chi2 = 0.3482 supporting the null.

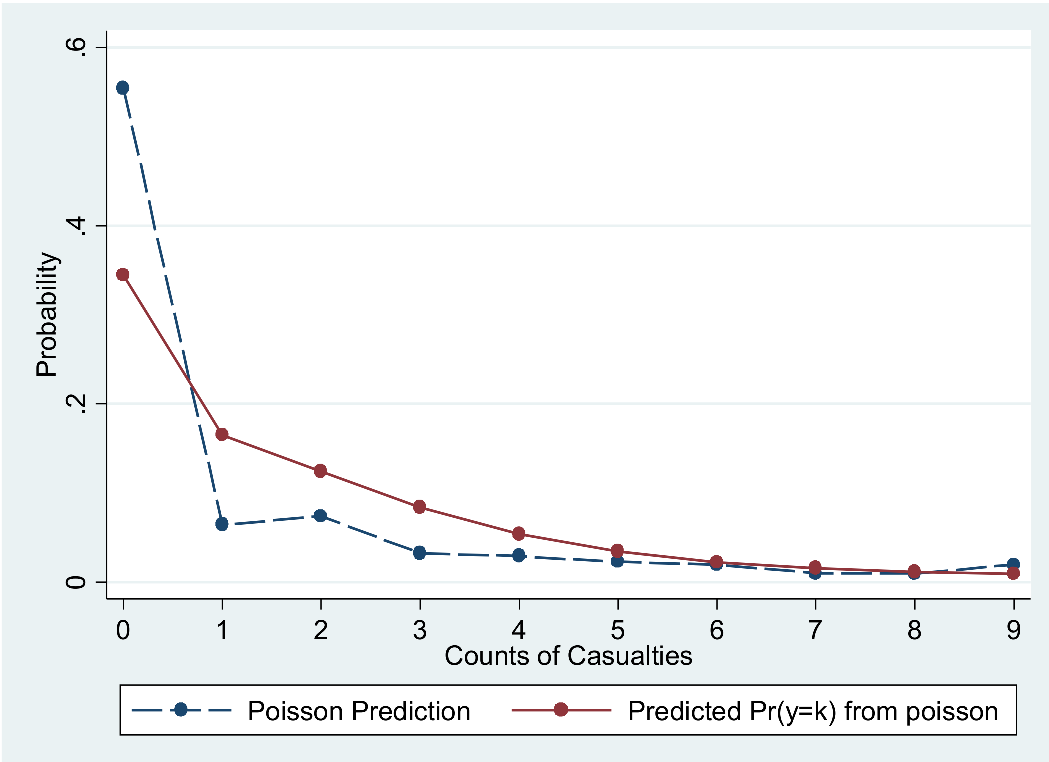
To summarize the results of relationship between incidence of terrorism and arrests types and terrorist types, the current level of terrorism incidents are correlated positively with all arrests, hardcore arrests, peripheral arrests, and ordinary arrests and negatively correlated with lagged arrests, lagged peripheral arrests, and killings current and prior, while controlling for prior period and other variables.

ARRESTS AND SERIOUNESS OF TERRORISM

Arrests all

Model 1 in table 4 shows the relationship between casualties as outcome and arrests and lagged arrests as predictors. The coefficient of arrests of 1.04 indicates that one more arrest is associated with a 4.0% increase in the number of casualties. The coefficient of lagged arrests of .97 indicates that one more prior arrest is associated with a 3.0% decrease in the number of casualties. In simple terms, controlling for prior period, the current level of casualties are correlated positively with current arrest levels and negatively correlated with prior arrest levels. Coefficients estimated through two-stage least square IV approach are almost equal to the coefficients estimated through simple Poisson regression: 1.034 for arrests and .97 for prior arrests eliminating the need for IV approach in this case. Predicted mean of 6.459375 is almost equal to the observed mean of 6.44229 suggesting a good fit. Variance of the predicted counts of 284.5438 (286.4662 observed) is more than the predicted mean but it is reasonable in the presence of many sources of heterogeneity—spatial, temporal, weapon types, and attack types. R2 of 0.79 and the squared correlation of coefficient between observed rates of casualties and expected is .92 which is quite high indicating a good fit of the model. On testing, goodness-of-fit chi2 equal to 888.3089 Prob > chi2(260) = 0.0000 shows lack of fit. The results of this model support the hypothesis that controlling for other variables, the increased number of arrests are associated with a significant increase in the rate of casualties and this was what was predicted by the defiance theory (Sherman, 1993). Tests for omitted variable suggest omitted variable and VIF levels for predictors not more than 3.43. Figure 4 presents graph observed vs. predicted counts of casualties.

Figure 4. Predicted vs. Observed Counts of Casualties



Ordinary Arrests vs. Killings

Model 2 in table 4 shows the relationship of ordinary arrests and arrests through killings with casualties. The table also shows association of their priors with casualties in the current period. The coefficient of usual arrests of 1.043346 indicates that one more arrest through usual

Table 4. Fixed-Effects Cross-Sectional-Time-Series Poisson Estimates of Impact of Terrorist Arrests on Casualty Rate

