

CROSS-NATIONAL PATTERNS OF TERRORISM

Comparing Trajectories for Total, Attributed and Fatal Attacks, 1970–2006

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Despite growing international concern about terrorism, until recently, very little was known about worldwide risk patterns for terrorist attacks. In this paper, we are especially interested in determining the extent to which terrorism is concentrated at the country level over time and whether different measures of terrorism (total, attributed and fatal attacks) yield similar results. Traditional sources of crime data—official police records and victimization and self-report crime surveys—typically exclude terrorism. In response, there has been growing interest in terrorist event databases. In this research, we report on the most comprehensive of these databases to date, formed by merging the Global Terrorism Database maintained by the START Center with the RAND-MIPT database. We use a statistical method called semi-parametric group-based trajectory analysis to examine 73,961 attacks in 206 countries and territories from 1970 to 2006. Our results confirm that terrorist attacks, like more common crimes, are highly concentrated across specific countries and these concentrations are fairly stable over time. Ten countries account for 38 per cent of all terrorist attacks in our data since 1970; 32 countries account for more than three-quarters of all attacks. The trajectory analysis also reveals a rapidly rising new terrorist threat concentrated especially among countries in South and Southeast Asia, the Middle East and Africa.

Keywords: cross-national comparative criminology, global terrorism database, terrorism hot spots, terrorism trends, terrorist groups, trajectory analysis, terrorism waves

Introduction

Despite growing international concern about terrorism, until recently, very little was known about worldwide risk patterns for terrorist attacks. But the experience of criminology in studying spatial patterns for other types of crime and violence suggests that risk varies greatly across time and space. In fact, the idea that violence is highly concentrated across spatial units can be traced back at least as far as Adolphe Quetelet's ([1831] 1984) pioneering study of the distribution of crime in France, Belgium and Holland. Similarly, a century later, Clifford Shaw (1929) observed the tremendous variation in the concentration of violent crime rates across Chicago neighbourhoods in the United States, with some areas producing a great deal of violent crime and others virtually none. More recently, criminologists Sherman, Gartin and Buerger (1989) examined emergency calls for the Minneapolis Police Department and found that crime reports were highly concentrated in a few locations—which they referred to as 'hot spots'. In a subsequent analysis, Sherman (1995: 36–7) concluded that the spatial concentration of crime was six times higher than it was for individuals, prompting him to ask: 'Why aren't we thinking more about wheredunit, rather than just whodunit?'

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In a follow-up study, Sherman and Weisburd (1995) found that most of the calls for police service came from a relatively small percentage of addresses. Only 4.4 per cent of the addresses and intersections placed three or more calls for service for serious crime; and only 0.3 per cent phoned the police 20 or more times. Comparable patterns were observed in Indianapolis, where Sherman (1995) found that all of the calls for service relating to gun crimes came from just 3 per cent of the addresses in the city (see also Eck *et al.* 2000). Similarly, recent cross-national investigations (LaFree and Drass 2002; LaFree and Hunnicutt 2006) have found evidence of considerable concentration of violence at the national level.

We have also learned that these spatial concentrations of violence are relatively stable over time. Going back to research conducted at the University of Chicago in the first half of the twentieth century, Shaw and McKay (1942) demonstrated that high and low-crime neighbourhoods in Chicago exhibited considerable stability over time, even though in many cases, their residential composition changed, as newly arriving immigrant groups replaced earlier ones. More recent research (Spelman 1995; Taylor 1999; Weisburd *et al.* 2004) also reports considerable stability in crime rates at the city block level over time. For example, Weisburd *et al.* (2004) found that 84 per cent of the street blocks in their study exhibited crime trends that were relatively stable over a 14-year period. And at the national level, LaFree (2005) and others (LaFree and Hunnicutt 2006) have found patterns of persistent violence in countries with high concentrations of homicide.

Evidence of persistent hot spot activity has important policy implications, because it allows law enforcement to be more effective by targeting areas of concentrated enduring violence. In a study of calls for police service in Boston from 1977 to 1980, Spelman (1995) found that 50 per cent of all calls over a three-year period originated from just 10 per cent of locations, suggesting both concentration and temporal stability. Similarly, Taylor (1999) found that crime rates in a small proportion of 90 street blocks in Baltimore remained stable between the first evaluation point in 1981 and the second in 1994. Griffiths and Chavez (2004) reported that only 6 per cent of Chicago census tracts accounted for 25.4 per cent of all homicides in Chicago during the 15-year study period. Finally, Weisburd *et al.* (2004) examined the stability of crime for street blocks in Seattle and concluded that the crime rates in 84 per cent of the blocks were stable over the entire 14 years spanned by the data.

At a more macro level, research has also shown that worldwide patterns of violence vary greatly across regions. According to the 1994 United Nations Crime and Justice Survey, Latin America has the highest rates of homicide, with over 20 per 100,000 persons. The rankings follow with Africa (15 per 100,000), Eastern Europe and North America (each with about ten per 100,000), South Asia (eight per 100,000), Western Europe (three per 100,000), and finally the Arab states, with only two homicides per 100,000 persons (Lewis 1999). Further analysis shows that within regions, a large proportion of homicides are concentrated in only a few nations. Gartner (2000) found that countries in sub-Saharan Africa averaged 40 homicides per 100,000 population in 1990, whereas many countries in Western Europe report homicide rates below one per 100,000 population. Data from the World Health Organization (WHO) for Latin American and Caribbean countries show a median of 23 homicides per 100,000 persons (Gartner 2000). While there is substantial variation in region and country-level homicide rates, depending on the data source, there is agreement that these rates are highly

concentrated, with sub-Saharan Africa reporting the highest rates, followed closely by Latin America and the Caribbean, and Arab and West European countries reporting the lowest rates.

There is also evidence that concentrations of violence at the country level persist over time. In a direct test of the stability of cross-national homicide rates in 34 countries, LaFree (2005) found that the substantial differences in homicide rates across countries remained from 1956 to 1998. Gartner (2000) examined the ‘inertia’ of homicide rates in 18 industrialized nations in 1988, 1991 and 1995 and found that the rates were highly correlated over time. Those countries with high homicide rates at the first period of observation retained high rates at subsequent observational periods, and those with low homicide rates exhibited low rates over time as well.

While most criminologists agree that ordinary criminal violence is spatially concentrated and relatively stable over time, much less is known about the concentration of terrorist violence over time. In an earlier paper (LaFree *et al.* 2006), we used event data from the Global Terrorism Database to examine the stability of cross-national terrorism trends from 1970 to 1997. Based on a trajectory analysis, we found that the two groups of countries with the fewest number of attacks included 88 per cent of the world’s countries but only 25 per cent of all terrorist attacks. By contrast, one group of countries included only 8 per cent of the total, but accounted for 67 per cent of all attacks.

In this research, we define terrorism as *acts of violence by non-state actors, perpetrated against civilian populations, intended to cause fear, in order to achieve a political objective*. We exclude violence initiated by governments (state terrorism) and violence involving open combat between opposing armed forces, even if these are conducted by non-state actors. We expand our earlier research by examining the extent to which terrorist strikes are concentrated at the national level and the extent to which any such concentration is stable over the four decades included in the analysis. We also examine the robustness of cross-national trends by analysing terrorist activity three different ways: as total attacks, attacks attributed to specific groups of perpetrators, and attacks that resulted in fatalities. Because it has only recently become possible to conduct such an analysis due to the difficulty of obtaining comprehensive incident-based data on terrorist attacks, we discuss in the next section the comparative challenges of collecting terrorism data compared to data on more common forms of crime.

Challenges of Collecting Data on Terrorist Attacks

Compared to other sources of cross-national data on crime, terrorism poses several special data collection challenges. In criminology, data on illegal violence come traditionally from three sources, corresponding to the major social roles connected to criminal events: ‘official’ data collected by legal agents, especially the police; ‘victimization’ data collected from the general population of victims and non-victims; and ‘self-report’ data collected from offenders (LaFree and Dugan 2004: 53–74). Major official sources of data on international crime include the International Criminal Police Organization (Interpol), the United Nations crime surveys, and for homicides only, the World Health Organization. These sources have produced a steady stream of empirical investigations of cross-national crime, especially homicides (LaFree 1999: 124–48; Eisner 2003; Messner 2003; Jacobs and Richardson 2008). For at least two decades, the International Crime Victimization Survey has collected data from samples of individuals in several dozen nations around the world

(Van Dijk *et al.* 2008; Mayhew and Van Dijk 1997) and many other victimization surveys have now been completed for individual countries or groups of countries (for a review, see Groves and Cork 2008).

Compared to the collection of victimization data, the collection of self-report cross-national survey data has been more sporadic. Nevertheless, several international self-reported crime studies have been undertaken (Junger-Tas *et al.* 1994) and have produced a variety of empirical analyses (Farrington *et al.* 1996; for a review, see Junger-Tas and Marshall 1999). However, data concerning terrorist events based on these three fundamental sources are either entirely lacking or face important additional limitations.