	Model 1		**Model 2**		**Model 3**	
Casualties	IRR	Robust	IRR	Robust	IRR	Robust

		Std. Err.		Std. Err.		Std. Err.
Arrests	1.040559*	.0186113				
L1.	.9713416	.0177488				
Ordinary			1.043346*	.0224701		
L1.			.9745976	.0188003		
Killings			.980865	.0985799		
L1.			.9291487	.0851679		
Hardcore					1.221203***	.0482608
L1.					1.008772	.0297929
Peripheral					.9912978	.0202455
L1.					.9602945	.0234698
Explosion	1.77956	.2853521	1.842578	.2839595	1.781901	.2931834
Masskillings	7.967083	1.319296	7.934212	1.180756	7.753611	1.285478
L.Incidents	1.106992	.0291307	1.111802	.0270065	1.105708	.0305524
Localized conflict	.7913891	.1750855	.7611159	.1732014	.8171355	.1833144
Faisalabad	.8876634	.2080259	.9410469	.1720902	.8915402	.2053472
Multan	.8415803	.1869942	.8634653	.199465	.847005	.1907881
Bahawalpur	1.306452	.3638174	1.479601	.4072112	1.294005	.3582316
D.G. Khan	1.281137	.3104582	1.291889	.3071771	1.273417	.307424
Rawalpindi	1.403407	.3361886	1.735565	.4285635	1.345172	.3553371
Gujranwala	.7638767	.2160353	.8417158	.2441046	.7517765	.2171108
Sargodha	.9626048	.2699113	1.145638	.3279254	.9522645	.2695492
Population	*Exposure*					
N	312		312		312	
R2	0.7940		0.8058		0.7944	

NOTES: Time dummies included in regression but not shown in the table.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ stars only on relevant coefficients

police procedures is associated with a 4.3% increase in the number of casualties. The coefficient of lagged ordinary arrests of .97 (0.182) shows that one more prior ordinary arrest is linked with a 3.0% decrease in the number of terrorism incidents. This coefficient is statistically insignificant even at a significance level of 0.10. The coefficient of killings of .98 (0.848) signifies no statistically significant relationship. The coefficient of lagged killings of .93 shows that one more lagged killing is connected to a 7.0% decrease in the number of casualties. Despite showing 7% and 3% decrease in casualties, the coefficients both for killings and prior killings are not statistically significant at a significance level of 0.05 or even of 0.10. One possible explanation for coefficients not being significant could be stated as the sparseness of the predictor killings as explained earlier. R2 is 0.79 and the squared correlation between incidents and their expected values is =.92 showing a high fit but not substantiated by a formal goodness of it test showing goodness-of-fit chi2 = 885.8593 Prob > chi2(258) equal to 0.0000. Against an observed mean of 6.459375 and variance of 284.5438, mean of the expected values is 6.442287 and variance 286.024. Test of omitted variable show the presence of some omitted variable but the VIF levels for all variables are below 3.50. Test of equivalency of ordinary arrests and killings show chi2(1) = 0.29 Prob > chi2 = 0.5882 suggesting that the association between killings and casualties and ordinary arrests and casualties are not equal.

Hardcore vs. Peripheral

Model 3 in table 4 shows the connection between arrests of hardcore terrorists and arrests of peripheral terrorists with casualties. The table also shows association of their lags with the incidents in the current period. The coefficient of hardcore arrests of 1.22 indicates that one more hardcore arrest is associated with a 22% increase in the rate of casualties. The coefficient of lagged hardcore arrests of 1.00 (0.767) shows a non significant relation. The coefficient of arrests of peripheral terrorists of .99 indicates that one more peripheral arrest is associated with a 1% (0.669) decrease in the number of casualties. The coefficient of prior peripheral arrests of .96 shows that one more prior peripheral arrest is related to a 4.0% decrease in the number of casualties significant at 0.10 levels. Goodness-of-fit chi2 = 808.3898 Prob > chi2(258) = 0.0000. R2 is 0.80 and the squared correlation between the observed and predicted counts of casualties is .93638573. And the maximum VIF for any predictor is 2.94. The predicted mean and variance are 6.442308 and 287.5784 against the observed mean of 6.459375 and variance 284.5438. Test of equivalency of coefficients of hardcore and peripheral shows chi2(1) = 25.64 Prob > chi2 = 0.0000 rejecting the null hypothesis of no difference.

In sum, controlling for prior period the current level of casualties are correlated positively with current arrests, hardcore arrests, and ordinary arrest levels and with all the other arrests types show no or statistically not significant relationship. Although, the coefficient for prior killings is comparatively higher but remains insignificant, most probably because of the reason of *sparseness* already explained. The effect sizes for all the arrest variables on casualties are weaker as compared to the effect sizes on incidents with the exception of hardcore arrests. It has the coefficient of 1.22 and that may be the reason for the other coefficients being weaker; may be it has sapped the impact of others. Only the hardcore arrests and killings seem to be the major influence on casualties, one increasing and the other decreasing them. This finding appeals to reason. Here the hypothesis that hardcore arrests are likely to result in more increase in casualties than the peripheral arrests is accepted.

Before I actually proceed to the conclusion section, I feel an urge to discuss an important question: if these results could be given a causal interpretation. Literature discusses two criteria for causality: unbiasedness and unconfoundedness. While unbiasedness is achieved through randomized experiments, unconfoundedness could be reached at through different statistical methods. I would support a causal interpretation on the following five grounds eliminating confoundedness: common sense, use of fixed-effects methods, use of IV methods, use of time dummies, and explicit use of some controls. First, the IV methods have been well-recognized methods instrumental in the recovery of causal effects of interest. In this paper, IV method was applied and results were similar to the methods without IV leading us to believe that there are no confounding variables. Second, the fixed effects model controls for time-invariant unmeasured variables, making causal interpretation possible. Third, to control for some unmeasured time-variant variables, time dummies were used. Fourth, some of the control variables, which could be measured explicitly, were included in the regression. Lastly, the results are supported by common sense: terrorists, highly motivated as usually they are, would like to pay in the same coin if they could, until overwhelmed by the government action beyond their expectations. These reasons enhance our confidence that the chances of confounding variables are the minimum and hence relationship looks casual.

CONCLUSION

To conclude, the current study was primarily a test of Sherman's theory of defiance (1993), at general levels. Assuming that terrorists meet defiance theory's four necessary conditions, likelihood was strong that their arrests would induce defiance in general, instead of inducing deterrence. In addition to testing the impact of arrests all inclusive, I segregated the arrests as hardcore vs. peripheral, ordinary vs. killings, and studied their differential impact on future incidence and seriousness of terrorism.

The changes of terrorism incidents and seriousness in police regions over a 20 year time period are explained with the changes in the number of arrests after controlling for other variables. The results to a large extent are consistent with the predictions of defiance theory. Arrests overall, arrests through the usual police procedures (ordinary), arrests of hardcore terrorists, and arrests of peripheral terrorists in the current time period led to increased incidence of terrorism in the contemporary time. Arrests, hardcore arrests, and ordinary, in the current period increased seriousness of terrorism in the contemporary period as measured by the number of casualties. Contrary to its impact on incidence of terrorism, peripheral arrests in the current period have shown no impact on seriousness, in the current period.

Defiance theory had predicted that hardcore arrests would generate more defiance as compared to the peripheral arrests and it happened so in case of incidence and seriousness both. The theory also predicted that killings would produce more terrorism as compared to the ordinary arrests. Here the findings are against the defiance theory. Killings in the current and killings in the lag (prior) period tended to negatively impact incidence and seriousness of terrorism in the current period. The impact is high near 17% reduction in terrorism but the coefficients are statistically not significant. The possible reason “sparseness” of the variable (killings) ha Apart from its own effects on future violent behavior, incapacitation may also reduce future criminal violence by increasing the effectiveness of either general or specific deterrence.

Lags of arrests, ordinary arrests, killings, and peripheral arrests show a negative relationship with the incidence and lags of arrests and peripheral arrests show inverse relationship with seriousness of terrorism in the current period, although the impact is very minor. Impact of lags of hardcore for incidence and lags of hardcore, peripheral, and ordinary for seriousness are zeros. The general findings of the study can be stated in the words that controlling for other variables, arrests in general, arrests of hardcore terrorists, arrests of peripheral, and ordinary arrests increase the incidence and seriousness of terrorism in the current period. But the priors of these predictors and killings and lags of killings generally decrease the incidence as well seriousness of terrorism in the current period showing decaying effect of arrests.

In the findings, there is a major support for defiance theory but not the consistent one. Arrests through killings was supposed to create defiance but instead it created deterrence—a large reduction of about 17% in terrorism incidence. One of the explanations might be that instead of defiance, killings have induced fear and that fear has led the terrorist community not to react which would support deterrence theory. Another possible explanation may be that the defiance is a tendency to counterattack, and it is not necessary for every tendency to actualize until they find conducive atmosphere to manifest into crime which we actually measure to know their presence. In the case of killings, it is quite possible that the circumstances were not right to react given that most of the top terrorist leadership had been arrested till 1997 and terrorism incidents graph was already coming down when killings actually occurred in 1998 and onward. According to this plausibility, mediating factor was not the fear but the incapacity which reversed the predicted outcome. That leads us to the proposition that just by terrorism incidents not increasing does not show the absence of defiance. Defiance may be there even if not actualized. To me that explanation of incapacity to take action looks more reasonable as the terrorists who were showing defiance to simple arrests why they would not show defiance to killings which by no means are perceived less unfair as compared to terrorist arrests. I understand that if they could, they would.

There are no comparable research studies on the defiant effect of terrorist arrests on the future incidence or seriousness of terrorism to compare the current study with. However, LaFree, Dugan, and Korte (2009) cite the researchers (Atran, 2003; Crenshaw, 2002; Higson-Smith, 2002) arguing that the extent to which government-based counterterrorist strategies outrage participants or energize a base of potential supporters may increase the likelihood of more terrorist strikes. LaFree, Dugan, and Korte (2009) cite McCauley (2006) pointing out that because of this principle, the responses to terrorism can be more dangerous than terrorism itself. Brophy-Baermann and Conybeare (1994) conclude that Israeli counterterrorist strategies did significantly reduce future terrorist strikes, but these strategies were only effective to the extent that they exceeded the level of counterterrorist violence anticipated by terrorist groups. Moreover, the effects were only short term and lasted no more than nine months, as sown in this study too in the form of decaying defiance. This account shows that findings of the current research study tally with the findings of earlier studies conducted not on arrests but on other counterterrorism strategies. And that’s what, possibly, imparts this study an external validity.

On theoretical front, this study not only provides support to defiance theory but also highlights the importance of differentiating between backlash and defiance or integrating the both. Defiance and backlash have been defined by how we measure them and not by what they actually are. Defiance has been defined as “the net increase in the prevalence, incidence, or seriousness of future offending” (Sherman, 1993: 459) while backlash has been defined as “the extent to which government threats or imposition of punishment increases the future incidence of prohibited behavior"(LaFree, Dugan, and Korte, 2009: 19). To me both look the same—increase in crime as a reaction to government policies or treatment. I would argue that the concepts could be integrated; defiance is a tendency and backlash is its manifestation.