The difficulties of using official data to study terrorism begin with the term ‘terrorism’ itself, which yields varying definitions, often overloaded with political and emotional implications. As the Palestine Liberation Organization’s long-term Chairman Arafat so famously noted in a 1974 speech before the United Nations, ‘One man’s terrorist is another man’s freedom fighter’. Hence, while many agree on legal definitions for common crimes, there is more uncertainty in defining terrorism. In fact, despite much effort, the United Nations has failed to develop an official definition of terrorism (O’Neill 2002). Thus, definitions of terrorism at the country level are rarely endorsed by all other countries. For example, the US State Department maintains a list of Foreign Terrorist Organizations (FTO; US Department of State 2009) that designates FTO status according to, among other things, its threat to US interests. Yet, many other countries perceive some of the FTOs designated by the United States not as terrorists, but as revolutionaries fighting for just causes. For example, Hamas is listed as an FTO despite its status among some countries of the world as a legitimate political party that won a major democratically held election.

Although government departments in some countries do collect official data on terrorism (e.g. the US National Counter Terrorism Center), these data face at least two major difficulties. First, terrorism data collected by government entities are open to scepticism either because they are influenced by political considerations, or because many fear that they might be so influenced. Of course, to some extent, this is also a problem with official data on crime (e.g. O’Brien 2003; Mosher *et al.* 2002). Police, courts and correctional officers frequently face both real and perceived political pressure to present their crime data in particular ways. However, owing to the fact that terrorism is a very public and political form of crime, any prevailing political pressure is likely to be especially acute when recording terrorist activity.

Second, apart from the difficulties of interpreting official data on terrorism, there is the even more fundamental problem that most countries do not routinely collect statistics on the arrest, prosecution and punishment of terrorist suspects. For example, most suspected terrorists in the United States and elsewhere are not legally processed for their acts of terrorism, but rather for other related offences (e.g. weapons violations, tax fraud; Smith and Damphousse 1998; 2008). It is true that this situation continues to evolve. For example, the USA Patriot Act, passed in 2001, strengthens criminal laws against terrorism by adding to the criminal code terrorist attacks against mass transportation systems, domestic terrorism, harbouring or concealing terrorists, or providing material support to terrorists (115 Stat. 374, Public Law 107–56—26 October 2001). Nevertheless, it still remains the case that most of those persons who are officially designated as terrorists in the annual reports produced by the US Federal Bureau of Investigation are either not prosecuted at all (e.g. the likely outcome for many of those

detained at the US's Guantanamo Detention Facility) or are prosecuted under traditional criminal statutes. At present, there is no easy way to gather official data on those arrested, prosecuted or convicted of terrorist activities; rather, the data must be assembled on a case-by-case basis (Smith and Damphousse 1998; 2008). Additionally, much terrorism data are collected by intelligence agencies that operate partially or entirely outside the realm of domestic criminal justice systems and do not make their information available for unclassified research.

Victimization data, which have played an increasingly important role for studying common crimes, have also not been widely used for studying terrorist activities. Several features of terrorism make it highly unlikely that victimization surveys will ever have widespread utility for studying terrorism rates.¹ To begin with, despite the attention it gets in the global media, terrorism is much rarer than most violent crime. This means that even with extremely large sample sizes, few individuals in most countries are victims in terrorist attacks. Moreover, because victims of terrorism are often chosen at random, they are unlikely to know their perpetrators, making it difficult to produce details about offenders. And, finally, in many cases, victims of terrorism are killed by their attackers (LaFree and Dugan 2009*b*)—a problem in criminology limited to the study of homicides.

Self-report data on terrorists have been more important than victimization data, but they, too, face serious limitations. Most active terrorists are unwilling to participate in interviews. And even if willing to participate, getting access to known terrorists for research purposes raises obvious challenges. As Merari (1991: 88) has put it, 'The clandestine nature of terrorist organizations and the ways and means by which intelligence can be obtained will rarely enable data collection which meets commonly accepted academic standards'.

Despite these challenges, compared to other types of cross-national crime data, collecting cross-national data on terrorist attacks has one considerable advantage: terrorists, unlike most common criminals, actively seek public recognition. Jenkins (1975: 16) famously declared that 'terrorism is theatre' and explained how 'terrorist attacks are often carefully choreographed to attract the attention of the electronic media and the international press'. In fact, the media are so central to contemporary terrorist groups that some researchers have argued that the birth of modern terrorism should be directly linked to the launch of the first television satellite by the United States in 1968 (Hoffman 1998: 136–7). This invention meant that news could be transmitted almost instantaneously from local studios back to network headquarters. The fact that terrorists are specifically seeking to attract attention through the media suggests that compared to other types of crime, media coverage can tell us far more about terrorism. Thus, while no responsible researcher would seriously argue that we can accurately track burglary or car theft rates by studying electronic and print media, it is a much more defensible argument to claim that we can track terrorist attacks in this way. Indeed, it seems increasingly difficult to imagine that most aerial hijackings or politically motivated assassinations—even in remote parts of the world—can totally elude the scrutiny of the global media.

For these reasons, there has been a growing interest in unclassified, open source data on terrorism. One of the most notable advances in this area has been the construction

¹ However, surveys can be quite useful for studying other terrorism-related issues, including fear of terrorism, support for terrorism and defensive actions taken to prevent terrorist victimization (LaFree and Franke 2007).

of large and comprehensive datasets tracing terrorist attacks over time. Beginning in the late 1960s, a growing number of governmental and private entities began collecting open source data on terrorist attacks. Among the most extensive and influential of these databases to date have been those collected by RAND and the Memorial Institute for the Prevention of Terrorism,² ITERATE (International Terrorism: Attributes of Terrorist Events), the US State Department, and the Global Terrorism Database (GTD). In general, all of these databases have relied on some combination of unclassified print and electronic media.

LaFree and Dugan (2007) describe eight of these event databases, with varying coverage going back as far as 1968. Analyses based on open source event databases have provided important insights into a wide range of terrorism-related empirical questions, including trends in terrorism over time (Enders and Sandler 2006; 2007; LaFree and Dugan 2009a), the deterrent impact of new anti-terrorism policies (Dugan *et al.* 2005; LaFree *et al.* 2009a) and the economic impact of terrorist attacks (Richardson 2006; Greenbaum *et al.* 2007).

However, an important limitation of most open source databases is that they have included only transnational events—those involving a national or a group of nationals from one country attacking targets in another country. This is a potentially significant limitation because sources that have compared domestic and transnational terrorist attacks (Asal and Rethemeyer 2007; Neumayer and Plumper 2008; Schmid 2004; LaFree and Dugan 2007) conclude that the former outnumber the latter by as much as seven to one. Moreover, as Falkenrath (2001: 164) points out, dividing bureaucratic responsibility and legal authority according to a domestic–international distinction is ‘an artifact of a simpler, less globally interconnected era’. Some groups such as al Qaeda have global operations that cut across domestic and international lines. Others (e.g. Abu Nidal, Kurdistan Workers’ Party) operate in multiple countries and, hence, might simultaneously be engaged in acts of both domestic and transnational terrorism. LaFree, Yang and Crenshaw (2009b) found that over 90 per cent of attacks by 53 foreign terrorist groups that posed a threat to the United States from 1970 to 2004 were domestic. In short, excluding domestic terrorist attacks masks a large portion of global terrorism and poses a serious limitation on our ability to understand cross-national terrorism patterns.

To overcome this limitation, we relied on a recently compiled database that includes both international and domestic terrorist attacks from 1970 until 2006 that was created by combining the Global Terrorism Database (GTD; LaFree and Dugan 2007) for the years 1970 to 1997, the international RAND-MIPT database from 1970 to 1997 and the international–domestic RAND-MIPT database from 1998 to 2006 (LaFree *et al.* 2009c). The resulting merged dataset includes nearly 74,000 known domestic and international terrorist attacks from around the world, making it the most comprehensive unclassified event database yet assembled.³ As previously noted, we define terrorism as acts of violence by non-state actors, perpetrated against civilian populations, intended to cause fear, in order to achieve a political objective.

²In 1994, the RAND Chronology was relocated to the University of St Andrews in Scotland. It remained there until moving back to RAND in the United States in December 1997.

³This distinction was relatively short-lived. While this paper was being prepared, the National Consortium for the Study of Terrorism and Responses to Terrorism released a new Global Terrorism Database that includes nearly 82,000 attacks from 1970 to 2007 (see www.start.umd.edu/gtd).

The availability of this large, longitudinal database on terrorist attacks marks an important milestone in the history of cross-national studies of crime. One of the most serious limitations of cross-national crime research is that it has been focused overwhelmingly on a small number of highly industrialized Western-style democracies (Stamatel 2006; Burchart and Engstrom 2002). In a review of cross-national research on homicide, LaFree (1999) found that most prior research had been based on fewer than 40 of the world's countries. And, of course, these countries are not a random sample, but rather strongly overrepresent Europe and North America while almost entirely excluding Africa, the Middle East and Asia. By contrast, the event data used for this study include unclassified information on terrorist attacks from all countries of the world.

We analyse the merged GTD–RAND data to address three fundamental questions about cross-national patterns of terrorism over time. First, based on long-standing concerns about the geographic concentration of crime across various spatial units, to what extent are global terrorist strikes concentrated at the national level? Second, to what extent are these cross-national patterns stable over time? And, finally, how sensitive are these trends to variations in how terrorist activity is measured? We address all three questions by using the semi-parametric group-based trajectory approach (Nagin 2005) to analyse terrorist activity in countries from 1970 to 2006. By applying trajectory analysis to country-level trends, we can identify distinct patterns of terrorist activity over time. To examine how sensitive these patterns are to the operationalization of terrorism, we run separate analyses for: (1) total terrorist attacks, (2) attacks with which a specific group is associated (attributed attacks), and (3) attacks that resulted in fatalities (fatal attacks).

Results from the analysis examining total attacks show that the world's countries can be sorted into five trajectory groups that reflect distinct patterns of terrorism from 1970 to 2006. Although the countries included in these five trajectory groups remain fairly stable over time, there is evidence of some longitudinal variation within trajectory groups. Our results also show that terrorist attacks have been highly concentrated in a relatively small number of countries since 1970. And, finally, regardless of how we measure terrorist activity (i.e. total, attributed or fatal attacks), the findings show similar patterns of country-level terrorism activity over time. These similarities are especially striking for countries that fall into the trajectory groups that include the highest and lowest rates of terrorism.

Data and Methods

Data

The Global Terrorism Database (GTD) began with a project that computerized data originally collected by the Pinkerton Global Intelligence Service (PGIS; LaFree and Dugan 2007). PGIS collected data on more than 67,000 domestic and transnational terrorist attacks between 1970 and 1997. In 1972, RAND terrorism experts began collecting data on international terrorist attacks and began augmenting their international database with domestic terrorism data in 1998—at the same time as the original PGIS data collection ended. To develop the data used for this project, we brought together the GTD team from the University of Maryland that computerized the PGIS data with a RAND team that has long-standing expertise in the collection and analysis of terrorist event data.

Using the GTD–RAND data, we examine the distribution of 73,961 terrorist attacks for 206 countries and territories between 1970 and 2006, excluding 1993 (see Appendix A). Original data for 1993 were lost by PGIS before we obtained the database and have never been recovered (LaFree and Dugan 2007). Fortunately, trajectory analysis includes specific procedures for dealing with missing data (Nagin 2005) and because the 1993 data are missing completely, our parameter estimates should not be affected by systematic bias (Allison 2002).

The GTD–RAND database includes more countries than presently reported by official sources because it includes a number of disputed territories that we treat here as countries (e.g. West Bank/Gaza, Northern Ireland) and it includes countries that either came into existence or dissolved at some point between 1970 and 2006.⁴ For example, the coding scheme takes into account changes in national borders and newly independent countries by coding countries with valid values only during the period when they officially existed.⁵ Fourteen per cent of the countries in the analysis have missing values as a result of changes in political boundaries.⁶ Another coding decision involves those countries that kept the same geographic boundaries, but had changes in their political regime or official name. These countries are coded as one unit consistently labelled throughout the entire time period. For example, despite its name change, we refer to the Democratic Republic of the Congo as Zaire and Rhodesia as Zimbabwe throughout the series.

One of the greatest challenges in collecting open source data on terrorist attacks is distinguishing terrorism from other types of violence, especially civilian casualties that occur during uprisings, insurgencies and armed conflicts. This was especially challenging following the United States-led invasion of Iraq that began on 20 March 2003. The GTD–RAND data are designed to exclude cases involving open combat between opposing armed forces, but we acknowledge that during wartime, it is often difficult to distinguish between acts of terror, other types of criminal violence and violent acts resulting from warfare. Accordingly, we present descriptive results that include cases from post-2003 Iraq and discuss the subsequent trajectory analysis results with and without these cases.

One strategy to distinguish valid cases of terrorism from ambiguous cases is to only examine those cases that are most likely to draw media attention. Thus, we also examine only those attacks that can be attributed to specific terrorist organizations or that result in fatalities. We classified an incident as attributed when the media source associated a specific organization with the attack. Fatal attacks were those that claimed at least one life. Examining only attributed cases reduces the sample to 28,298 attacks and examining only fatal attacks further reduces the sample to 22,555 attacks. We assume that reports of these attacks are not only more likely to be recorded by the media, but, when they are recorded, we assume that they are more likely to provide enough detail to be accurately coded. Hence, these two measures may represent a more conservative operationalization of terrorism.

⁴Unless otherwise noted, we use interchangeably the terms country, nation and territory.

⁵The following countries were coded to reflect their changing geographic boundaries, with the time-span in parenthesis representing the period in which the country had valid data values: Soviet Union, Yugoslavia (1970–91); Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan (1992–2006); Bosnia-Herzegovina, Croatia, Macedonia, Slovenia, Serbia-Montenegro also known as Federal Republic of Yugoslavia (1992–2006); Czechoslovakia (1970–92); Czech Republic, Slovak Republic, Eritrea (1993–2006); Namibia (1990–2006); North Yemen, South Yemen (1970–89); Yemen (1990–2006); and East Germany (1970–89).

⁶Trajectory analysis easily accommodates an unbalanced sample of countries and years (Nagin 2005).

Methods

We use group-based trajectory analysis to determine whether distinctive patterns of terrorist activity emerge from the data and to examine the stability of these patterns over time. Trajectory analysis is a recent methodological innovation that was developed primarily for the purposes of describing trends in anti-social behaviour among youth (Nagin *et al.* 2003; Nagin and Tremblay 1999; Nagin 2005). Recently, trajectory analysis has been applied to the study of crime distribution across geographic locations (Weisburd *et al.* 2004; Weisburd *et al.* 2009) and trends in terrorist activities and crime across countries and groups (LaFree *et al.* 2006; Piquero and Piquero 2006; Dugan *et al.* 2007). Trajectory analysis is designed to identify latent groups of cases with similar developmental paths (Bushway *et al.* 2001; Weisburd *et al.* 2004; Nagin 2005) and also estimates the proportion of study populations that follow particular trajectories. The fact that trajectory analysis can capture developmental processes in a dynamic, longitudinal framework makes it attractive for examining long-term trends.

Because the dependent variables in this analysis are counts of terrorist attacks over time, we use both the Poisson and Zero-Inflated Poisson (ZIP) models with quadratic functions to estimate the country-level trajectories (Lambert 1992; Nagin 2005). Although the Poisson model is suitable for count data, it is less desirable when the data being modelled have a high number of zero values. Given that terrorism is a relatively rare event, we can expect many countries to have zero counts for any specific year. ZIP models are extensions of the Poisson model and accommodate the large number of zero values and potential intermittency: that is, periods of terrorist inactivity that could represent a lack of opportunity for attacks rather than a lack of risk (Nagin and Land 1993).⁷

We begin by determining the optimal number of latent groups that best fit the data through an iterative process. After modelling the data using different numbers of groups, we assess the comparative fit of the various models using the Bayesian Information Criterion (BIC), a statistic that allows us to compare each model specification to select the one that most closely matches the underlying data.⁸ We also examine the posterior probability of group membership for each country that falls into a specific trajectory group. Posterior probabilities determine how well each of the models fits the relevant data and provide an assessment of the extent to which the models correctly classify individual countries into specific trajectories. Average posterior probabilities that are near or equal to 1.00 are ideal, as this indicates that the majority or all of the countries

⁷The Poisson and ZIP models allow analysts to model risk for particular events. The ZIP model accounts for the possibility that although an event may not occur, the risk of the event is still present. Thus, the value reflecting non-occurrence of an event (0) can either reflect a zero risk or positive risk that the event occurs. A common example used to describe intermittency is the observation of symptoms of illness in patients. A patient may not exhibit any symptoms at a specific point in time, for two very different reasons: either the patient no longer has the illness or the patient has the illness but is asymptomatic because the illness is in remission. Within criminology, intermittency may occur when potential criminals remain lawful either because they have desisted and therefore produce no risk of offending or because they had no opportunity to offend, despite their desire to do so (i.e. a positive risk). Thus, a zero value may reflect two types of processes and the ZIP model attempts to accommodate for this possibility.