In the light of this study, one of the recommendations could be made that we should avoid arresting terrorists as it leads to defiance and instead we should kill them as it reduces terrorism. I will consider this recommendation rather as simplistic. Because arrest is simply not only preventive but the starting point of further criminal justice processes. Terrorists have to be arrested. Instead, I would advocate that arrests should be made after making preparations for the counterattack. Attack them after making your defenses stronger for their immediate reaction. If killing is an option, we should kill selectively. For example, in July 2007, the government of Pakistan conducted operation against terrorists in Red Mosque, Islamabad. Many terrorists were killed. Counterattack was stronger; in the first six months of 2007, there were eight suicide attacks in Pakistan but during the last six months, there were 45. The circumstances were ripe to turn these killed terrorists into "martyrs" which determined the reaction. In the light of findings of this study, my recommendation to the practitioners and policy makers would be what Braithwaite has suggested "in the case of counterterrorism policies, it [incapacitation] may mean either arrest or imprisonment of high-profile offenders or targeted assassination" (Braithwaite, 2005: 96).

Another policy implication of the current study derived from defiance theory concerns its four necessary conditions. We need to look out for a way that the terrorists do not meet with any of those conditions. We need to break their pride. I fear that humane treatment and fairness in court would add glamour to their situation. Fairness is likely to lead to failure of cases in the court as terrorists are terrorists not bound by any ethics, would intimidate the judges and the witnesses. The situation is not ideal that the judges and witnesses could be provided foolproof security. It happened in Pakistan that the judges and witnesses were not only verbally threatened; they were killed, ultimately leading to a weaker prosecution.

In addition to its theoretical and policy implications, the study has a wider import for the international community for their growing concern over the terrorism situation Pakistan. They should know that the sectarian terrorism which this study uses as its context is, “the principal source of terrorist activity in Pakistan” (Haqqani, 2006).

I consider it important to recognize the limitations of this study. First, the sample is from a specific location i.e. Pakistan and about a specific type of terrorists. It is advisable to explore further, if these results could be extrapolated to the other locations and terrorist types. Second, the method used is still emerging. Panel data methods are originally designed for data sets where the number of locations (n) is larger as compared to the number of time points (T), the smaller the T, the better it is. The present study is the reverse; larger the number of T and smaller the number of n. Although the methods called cross-sectional-time-series are emerging, but they still find very limited space in the books. I would recommend to cross-check these findings using data having a large number of locations and a few time periods. Last, killings have shown an impact against our expectations in the light of defiance theory, but despite larger coefficients, they are not statistically significant. I presume that sparseness of the variable killing may be responsible for coefficients not coming significant. I recommend to use a dataset in which this variable is not sparse and then see whether we get the same results but significant.

In short, the study supports defiance theory in all except in the case of arrests through killings. The impact of killings is also in line with the predictions of this theory if we take defiance as a tendency (disposition) rather than an *actual* increase in the number of terrorism incidents or seriousness. Therefore, an integration of defiance and backlash is suggested. As a policy implication, it is proposed that we have no option but to arrest terrorists; we have to arrest them but after doing our own target hardening. Another corollary of this study is that with the terrorists, only the strategies which overwhelm them would work, especially in Pakistan where their motivation level is quite high.

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APPENDIX 1. Within and Between Variation in Outcome and Predictor Variables

```
. xtsum incidents casualties  arrests hardcore peripheral  arrests_usual arrests_killing
```

Variable		Mean	Std. Dev.	Min	Max	Observations
incide~s	overall	1.3375	2.764276	0	24	N = 320
	between		1.038629	.3	2.875	n = 8
	within		2.587346	-1.5375	22.4625	T = 40
casual~s	overall	6.459375	16.86843	0	142	N = 320
	between		4.342562	1.825	13.6	n = 8
	within		16.37044	-7.140625	134.8594	T = 40
arrests	overall	2.771875	4.385194	0	26	N = 320
	between		1.168213	1.2	4.475	n = 8
	within		4.246417	-1.703125	25.34688	T = 40
hardcore	overall	.83125	1.644681	0	12	N = 320
	between		.3839992	.275	1.3	n = 8
	within		1.604852	-.46875	11.93125	T = 40
periph~l	overall	1.6375	3.156299	0	21	N = 320
	between		.7555745	.825	2.7	n = 8
	within		3.075895	-1.0625	20.6875	T = 40
arrest~l	overall	2.46875	4.103553	0	26	N = 320
	between		1.0856	1.1	3.925	n = 8
	within		3.975513	-1.45625	25.34375	T = 40
arrest~g	overall	.303125	1.096585	0	9	N = 320
	between		.1933896	.05	.575	n = 8
	within		1.081513	-.271875	8.728125	T = 40

.

APPENDIX 2. Two-Step Estimation of Effects of Arrests on Terrorism Incidence

```
. xi:regress  arrests l.incidents  L_arrests  localized_conflict i.panel i.halfyear CID, vce(robust)
i.panel           _Ipanel_1-8         (naturally coded; _Ipanel_1 omitted)
i.halfyear        _Ihalfyear_60-99    (naturally coded; _Ihalfyear_60 omitted)

Linear regression                                      Number of obs =     312
                                                       F( 48,   263) =    4.97
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4819
                                                       Root MSE      =  3.4585
```