⁸The BIC is useful for determining the optimal number of trajectory groups and is expressed in the following form:

$$\text{BIC} = \log(L) - 0.5 * \log(n) * (k),$$

where L is the value of the model's maximized likelihood, n is the sample size, and k is the number of parameters (specifically groups). One important benefit of the BIC is that it institutes a penalty for increasing the number of groups in the model. Thus, expanding the model by adding groups is only desirable if the resulting improvement in the log likelihood exceeds the penalty for more parameters (Nagin 2005).

in a trajectory group were correctly assigned. Nagin (2005) suggests that average posterior probabilities above 0.70 are acceptable. After determining the optimal number of trajectory groups, we examine the patterns of the trajectories by plotting the average number of attacks each year for each trajectory group.

Results

In order to address the issues we raised above, we divide the presentation of results into separate sections for total, attributed and fatal attacks. In the final two parts of this section, we compare the high-frequency trajectory groups and the recent, rapidly increasing trajectory groups for all three analyses.

Total attacks

Figure 1 shows the patterns of total, attributed and fatal attacks between 1970 and 2006. Because of the complexity of the Iraqi cases after the United States-led invasion of 2003, we exclude them from the figures, but will consider their impact on the results throughout the analysis and discussion that follows. According to Figure 1, total terrorist attacks increased in the mid to late 1970s, remained fairly stable throughout the 1980s, and increased again in the early 1990s, reaching a total of 3,654 events in 1992. Terrorist activity then declined during the late 1990s to levels as low as those observed in the late 1970s—1,151 attacks in 2000. However, after 2001, attacks increased again, reaching a series high of 6,660 in 2006. The average number of attacks each year across all countries is 2,054. Trend lines are substantially lower for attributed and fatal attacks than for total

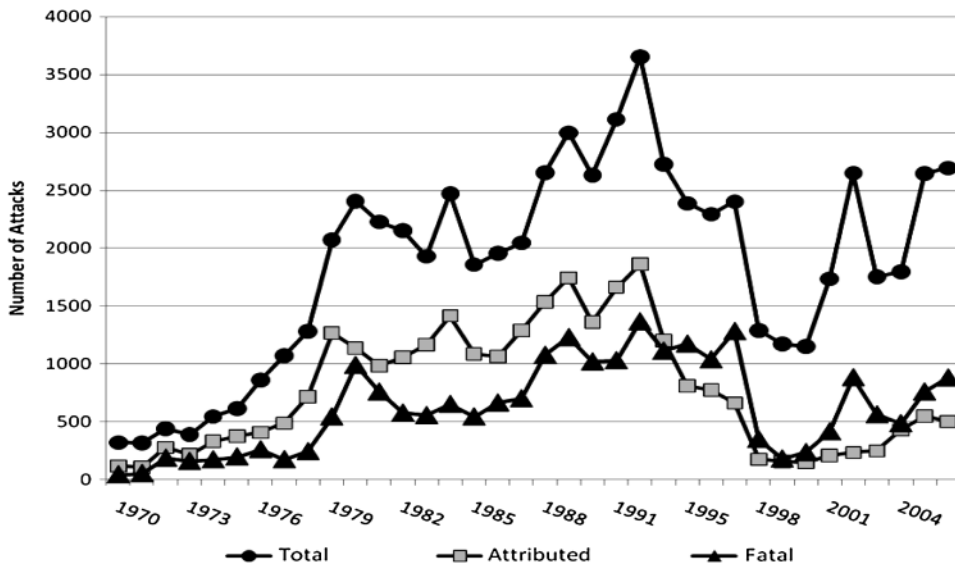


FIG. 1 Total, attributed and fatal terrorist attacks, 1970–2006.
 Note: excludes cases from Iraq after 20 March 2003.

attacks, although all three share a similar overall shape. All three trends have a generally positive trajectory from the start of the series in 1970 until the early 1990s. All three also decline during the end of the twentieth century but then increase again during the last few years of the series. Attributed attacks were more common than fatal attacks from 1970 until 1992 but slightly less common than fatal attacks for the rest of the series. The average number of total attacks each year per country is 10.19, with a median of 1.16, indicating that a small number of countries are experiencing a large proportion of all attacks.

The impact of excluding the post-2003 Iraqi cases is substantial, increasing total attacks from 2,692 to 6,308 and fatal attacks from 881 to 3,555 in 2006. The impact of excluding the Iraqi cases is much less on attributed attacks, indicating that relatively few of the post-2003 Iraqi cases (8.25 per cent) were attributed to specific groups. We would disagree with the position of those (e.g. Human Security Report Project 2008) who claim that no civilian deaths in post-2003 Iraq are terrorism, but, at the same time, we acknowledge that distinguishing terrorism from other forms of violence in a war-torn country poses a continuing challenge for event databases.

To develop geographic comparisons for terrorist attacks, we next divided the 206 countries in the analysis into nine major regions and present the distribution of total, attributed and fatal attacks for each region (see Appendix A).⁹ Turning first to total attacks, Figure 2 shows that Latin America and Western Europe have the largest number

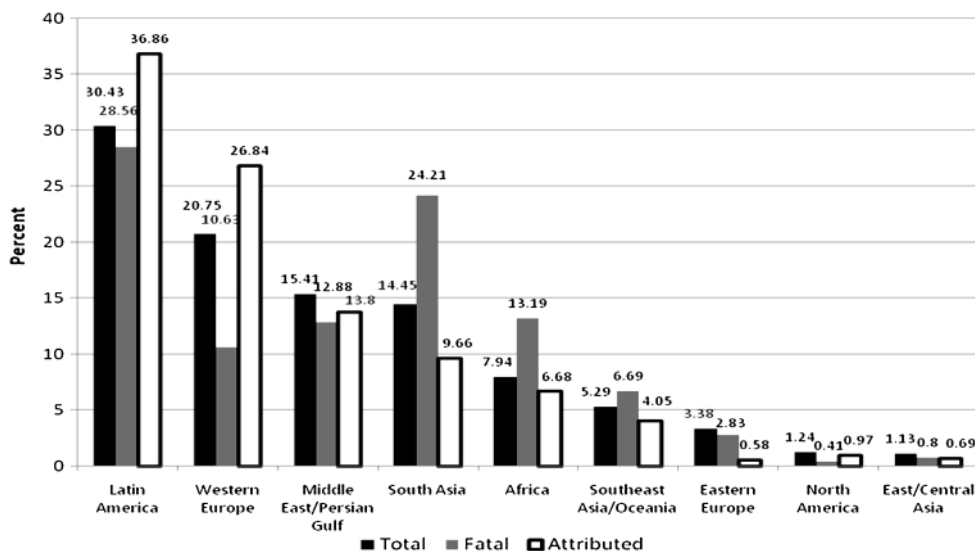


FIG. 2 Percentage of total, fatal and attributed attacks by region, 1970–2006.

Note: excludes cases from Iraq after 20 March 2003.

⁹Note that for purposes of this analysis, we treat the country as the target. Thus, an attack on the US embassy in Nigeria is treated here as a Nigerian attack. Similarly, an attack on a Nigerian ambassador living in the United States would be counted as a US attack. Although the vast majority of cases in the database involve attacks in which the location of the target and the nationality of the target are the same, there are variations across attacks, depending on the geographical country attacked, the nationality of the perpetrators and the nationality of the target.

of attacks during this period. Latin America accounts for 30.43 per cent of all attacks and Western Europe for 20.75 per cent of all attacks. Following these regions, the Middle East/Persian Gulf and South Asia were attacked most frequently, accounting for 15.41 and 14.45 per cent of all attacks, respectively. Africa ranks fifth among the regions, accounting for 7.94 per cent of total attacks, followed by Southeast Asia (5.29 per cent), Eastern Europe (3.38 per cent), North America (1.24 per cent), and Eastern and Central Asia (1.13 per cent). When we include the post-2003 Iraqi cases in the analysis (results available on request), the Middle East/Persian Gulf moves from third to second place (behind Latin America), accounting for 23.77 per cent of total attacks.

Figure 2 shows that percentages of attributed attacks also differ substantially across the nine regions. Latin America and Western Europe are the only two regions with a higher percentage of attributed than total attacks. This may reflect the fact that terrorism in both regions has been characterized by relatively long-lasting and stable terrorist groups that often claim responsibility for their attacks.

Figure 2 also shows that the percentage distribution of fatal attacks by region differs substantially from that of total attacks. While Latin America remains the leader in fatal attacks as well as in the percentage of total attacks, South Asia, Africa and the Middle East/Persian Gulf have the next highest percentage of fatal attacks, accounting for 24.21, 13.19 and 12.88 per cent of all fatal attacks, respectively. Figure 2 also shows that while Western Europe is second in the proportion of total attacks, its rank drops to fifth in fatal attacks. In general, terrorist attacks in Western Europe are noteworthy for producing relatively few fatalities per attack. South Asia and Africa are the only two regions that have a higher proportion of fatal than total attacks. The reasons for these differences remain to be explained, although part of the explanation may simply be media differences in reporting—possibly accounting more reliably for fatal attacks in regions less well covered by the media—and proximate access to medical care across regions.