arrests	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
incidents						
L1.	.4605068	.1491629	3.09	0.002	.1668013	.7542123
L_arrests	.1174906	.0601999	1.95	0.052	-.0010445	.2360257
localized_~t	-2.156052	1.398604	-1.54	0.124	-4.909938	.597834
_Ipanel_2	-.2850697	.7405815	-0.38	0.701	-1.743293	1.173154
_Ipanel_3	.6406293	.8291021	0.77	0.440	-.9918934	2.273152
_Ipanel_4	-.7805877	.7394968	-1.06	0.292	-2.236675	.6755
_Ipanel_5	-1.026591	.7258556	-1.41	0.158	-2.455819	.402637
_Ipanel_6	.6083878	.982981	0.62	0.537	-1.327126	2.543902
_Ipanel_7	-1.195118	.6998439	-1.71	0.089	-2.573128	.1828921
_Ipanel_8	-1.487866	.7370479	-2.02	0.045	-2.939132	-.0366005
_Ihalfyea~61	.7249531	.798907	0.91	0.365	-.8481147	2.298021
_Ihalfyea~62	.2435106	.6707236	0.36	0.717	-1.077161	1.564182
_Ihalfyea~63	-.1447466	.809373	-0.18	0.858	-1.738422	1.448929
_Ihalfyea~64	(dropped)					
_Ihalfyea~65	1.156334	.8804178	1.31	0.190	-.5772303	2.889899
_Ihalfyea~66	.9971417	.8166666	1.22	0.223	-.6108953	2.605179
_Ihalfyea~67	.0205122	.6843232	0.03	0.976	-1.326937	1.367962
_Ihalfyea~68	-.0248068	.7069869	-0.04	0.972	-1.416882	1.367268
_Ihalfyea~69	2.302503	1.481066	1.55	0.121	-.613752	5.218758
_Ihalfyea~70	.1633965	1.075056	0.15	0.879	-1.953416	2.280209
_Ihalfyea~71	-8.809712	2.235115	-3.94	0.000	-13.21071	-4.408714
_Ihalfyea~72	-7.881274	2.196669	-3.59	0.000	-12.20657	-3.555977
_Ihalfyea~73	-6.603083	2.198342	-3.00	0.003	-10.93167	-2.274493
_Ihalfyea~74	-2.71865	2.60705	-1.04	0.298	-7.851996	2.414696
_Ihalfyea~75	(dropped)					
_Ihalfyea~76	-7.104063	2.677716	-2.65	0.008	-12.37655	-1.831573
_Ihalfyea~77	-1.63424	2.840315	-0.58	0.566	-7.226892	3.958412
_Ihalfyea~78	-1.803661	3.252427	-0.55	0.580	-8.207771	4.600449
_Ihalfyea~79	-3.682701	2.608935	-1.41	0.159	-8.819759	1.454356
_Ihalfyea~80	-4.269035	2.777271	-1.54	0.125	-9.73755	1.19948
_Ihalfyea~81	-4.396732	2.552837	-1.72	0.086	-9.423331	.6298677
_Ihalfyea~82	-4.352673	2.373562	-1.83	0.068	-9.026275	.3209301
_Ihalfyea~83	-5.120743	3.174045	-1.61	0.108	-11.37052	1.129032
_Ihalfyea~84	-3.861117	2.439123	-1.58	0.115	-8.663812	.9415782
_Ihalfyea~85	-1.978607	2.594473	-0.76	0.446	-7.087189	3.129975
_Ihalfyea~86	-5.618208	2.455157	-2.29	0.023	-10.45247	-.7839433
_Ihalfyea~87	-6.687492	2.303979	-2.90	0.004	-11.22408	-2.1509
_Ihalfyea~88	-7.939006	2.219888	-3.58	0.000	-12.31002	-3.567992
_Ihalfyea~89	-3.002897	3.265857	-0.92	0.359	-9.43345	3.427656
_Ihalfyea~90	-7.383227	2.25232	-3.28	0.001	-11.8181	-2.948353
_Ihalfyea~91	-6.635074	2.215421	-2.99	0.003	-10.99729	-2.272855
_Ihalfyea~92	-5.789447	2.744925	-2.11	0.036	-11.19427	-.3846217
_Ihalfyea~93	-6.402124	2.427815	-2.64	0.009	-11.18255	-1.621695
_Ihalfyea~94	-5.761256	2.253112	-2.56	0.011	-10.19769	-1.324822
_Ihalfyea~95	-5.027124	2.547357	-1.97	0.049	-10.04293	-.0113156
_Ihalfyea~96	-4.365242	2.488741	-1.75	0.081	-9.265635	.5351506
_Ihalfyea~97	-7.010923	2.366252	-2.96	0.003	-11.67013	-2.351714
_Ihalfyea~98	-4.140127	2.713579	-1.53	0.128	-9.483233	1.202978
_Ihalfyea~99	-6.971678	2.403788	-2.90	0.004	-11.7048	-2.238559
CID	8.274344	2.230552	3.71	0.000	3.882331	12.66636
_cons	-.0707967	.8546939	-0.08	0.934	-1.75371	1.612117

```
. predict lpuhat, residual
(8 missing values generated)

. xi: poisson  incidents l.incidents arrests l.arrests localized_conflict i.panel i.halfyear lpuhat, vce(robust)
> nolog
i.panel           _Ipanel_1-8         (naturally coded; _Ipanel_1 omitted)
i.halfyear        _Ihalfyear_60-99    (naturally coded; _Ihalfyear_60 omitted)
note: _Ihalfyear_71 dropped because of collinearity
note: _Ihalfyear_75 dropped because of collinearity

Poisson regression                                Number of obs   =        312
                                                  Wald chi2(49)   =   10929.21
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -323.71528                 Pseudo R2       =     0.5448

------------------------------------------------------------------------------
             |               Robust
   incidents |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   incidents |
         L1. |    .055199    .034809     1.59   0.113    -.0130255    .1234235