Including the post-2003 Iraqi cases (results available on request) has a major impact on the rank ordering of regions for fatal terrorist attacks, moving the Middle East/Persian Gulf from fourth to first place. From 2003 to 2006, the GTD–RAND database includes 18,754 terrorism-related fatalities from Iraq.

In Figure 3, we turn to the trajectory analysis of total attacks from 1970 to 2006. According to Figure 3, there are five unique patterns of terrorist activity that are obscured when we combine all countries into one general trend, for convenience hereafter referred to as Groups 1 through 5 (see Appendix B1 for descriptive statistics; see Appendix B2 for a complete list of countries). Results for Group 5 are especially striking. Group 5 includes only ten countries or 4.85 per cent of all countries examined (Colombia, France, India, Israel, Northern Ireland (treated here as a country), Pakistan, Russia, Spain, Sri Lanka and Turkey) and yet this trajectory accounts for 37.98 per cent of the total terrorism attacks during this period. Countries in Group 5 averaged more than 2,500 attacks over the period studied, indicating that terrorism attacks are highly concentrated in a relatively small number of countries. Group 5 includes countries with the highest frequency of terrorist attacks and, compared to other trajectory groups, includes countries that have generally experienced increasing attacks from 1970 to 2006.

Trajectory Group 4 also accounts for a large proportion of total attacks (38.13 per cent), but its distribution is much different from Group 5. Group 4 shows rapid increases in attacks throughout the 1970s with a series peak in 1982, continued high rates until a

smaller peak in 1991, and then steady declines in annual attacks until 2006. In general, Group 4 includes 21 countries with very active terrorist organizations in the 1970s and 1980s that have become far less active into the twenty-first century (including Algeria, Argentina, Bosnia-Herzegovina, Burundi, Chile, El Salvador, Germany, Greece, Guatemala, Iran, Italy, Lebanon, Nicaragua, Peru, Philippines, Serbia-Montenegro, South Africa, Tajikistan, United Kingdom, United States, and Corsica (treated here as a country)). Many of these countries (e.g. Chile, El Salvador, Peru) had terrorist groups organized around Marxist–Leninist causes whose activities dropped off substantially with the collapse of the Soviet Union. While the countries of Group 4 represent only 10.19 per cent of the sample, they account for more than 38.13 per cent of total attacks in the database, averaging 1,155 attacks a year.

Trends for trajectory Group 1 are also distinctive. Prior to the mid-1990s, attacks against the ten countries in this group (Afghanistan, Bangladesh, Indonesia, Kashmir (treated as a country), Nepal, Rwanda, Soviet Union, Thailand, West Bank/Gaza (treated as a country) and Yugoslavia) hovers near zero, but, after 1999, the average number of attacks for countries in this group rises quickly to surpass activity for those countries in all of the four other groups.¹⁰ While Group 1 includes only 4.85 per cent of the sample, it comprises 10.43 per cent of all attacks, 42.46 per cent of all attacks over the last seven years of the series. In general, the ten countries that make up trajectory Group 1 are those that have been victimized with rapidly increasing frequency after the turn of the twenty-first century. Thus, average annual attacks for the countries in Group 1 moved

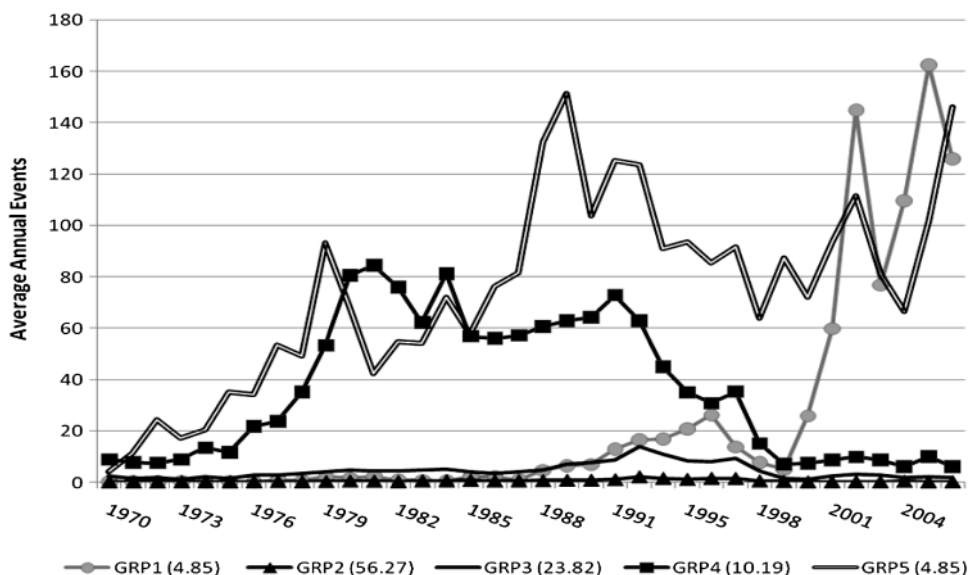


FIG. 3 Trajectory analysis of total attacks, 1970–2006.

Note: excludes cases from Iraq after 20 March 2003.

¹⁰The Soviet Union and Yugoslavia, which both ceased to exist as political entities in 1991, are interesting exceptions to this pattern. Both fit trajectory Group 1 because they had very low levels of terrorist activity throughout the series until the very end of their existence.

from five in 1999 to 125.75 in 2006. Given the steep climb of this trajectory at the end of the series, many of these countries are likely to be the location for major terrorist activity in the immediate future.

Groups 2 and 3 are at once those with the largest number of total countries (for a complete list of countries, see Appendix B2), but the smallest number of total attacks. Trajectory Group 2 includes 116 countries (56.31 per cent of the countries examined), but accounts for only 2.62 per cent of the total attacks in the data. The average country in trajectory Group 2 experienced a total of 15 attacks during the 37 years included in the database. Trajectory Group 3 includes 48 countries representing 23.3 per cent of the countries examined. As with countries in Group 2, countries in Group 3 also have a relatively low level of terrorism activity, accounting for 10.83 per cent of all attacks. Countries in Group 3 average 147 total attacks over the series.

When we repeated the same analysis including the post-2003 Iraqi cases (available on request), we found the results were very similar except that Iraq became a part of Group 1 and, as a result, greatly increased total attacks for this trajectory at the end of the series. With post-2003 Iraq included, the countries in Group 1 had an average of 552.67 attacks in 2006 compared to 125.75 attacks without Iraq.

We find considerable but not total stability in the ordering of the five trajectories over time. On average, countries in Group 5 experience the most attacks for the series, with two exceptions. First, countries in Group 4 have an average level of attacks that exceeds countries in Group 5 for the years 1970 and 1979–84; and, second, countries in Group 1 experience more attacks than countries in Group 5 for the years 2001–02 and 2004–05. Group 4 remains above the three less frequent attack trajectory groups (Groups 1–3) throughout the series, with one exception. In 1999, the average number of attacks for countries in Group 1 rises above that for countries in Group 4 for the rest of the series. In general, countries in Group 1 show the most dynamic change near the end of the series. Indeed, many of the countries included in Group 1 (e.g. Afghanistan, Bangladesh, Kashmir, Rwanda) have experienced wrenching social and political changes in the past decade.

Taken together, Groups 1, 4 and 5 are responsible for 86.54 per cent of all attacks in the database. The countries and territories making up Group 5 can be considered the long-term global leaders in the production of terrorism. Taken together, the peak rate of attacks for these countries came in 1989, just before the collapse of the Soviet Union. The average rate of attacks for the countries in trajectory Group 5 at the end of the series in 2006 (146.10) was just under their rate (151.33) at the time of the 1989 peak. Most of these countries have one or more terrorist groups that have operated within the country for many years that account in large part for the high number of terrorist attacks sustained. For example, FARC has long operated in Colombia, ETA has long operated in Spain, and the LTTE has long operated in Sri Lanka.