     arrests |
         --. |   .0543724   .0460247     1.18   0.237    -.0358343    .1445792
         L1. |  -.0489129   .0211584    -2.31   0.021    -.0903826   -.0074431
localized_~t |   .8773116   .2871784     3.05   0.002     .3144523    1.440171
   _Ipanel_2 |   .3554873   .1960115     1.81   0.070    -.0286882    .7396629
   _Ipanel_3 |   .3816858   .2501629     1.53   0.127    -.1086245     .871996
   _Ipanel_4 |  -.1110851   .2520693    -0.44   0.659    -.6051318    .3829616
   _Ipanel_5 |  -.4489567   .2971972    -1.51   0.131    -1.031453    .1335391
   _Ipanel_6 |  -.7245708   .2846079    -2.55   0.011    -1.282392   -.1667496
   _Ipanel_7 |  -.8437708   .3530678    -2.39   0.017    -1.535771   -.1517706
   _Ipanel_8 |  -1.276957   .3672035    -3.48   0.001    -1.996663   -.5572514
_Ihalfyea~61 |  -.3111531   .3945249    -0.79   0.430    -1.084408    .4621015
_Ihalfyea~62 |   .2784494   .4196914     0.66   0.507    -.5441306    1.101029
_Ihalfyea~63 |   .3342507   .3614821     0.92   0.355    -.3742412    1.042743
_Ihalfyea~64 |   -.814894   .4713401    -1.73   0.084    -1.738704    .1089157
_Ihalfyea~65 |  -.5888288   .4004427    -1.47   0.141    -1.373682    .1960245
_Ihalfyea~66 |   -.594475   .4701978    -1.26   0.206    -1.516046    .3270957
_Ihalfyea~67 |   .4759891   .5268418     0.90   0.366    -.5566019     1.50858
_Ihalfyea~68 |   .3009289   .3803758     0.79   0.429    -.4445938    1.046452
_Ihalfyea~69 |   .4886733   .3098076     1.58   0.115    -.1185386    1.095885
_Ihalfyea~70 |   .5009073   .3629808     1.38   0.168    -.2105219    1.212336
_Ihalfyea~72 |  -.0814908   .3386448    -0.24   0.810    -.7452224    .5822407
_Ihalfyea~73 |   .8461286    .389207     2.17   0.030     .0832968     1.60896
_Ihalfyea~74 |   .9627307   .2390363     4.03   0.000     .4942283    1.431233
_Ihalfyea~76 |    .412539   .4387913     0.94   0.347    -.4474762    1.272554
_Ihalfyea~77 |   .3204565   .4948472     0.65   0.517    -.6494261    1.290339
_Ihalfyea~78 |  -.3606415   .3763037    -0.96   0.338    -1.098183    .3769002
_Ihalfyea~79 |  -.4726857   .4867964    -0.97   0.332    -1.426789    .4814178
_Ihalfyea~80 |   -.748885   .3425315    -2.19   0.029    -1.420234   -.0775356
_Ihalfyea~81 |   -.932284   .3966873    -2.35   0.019    -1.709777   -.1547912
_Ihalfyea~82 |   .2872675   .4285255     0.67   0.503    -.5526269    1.127162
_Ihalfyea~83 |  -.3678984   .3479144    -1.06   0.290    -1.049798    .3140014
_Ihalfyea~84 |  -.1218878   .2699743    -0.45   0.652    -.6510276    .4072521
_Ihalfyea~85 |  -1.365715   .8002895    -1.71   0.088    -2.934253    .2028237
_Ihalfyea~86 |  -2.002381    .940452    -2.13   0.033    -3.845633   -.1591287
_Ihalfyea~87 |  -16.31478   .4903313   -33.27   0.000    -17.27581   -15.35375
_Ihalfyea~88 |  -1.380303    1.02941    -1.34   0.180    -3.397908    .6373032
_Ihalfyea~89 |  -1.370415   .4625691    -2.96   0.003    -2.277033   -.4637959
_Ihalfyea~90 |  -1.351537   .6656228    -2.03   0.042    -2.656134   -.0469403
_Ihalfyea~91 |  -1.516453   .7906711    -1.92   0.055     -3.06614    .0332342
_Ihalfyea~92 |  -16.28615   .4990965   -32.63   0.000    -17.26436   -15.30794
_Ihalfyea~93 |  -2.110028   1.073504    -1.97   0.049    -4.214058    -.005998
_Ihalfyea~94 |    -16.479    .486173   -33.90   0.000    -17.43188   -15.52612
_Ihalfyea~95 |  -16.33656   .4653303   -35.11   0.000    -17.24859   -15.42452
_Ihalfyea~96 |  -2.317358   .8786168    -2.64   0.008    -4.039415   -.5953003
_Ihalfyea~97 |  -16.30798    .496264   -32.86   0.000    -17.28064   -15.33532
_Ihalfyea~98 |  -1.323582   .5242187    -2.52   0.012    -2.351032   -.2961325
_Ihalfyea~99 |  -16.18956   .5020295   -32.25   0.000    -17.17352    -15.2056
      lpuhat |     .00979   .0525429     0.19   0.852    -.0931921    .1127721
       _cons |   .2756117   .3822432     0.72   0.471    -.4735712    1.024794
------------------------------------------------------------------------------

. test lpuhat=0

 ( 1)  [incidents]lpuhat = 0

           chi2(  1) =    0.03
         Prob > chi2 =    0.8522
```