Attributed attacks

We turn next to a trajectory analysis limited to the 27,694 attacks to which a specific terrorist group was attributed. According to Figure 4, our trajectory analysis of attributed attacks produced four distinct groups (for a list of countries in each group, see Appendix B3). As in the analysis of total attacks, the analysis of attributed attacks shows that terrorism is highly clustered in a small number of countries. In fact, compared to

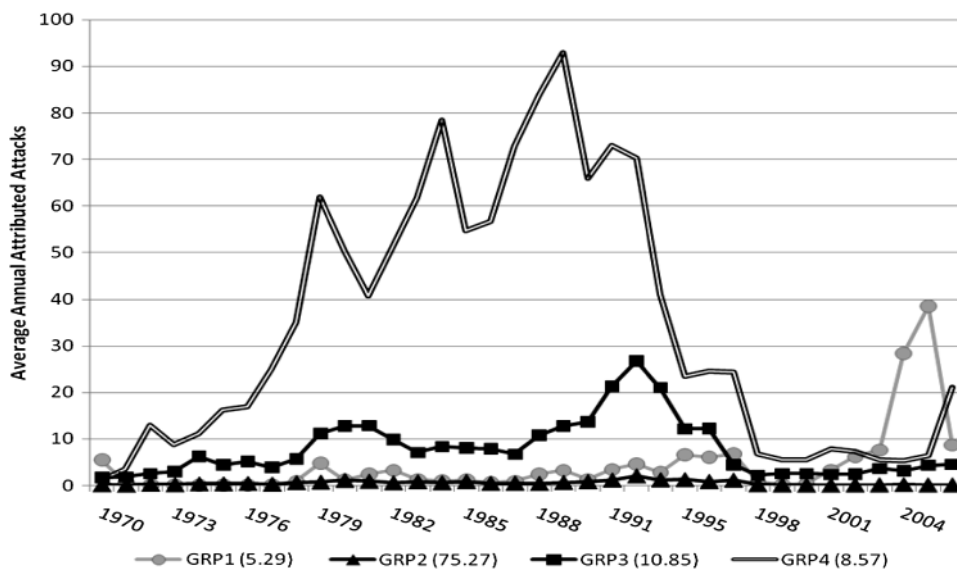


FIG. 4 Trajectory analysis of attributed attacks, 1970–2006.

Note: excludes cases from Iraq after 20 March 2003.

the analysis of total attacks, clustering is even more extreme for the analysis of attributed attacks. Thus, the 15 countries in Group 4 (8.57 per cent of all countries) account for 66.66 per cent of all attributed attacks. Indeed, most of the countries in this group have long had one or more extremely active terrorist organizations. The Group 4 trajectory reaches a peak in 1989 with an average of more than 90 attributed attacks per country and then declines dramatically into the twenty-first century before experiencing a slight upturn in attacks after 2003. Many of the countries in Group 4 for attributed attacks were also classified in the high total attack group (Group 5), including Colombia, France, India, Israel, Sri Lanka and Northern Ireland.

Countries in Group 3 have the second highest overall level of attributed attacks up until the early 1990s, when they are displaced by Group 1. Group 3 includes 10.85 per cent of all countries, but accounts for 19.47 per cent of all attributed attacks between 1970 and 2006. The Group 3 trajectory rises gradually from 1970 until reaching a peak in 1992 and then declines during the late 1990s so that its rates in the twenty-first century are similar to its rates in the 1970s.

Group 2 is characterized by low levels of attributed terrorist attacks throughout the series. Over three-quarters of all countries of the world are classified into Group 2, yet they only account for 2,489 (8.99 per cent) of all attributed attacks. In short, the vast majority of the world's countries experience very few terrorist attacks that can be attributed to specific organizations. Many of the countries included in this low-level Group 2 were also classified into the two lowest-rate trajectory groups in the total attacks analysis (Groups 2–3) including Austria, Australia, Denmark, Hungary, Iceland, Lithuania, Luxembourg, Poland, Romania, Sweden and Switzerland.

And, finally, Group 1 includes only 5.29 per cent of all countries, yet it accounts for 4.88 per cent of all attributed attacks. Group 1 for attributed attacks resembles Group 1

for total attacks, with relatively low levels during the early part of the series and then rapid increases after 1999. Rates for the Group 1 trajectory closely parallel rates for Group 2 until the turn of the twenty-first century. Starting in 2001, the Group 1 trajectory increases rapidly, reaching a peak in 2004—at which time, rates for Group 1 are higher than for any of the other attributed group trajectories.

When we re-estimate the attributed analysis including the post-2003 Iraqi cases, the same number of groups emerges and the overall pattern for each group remains the same. The main difference is that the Group 1 peak in 2004 is substantially higher (55.73 versus 38.56).

Although compared to the analysis for total attacks, the analysis for attributed attacks yields one less trajectory group, the overall patterns for the two analyses (total attacks and attributed attacks) are quite similar. Both analyses resulted in one trajectory that consists of a few countries that account for a large proportion of total events (Group 5 for total attacks, Group 4 for attributed attacks). Both analyses also produce a secondary trajectory group that displays a moderate level of terrorism activity, with considerable activity in the 1980s and early 1990s that declines notably during the late 1990s (Group 4 for total attacks, Group 3 for attributed attacks). Finally, both analyses produce a trajectory composed of countries with very low attack rates until the late 1990s and rapidly increasing rates thereafter (Group 1 for both total and attributed attacks). The main difference between the trajectory analysis for total and attributed attacks is that the two lowest-frequency trajectories for total attacks (Groups 2 and 3) are separated, but are combined for attributed attacks (Group 2).

To summarize, the stability of the different terrorism trends over time for the trajectory analysis of attributed attacks resembles the results for total attacks. As in the total attacks analysis, the trajectory group with the overall highest rate (Group 4) exhibits the highest level of attributed attacks throughout the series, with the exception of 1970 and 2002–05, when it is overtaken by Group 1. Also, as with the analysis of total attacks, Group 1 changes the most—beginning the series at zero and ending the series with higher attack rates than any other trajectory group.

Fatal attacks

In Figure 5, we present the results of the trajectory analysis for the 22,555 fatal attacks. Here, we find that three different patterns of terrorist activity, or trajectory groups, emerge. Despite the difference in the number of groups, the overall pattern is again similar to the prior analyses—a relatively high and stable level of terrorism (Group 3), a moderate level of terrorism that increases towards the end of the series (Group 1), and a low and stable level of terrorist activity (Group 2). Once again, we find that a high number of attacks are clustered in a small number of countries, with Group 3 including only 6.45 per cent of all countries, but accounting for 55.58 per cent of the fatal attacks. Not surprisingly, the list of countries in Group 3 is similar to that for the other high-frequency groups (see Appendix B4 for full list).

In strong contrast to Group 3, Group 2 includes 86.02 per cent of all countries, but only accounts for 27.01 per cent of all fatal attacks. This again shows that the majority of the world's countries rarely experience terrorism, fatal or not. As with the analysis of total and attributed attacks, most countries have experienced little terrorism activity over the 37-year period.

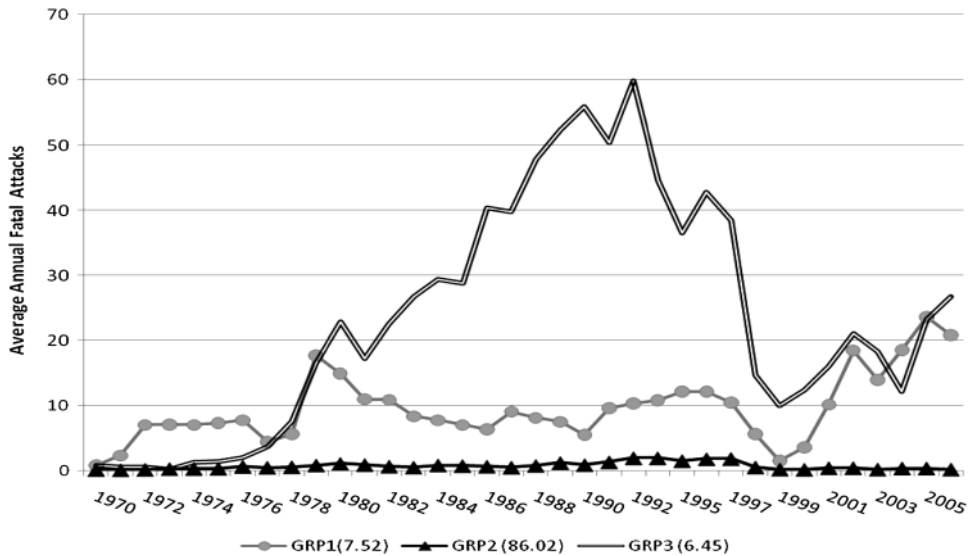


FIG. 5 Trajectory analysis of fatal attacks, 1970–2006.
Note: excludes cases from Iraq after 20 March 2003.

Group 1 in this analysis represents those countries that have moderate levels of fatal attacks for most of the time series, but exhibit rapid increases towards the end of the series. Group 1 includes 7.52 per cent of all countries, but accounts for 17.41 per cent of all fatal attacks.

When we re-estimated the analysis by including post-2003 Iraqi cases (results available on request), the same number of groups emerge; however, Group 1 peaks in 2004 with an average of 29.59 attacks and ends the observational period in 2006 with an average rate (26.78) higher than that of Group 3 (24.61).

Comparing total, attributed and fatal attacks

Although fewer trajectory groups emerge from the analysis of fatal attacks compared to total and attributed attacks, substantial similarities are present across all three analyses. Fatal attacks are highly concentrated in a small number of countries (Group 3) that reach a peak in the early 1990s and decline sharply thereafter. Also, like total and attributed attacks, the analysis of fatal attacks produced a trajectory (Group 2) that consists of a large number of countries that experience relatively few attacks. In general, the trajectory group that exhibits the lowest average number of terrorist attacks over time includes more countries as we move from the analysis of total attacks (116 countries) to attributed attacks (132 countries) to fatal attacks (160 countries). Again, this reinforces our conclusion that most of the countries in the GTD–RAND database experience relatively low levels of terrorist attacks over time. A comparison of the three analyses also indicates that terrorist activity is highly clustered in a relatively small number of countries over time, and, indeed, all three analyses produced a high-frequency trajectory that includes relatively few countries but accounts for a large proportion of attacks.