APPENDIX 3. Two-Step Estimation of Effects of Arrests on Terrorism Seriousness

```
. xi:reg  arrests l.incidents l.arrests CID   localized_conflict i.region i.halfyear, vce(robust)
i.region          _Iregion_1-8        (naturally coded; _Iregion_1 omitted)
i.halfyear        _Ihalfyear_60-99    (naturally coded; _Ihalfyear_60 omitted)

Linear regression                                      Number of obs =     312
                                                       F( 48,   263) =    4.97
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4819
                                                       Root MSE      =  3.4585
```

arrests	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
incidents						
L1.	.4605068	.1491629	3.09	0.002	.1668013	.7542123
arrests						
L1.	.1174906	.0601999	1.95	0.052	-.0010445	.2360257
CID	8.274344	2.230552	3.71	0.000	3.882331	12.66636
localized_~t	-2.156052	1.398604	-1.54	0.124	-4.909938	.597834
_Iregion_2	-.2850697	.7405815	-0.38	0.701	-1.743293	1.173154
_Iregion_3	.6406293	.8291021	0.77	0.440	-.9918934	2.273152
_Iregion_4	-.7805877	.7394968	-1.06	0.292	-2.236675	.6755
_Iregion_5	-1.026591	.7258556	-1.41	0.158	-2.455819	.402637
_Iregion_6	.6083878	.982981	0.62	0.537	-1.327126	2.543902
_Iregion_7	-1.195118	.6998439	-1.71	0.089	-2.573128	.1828921
_Iregion_8	-1.487866	.7370479	-2.02	0.045	-2.939132	-.0366005
_Ihalfyea~61	.7249531	.798907	0.91	0.365	-.8481147	2.298021
_Ihalfyea~62	.2435106	.6707236	0.36	0.717	-1.077161	1.564182
_Ihalfyea~63	-.1447466	.809373	-0.18	0.858	-1.738422	1.448929
_Ihalfyea~64	(dropped)					
_Ihalfyea~65	1.156334	.8804178	1.31	0.190	-.5772303	2.889899
_Ihalfyea~66	.9971417	.8166666	1.22	0.223	-.6108953	2.605179
_Ihalfyea~67	.0205122	.6843232	0.03	0.976	-1.326937	1.367962
_Ihalfyea~68	-.0248068	.7069869	-0.04	0.972	-1.416882	1.367268
_Ihalfyea~69	2.302503	1.481066	1.55	0.121	-.613752	5.218758
_Ihalfyea~70	.1633965	1.075056	0.15	0.879	-1.953416	2.280209
_Ihalfyea~71	-8.809712	2.235115	-3.94	0.000	-13.21071	-4.408714
_Ihalfyea~72	-7.881274	2.196669	-3.59	0.000	-12.20657	-3.555977
_Ihalfyea~73	-6.603083	2.198342	-3.00	0.003	-10.93167	-2.274493
_Ihalfyea~74	-2.71865	2.60705	-1.04	0.298	-7.851996	2.414696
_Ihalfyea~75	(dropped)					
_Ihalfyea~76	-7.104063	2.677716	-2.65	0.008	-12.37655	-1.831573
_Ihalfyea~77	-1.63424	2.840315	-0.58	0.566	-7.226892	3.958412
_Ihalfyea~78	-1.803661	3.252427	-0.55	0.580	-8.207771	4.600449
_Ihalfyea~79	-3.682701	2.608935	-1.41	0.159	-8.819759	1.454356
_Ihalfyea~80	-4.269035	2.777271	-1.54	0.125	-9.73755	1.19948
_Ihalfyea~81	-4.396732	2.552837	-1.72	0.086	-9.423331	.6298677
_Ihalfyea~82	-4.352673	2.373562	-1.83	0.068	-9.026275	.3209301
_Ihalfyea~83	-5.120743	3.174045	-1.61	0.108	-11.37052	1.129032
_Ihalfyea~84	-3.861117	2.439123	-1.58	0.115	-8.663812	.9415782
_Ihalfyea~85	-1.978607	2.594473	-0.76	0.446	-7.087189	3.129975
_Ihalfyea~86	-5.618208	2.455157	-2.29	0.023	-10.45247	-.7839433
_Ihalfyea~87	-6.687492	2.303979	-2.90	0.004	-11.22408	-2.1509
_Ihalfyea~88	-7.939006	2.219888	-3.58	0.000	-12.31002	-3.567992
_Ihalfyea~89	-3.002897	3.265857	-0.92	0.359	-9.43345	3.427656
_Ihalfyea~90	-7.383227	2.25232	-3.28	0.001	-11.8181	-2.948353
_Ihalfyea~91	-6.635074	2.215421	-2.99	0.003	-10.99729	-2.272855
_Ihalfyea~92	-5.789447	2.744925	-2.11	0.036	-11.19427	-.3846217
_Ihalfyea~93	-6.402124	2.427815	-2.64	0.009	-11.18255	-1.621695
_Ihalfyea~94	-5.761256	2.253112	-2.56	0.011	-10.19769	-1.324822
_Ihalfyea~95	-5.027124	2.547357	-1.97	0.049	-10.04293	-.0113156
_Ihalfyea~96	-4.365242	2.488741	-1.75	0.081	-9.265635	.5351506
_Ihalfyea~97	-7.010923	2.366252	-2.96	0.003	-11.67013	-2.351714
_Ihalfyea~98	-4.140127	2.713579	-1.53	0.128	-9.483233	1.202978
_Ihalfyea~99	-6.971678	2.403788	-2.90	0.004	-11.7048	-2.238559
_cons	-.0707967	.8546939	-0.08	0.934	-1.75371	1.612117

```
.
. predict lpuhat2, resid
(37 missing values generated)
```

```
. xi:poisson  casualties  incidents arrests L.arrests EXP Mass     localized_conflict i.region i.halfyear lpuhat2 ,
> vce(robust) irr nolog
i.region          _Iregion_1-8        (naturally coded; _Iregion_1 omitted)
i.halfyear        _Ihalfyear_60-99    (naturally coded; _Ihalfyear_60 omitted)
note: _Ihalfyear_67 dropped because of collinearity

Poisson regression                                Number of obs   =        312
                                                  Wald chi2(52)   =   33093.82
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -705.22344                 Pseudo R2       =     0.7955
```