One of the most important differences in the results is that the high-level terrorism trajectory groups for attributed (Group 4) and fatal attacks (Group 3) resemble a bell-shaped distribution whereas the high-frequency group for the analysis of total attacks (Group 5) remains on an upward trajectory to the end of the series. To develop a more complete understanding of the dynamics of these differences, we next examined the countries that were classified into the highest-rate trajectory group for each analysis.

In Table 1, we compare the countries in the highest overall level terrorism activity trajectory group for all three analyses with highlights for countries that appear in more than one of the analyses. Of the ten countries in the high-rate group for total attacks, four (Colombia, India, Israel, Sri Lanka) are also in the high-rate group for attributed and fatal attacks, indicating that there is some stability in the countries that are classified as having high rates of terrorist activity, regardless of how it is measured.¹¹ In addition, three of the countries in the high-rate group for total attacks are also in the high-rate group for attributed attacks (France, Spain, Northern Ireland) and two of the countries in the high-rate group for total attacks are also in the high-rate group for fatal attacks (Pakistan, Turkey). The only country in the high-rate group for total attacks that is not in at least one of the other high-rate trajectory groups is Russia, suggesting that a high proportion of terrorist attacks in Russia cannot be attributed to specific groups and produced no fatalities. In addition, France, Northern Ireland and Spain are classified in the high-rate trajectories for both total and attributed attacks, but not for fatal attacks, indicating that the large number of terrorist attacks in these countries produced relatively fewer fatal attacks than the 12 countries in the high-fatalities group.

According to Table 1, seven of the countries in the high-rate trajectory for attributed attacks are also in the high-rate trajectory for fatal attacks (Algeria, Colombia, India, Israel, Peru, Philippines, Sri Lanka). Five countries (Chile, El Salvador, Germany, Italy, Nicaragua) are only in the high-rate trajectory for attributed attacks.

TABLE 1 *Countries/territories with the highest levels for total, attributed and fatal attacks, 1970–2006*

Total (N = 10; 4.85%) Group 5	Attributed (N = 15; 8.57%) Group 4	Fatal (N = 12; 6.45%) Group 3
	Algeria	Algeria
	Chile	
Colombia	Colombia	Colombia
	El Salvador	
France	France	
	Germany	
India	India	Guatemala
Israel	Israel	India
	Italy	Israel
	Nicaragua	Lebanon
Northern Ireland	Northern Ireland	
Pakistan		Pakistan
	Peru	Peru
	Philippines	Philippines
Russia		
Spain	Spain	
Sri Lanka	Sri Lanka	South Africa
Turkey		Sri Lanka
% Attacks 37.98%	66.66%	Turkey
		55.58%

¹¹After a major military offensive, the LTTE admitted defeat on 17 May 2009, which, in the short run at least, has virtually eliminated terrorist attacks in Sri Lanka (Jayasekara 2009).

Nicaragua) are exclusively in the high-rate group for attributed attacks, suggesting that terrorist attacks in these countries are especially likely to be linked to specific groups. Three countries (Guatemala, Lebanon, South Africa) are exclusively in the high-rate trajectory for fatal attacks, suggesting that the fatal attacks in these countries are produced by fewer total attacks than the ten countries in the high total attacks group.

There are also interesting regional differences between the countries included in the three high-frequency trajectories. While West European countries were strongly represented among those with high levels of total attacks (France, Spain, Northern Ireland) and attributed attacks (France, Germany, Italy, Spain, Northern Ireland), not a single West European country is in the high-rate fatal attack trajectory. Thus, although there are a large number of attacks in these countries, there are fewer fatal attacks. By contrast, Latin American countries were strongly represented in the high-rate attributed attacks (Chile, Colombia, El Salvador, Nicaragua, Peru) and in the fatal attacks (Colombia, Guatemala, Peru) trajectory groups, but only one Latin American country (Colombia) is in the high-rate total attack trajectory. This indicates that relatively more fatal attacks by known groups occur in these countries. The high-rate fatal attacks group is dominated by countries from the Middle East (Israel, Lebanon, Turkey), South Asia (India, Pakistan, Sri Lanka) and Latin America (Colombia, Guatemala, Peru).

Future hot spots

Analyses of total, attributed and fatal attacks all yielded a trajectory (Group 1 in each case) that was relatively low throughout the first 30 years of the series and then increased steeply after 1999. Thus, this trajectory can be seen as comprising countries whose terrorist attack patterns are of great concern in the first decade of the twenty-first century. In Table 2, we compare the countries in this rapidly rising trajectory for the three attack types. As with the results for the trajectories with the greatest number of attacks, many of the countries with recent rapid increases are the same whether we look at total, attributed or fatal attacks. Thus, of the ten countries in the rapidly rising trajectory for total attacks, four (Afghanistan, Iraq, Rwanda, West Bank/Gaza) are also in the rapidly rising group for attributed and fatal attacks and four are in just the rapidly rising group for fatal attacks (Bangladesh, Kashmir, Nepal, Thailand). In addition, one country in the rapidly rising category for attributed attacks (Burundi) is also in the rapidly rising category for fatal attacks.

For the rapidly rising total attacks trajectory, only three countries do not appear in similar trajectories for attributed or fatal attacks or both (Indonesia, Soviet Union, Yugoslavia). And the Soviet Union and Yugoslavia are special cases. Because both countries ceased to exist in 1991, they are classified in the rapidly rising trajectory not because of high levels of recent attacks, but slowly rising levels of attacks throughout the first three decades of the series. The classification of the Soviet Union in the high total attacks trajectory for the first three-quarters of the series is mirrored in part by the fact that Russia (a major portion of the former Soviet Union) is in the rapidly rising trajectory for fatal attacks for the last quarter of the series. Likewise, the classification of Yugoslavia in the high total attacks trajectory is accounted for in part by the fact that Bosnia/Herzegovina (one of the six provinces that made up the former Yugoslavia) is in the rapidly rising trajectory for attributed attacks. Honduras, Uganda and Uruguay are the only other countries in the rapidly rising attributed trajectory but not in the other two trajectories and El Salvador, Nicaragua, Northern Ireland, Russia and Spain are the only other countries in the rapidly rising fatal trajectory but not in the other two trajectories.

TABLE 2 *Countries/territories in terrorism trajectory with the largest increase since 1999 for total, attributed and fatal attacks, 1970–2006*

Total (N = 11; 4.85%)	Attributed (N = 9; 5.29%)	Fatal (N = 14; 7.52%)
Afghanistan Bangladesh	Afghanistan	Afghanistan Bangladesh
	Bosnia-Herzegovina Burundi	Burundi El Salvador
	Honduras	
Indonesia Iraq* Kashmir Nepal	Iraq*	Iraq* Kashmir Nepal Nicaragua Northern Ireland Russia Rwanda Spain
Rwanda	Rwanda	
Soviet Union^ Thailand		Thailand
	Uganda Uruguay West Bank/Gaza	
West Bank/Gaza Yugoslavia^ % Attacks 10.43%	4.88%	West Bank/Gaza 17.41%

*Iraq only included if post-2003 Iraqi cases are included in the analysis. ^Yugoslavia and Soviet Union cease to exist in 1991.

Taken together, these results suggest that major terrorism country-level hot spots in the first decade of the twenty-first century are concentrated in South and Southeast Asia, the Middle East and Africa. Collectively, these regions account for all nine of the countries in the rapidly rising total attack trajectory (excluding the Soviet Union and Yugoslavia), six of the nine countries in the rapidly rising attributed attack trajectory, and nine of the 14 countries in the rapidly rising fatal attack trajectory.

Conclusions

We began this paper by asking to what extent terrorist strikes are concentrated at the national level. Based on the trajectory analysis described above, our conclusion is that terrorist strikes from 1970 to 2006 have been highly concentrated in a small number of countries. Ten countries of the world (4.85 per cent) have been the location for nearly 38 per cent of all terrorist strikes in the merged GTD–RAND database and another 22 countries (10.68 per cent) account for an additional 38 per cent of total attacks. Thus, over three-quarters of the attacks occurred in only 32 of the countries in the current analysis. The clustering of terrorist attacks within a small number of countries was even greater in the analysis of attributed and fatal attacks. Thus, in the analysis of attributed attacks, 15 countries (8.57 per cent) were responsible for 66.66 per cent of all attacks and, in the analysis of fatal attacks, 12 countries (6.45 per cent) were responsible for 55.58 per cent of all attacks.