casualties	IRR	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
incidents	1.107872	.0293086	3.87	0.000	1.051892	1.166831
arrests						
--.	1.03416	.0677731	0.51	0.608	.9095041	1.175901
L1.	.97279	.0192752	-1.39	0.164	.9357355	1.011312
EXP	1.777306	.2902903	3.52	0.000	1.290429	2.447882
Mass	8.019786	1.365516	12.23	0.000	5.744207	11.19684
localized_~t	.8175314	.1930915	-0.85	0.394	.514589	1.298818
_Iregion_2	.7493635	.1816631	-1.19	0.234	.4659524	1.205157
_Iregion_3	.8696808	.2029566	-0.60	0.550	.5504473	1.374055
_Iregion_4	.824337	.2417818	-0.66	0.510	.4639204	1.464759
_Iregion_5	.6999174	.1715016	-1.46	0.145	.432988	1.131404
_Iregion_6	.7574185	.185366	-1.14	0.256	.4688328	1.22364
_Iregion_7	.6780054	.2010174	-1.31	0.190	.3791979	1.212273
_Iregion_8	.4030655	.1221956	-3.00	0.003	.2224951	.7301812
_Ihalfyea~61	.8825389	.339899	-0.32	0.746	.4148624	1.87743
_Ihalfyea~62	1.463996	.8433705	0.66	0.508	.4733525	4.527884
_Ihalfyea~63	1.113361	.3346775	0.36	0.721	.6176803	2.006818
_Ihalfyea~64	.6685297	.258641	-1.04	0.298	.3131897	1.427033
_Ihalfyea~65	.9457075	.4795612	-0.11	0.912	.350041	2.555023
_Ihalfyea~66	.811947	.2969516	-0.57	0.569	.3964784	1.662784
_Ihalfyea~68	1.039575	.3394267	0.12	0.905	.5481938	1.971413
_Ihalfyea~69	1.009005	.2914132	0.03	0.975	.5728698	1.777178
_Ihalfyea~70	.7047054	.1869099	-1.32	0.187	.4190273	1.185149
_Ihalfyea~71	1.520724	.6798932	0.94	0.348	.6331266	3.652667
_Ihalfyea~72	1.149786	.3226372	0.50	0.619	.6633833	1.992827
_Ihalfyea~73	1.469914	.4284531	1.32	0.186	.8301988	2.602565
_Ihalfyea~74	.4838789	.3079947	-1.14	0.254	.1389751	1.684754
_Ihalfyea~75	.5497358	.547434	-0.60	0.548	.0780758	3.870717
_Ihalfyea~76	3.262362	1.43292	2.69	0.007	1.379307	7.716199
_Ihalfyea~77	1.622421	.9212915	0.85	0.394	.5331	4.937627
_Ihalfyea~78	.5662595	.390872	-0.82	0.410	.1463715	2.190658
_Ihalfyea~79	1.016914	.5528928	0.03	0.975	.3503393	2.951751
_Ihalfyea~80	1.219302	.5372823	0.45	0.653	.5140808	2.891952
_Ihalfyea~81	1.257725	.7663663	0.38	0.707	.3810001	4.151893
_Ihalfyea~82	2.864833	1.714106	1.76	0.079	.8867537	9.255412
_Ihalfyea~83	1.14513	.4521368	0.34	0.731	.528167	2.482781
_Ihalfyea~84	1.867155	.706673	1.65	0.099	.8892442	3.920483
_Ihalfyea~85	.7382004	.370834	-0.60	0.546	.2757873	1.975942
_Ihalfyea~86	.4299516	.2479776	-1.46	0.143	.1388299	1.331546
_Ihalfyea~87	3.83e-11	1.80e-11	-50.99	0.000	1.52e-11	9.63e-11
_Ihalfyea~88	.2386184	.22808	-1.50	0.134	.0366518	1.553505
_Ihalfyea~89	2.544863	1.253297	1.90	0.058	.9693121	6.681365
_Ihalfyea~90	.3306456	.2313703	-1.58	0.114	.0838942	1.303148
_Ihalfyea~91	1.014794	.4988096	0.03	0.976	.3872398	2.65935
_Ihalfyea~92	3.89e-11	1.91e-11	-48.78	0.000	1.49e-11	1.02e-10
_Ihalfyea~93	.077895	.0803995	-2.47	0.013	.0103024	.5889508
_Ihalfyea~94	3.64e-11	1.75e-11	-50.05	0.000	1.42e-11	9.33e-11
_Ihalfyea~95	3.29e-11	1.64e-11	-48.49	0.000	1.24e-11	8.73e-11
_Ihalfyea~96	.0715363	.0710619	-2.66	0.008	.0102087	.5012827
_Ihalfyea~97	3.77e-11	1.76e-11	-51.48	0.000	1.51e-11	9.41e-11
_Ihalfyea~98	2.180037	.8440144	2.01	0.044	1.020742	4.655986
_Ihalfyea~99	4.46e-11	2.07e-11	-51.29	0.000	1.80e-11	1.11e-10
lpuhat2	1.006508	.0612386	0.11	0.915	.8933626	1.133983