We also used trajectory analysis to examine the extent to which the overall patterns of terrorist strikes across nations are stable over time. In general, the argument for the concentration of terrorist attacks within certain countries is stronger than the argument

for the stability of terrorist attack patterns over time. Though there was considerable stability, there were also important changes that were apparent in all three analyses. In the total attacks analysis, the countries comprising the high-rate trajectory (Group 5) were eclipsed by the next highest-rate trajectory (Group 4) in the early 1980s and by the rapidly rising countries constituting Group 1 in the twenty-first century.

Just as there is a fair degree of consistency for the countries comprising the high-frequency trajectories, there is also considerable stability in the countries constituting the low-rate trajectories. Our results underscore the fact that the vast majority of countries have experienced few terrorist attacks since 1970. Importantly, these general patterns remain similar regardless of whether we measure total, attributed or fatal attacks.

Despite growing international concern about terrorism, until recently, very little was known about worldwide risk patterns for terrorist attacks. Our results show that terrorist attacks, like more common crimes, are highly concentrated at the country level over time and measuring terrorism as total, attributed or fatal attacks all produce high levels of concentration. However, there are also signs of change. In all three of the trajectory analyses, we identified a group of countries with rapid increases in terrorist attacks after 1999. While terrorist attacks in the last quarter of the twentieth century were in large part concentrated within countries of Latin America and Western Europe, terrorism hot spots during the first decade of the twenty-first century have shifted considerably towards countries in South and Southeast Asia, the Middle East and Africa.

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Appendix A: Countries/Territories by Region

Region	Countries/territories
Africa	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo-Brazzaville, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of Cabinda, Rwanda, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Western Sahara, Zaire, Zambia, & Zimbabwe
East & Central Asia	China, Hong Kong, Japan, Kazakhstan, Kyrgyzstan, Macao, Mongolia, North Korea, South Korea, Taiwan, Tajikistan, Turkmenistan, & Uzbekistan
Eastern Europe	Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Belarus, Croatia, Czech Republic, Former Czechoslovakia, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Serbia- Montenegro, Slovak Republic, Slovenia, Former Soviet Union, Ukraine, & Former Yugoslavia
Latin America	Antigua & Barbuda, Argentina, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Kitts & Nevis, Suriname, Trinidad & Tobago, Uruguay, Venezuela, & the Virgin Islands (U.S.)
Middle East & Persian Gulf	Bahrain, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Gaza/West Bank, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Former North/South Yemen, & Yemen
North America	Canada, & the United States
South Asia	Afghanistan, Bangladesh, Bhutan, Brunei, Guam, India, Kashmir, Nepal, New Caledonia, Pakistan, Sri Lanka, Tonga, Vanuatu, Wallis & Futuna, & Western Samoa
Southeast Asia & Oceania	Australia, Cambodia, East Timor, Fiji, French Polynesia, Indonesia, Laos, Malaysia, Myanmar, New Zealand, Palau, Papua New Guinea, Philippines, Singapore, Thailand, South Vietnam, & Vietnam
Western Europe	Andorra, Austria, Belgium, Corsica-France, Denmark, Finland, France, Former East Germany, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Isle of Man, Netherlands, Northern Ireland, Norway, Portugal, Spain, Sweden, Switzerland, & United Kingdom

Appendix B1: Descriptive Statistics (Excluding post-2003 Iraq), Total Attacks 1970–2006

Trajectory group	Number of countries (%)	Average Posterior Probability (PP)	Min. PP	Max. PP	Average number of attacks	Median number of attacks	Total attacks	Per cent of attacks (N = 66,646)
1	10 (4.85)	1.00	0.99	1.00	695.20	507.00	6952	10.43
2	116 (56.31)	0.99	0.86	1.00	15.07	10.00	1748	2.62
3	48 (23.30)	0.99	0.99	1.00	147.27	122.00	7216	10.83
4	22 (10.68)	1.00	0.99	1.00	1155.23	986.50	25415	38.13
5	10 (4.85)	1.00	1.00	1.00	2531.50	2547.50	25315	37.98

Appendix B2: Classification of Countries/Territories into Terrorism Trajectory Groups, Total Attacks

Group1	Group 2	Group 2	Group 2	Group 2	Group 3	Group 3	Group 4	Group 5
Afghanistan Bangladesh	Andorra Antigua & Barbuda Armenia	Eritrea Estonia	Polynesia Caledonia	Suriname Swaziland	Albania Angola	Netherlands Nigeria	Algeria Argentina	Colombia France
Indonesia	Falkland Island	Malaysia	Malaysia	Taiwan	Australia	Panama	Bosnia- Herzegovina	India
Kashmir Nepal	Fiji Finland	Maldives Mali	Maldives Mali	Tanzania Togo	Austria Belgium	Papua New Guinea Portugal	Burundi Chile	Israel Northern Ireland
Rwanda Soviet Union	French French Guiana	Malta Mar, Isle Martinique	Malta Mar, Isle Martinique	Tonga Trinidad/Tobago	Bolivia Brazil	Puerto Rico Saudi Arabia	Corsica France El Salvador	Pakistan Russia
Thailand West Bank/ Gaza	Gabon Gambia	Mauritania Mauritius	Mauritania Mauritius	Tunisia Turkmenistan	Cambodia Canada	Sierra Leone Somalia	Germany Greece	Spain Sri Lanka
Yugoslavia	Ghana	Moldova	Moldova	United Arab Emirates	China	Sudan	Guatemala	Turkey
	Gibraltar Grenada	Mongolia Morocco	Mongolia Morocco	Uzbekistan Vanuatu	Costa Rica Croatia	Sweden Switzerland	Herzegovina Iran	
	Guadeloupe	Namibia New Zealand	Namibia New Zealand	Vietnam Virgin Islands US	Cyprus Dominican	Syria Uganda	Italy Lebanon	
	Guinea	Niger North Korea	Niger North Korea	Wallis & Futuna Western Sahara	Ecuador Egypt	Ukraine Uruguay	Nicaragua Peru	
	Hong Kong	North Yemen	North Yemen	Western Samoa	Ethiopia	Venezuela	Philippines Serbia- Montenegro	
	Hungary Iceland	Norway Palau	Norway Palau	Zaire Zambia	Georgia Haiti	Yemen/Zimbabwe	South Africa Tajikistan	
	Ivory Coast Jamaica	Paraguay Poland	Paraguay Poland		Honduras Iraq		United Kingdom United States	
	Kazakhstan	Qatar	Qatar		Ireland Japan			
	Laos	Rep. of Cabinda	Rep. of Cabinda		Jordan Kenya			
	Latvia	Romania	Romania		Kuwait			
	Lesotho	Senegal Seychelles	Senegal Seychelles		Macedonia			
	Liberia	Singapore	Singapore		Mexico			
	Libya	Slovak Republic	Slovak Republic		Mozambique			
	Lithuania	Slovenia	Slovenia		Myanmar Republic			
	Luxembourg	South Korea	South Korea		Republic Republic			
	Macao	South Vietnam	South Vietnam					
	Madagascar Malawi	South Yemen St. Kitts/Nevis	South Yemen St. Kitts/Nevis					

Appendix B3: Classification of Countries/Territories into Terrorism Trajectory Groups, Attributed Attacks

Group 1	Group 2	Group 2	Group 2	Group 2	Group 3	Group 4
Afghanistan	Albania	East Timor	Luxembourg	Sierra Leone	Angola	Algeria
Bosnia-Herzegovina	Andorra	Ecuador	Macedonia	Singapore	Argentina	Chile
Burundi	Antigua & Barbuda	Eritrea	Madagascar	Slovak Republic	Bangladesh	Colombia
	Armenia	Ethiopia	Malawi	Somalia	Cambodia	El Salvador
Honduras	Australia	Falkland Islands				
Rwanda	Austria	Fiji	Malaysia	South Korea	Corsica France	France
		French Guiana	Mali	Soviet Union	Egypt	Germany
Uganda	Azerbaijan	French Polynesia	Malta	St Kitts & Nevis	Greece	India
Uruguay	Bahrain	Gabon	Martinique	Sudan	Guatemala	Israel
West Bank/Gaza	Barbados	Gambia	Mauritania	Suriname	Iran	Italy
	Belarus	Georgia	Mexico	Swaziland	Kashmir	Nicaragua
	Belgium	Ghana	Morocco	Sweden	Lebanon	Northern Ireland
	Belize	Guadeloupe	Namibia	Switzerland	Mozambique	Ireland
	Bolivia	Guinea	Nepal	Syria	Myanmar	Peru
	Brazil	Guyana	Netherlands	Taiwan	Pakistan	Philippines
	Brunei	Haiti	New Caledonia	Tajikistan	South Africa	Spain
	Bulgaria	Hong Kong	New Zealand	Tanzania	Turkey	Sri Lanka
	Cameroon	Hungary	Niger	Thailand	United Kingdom	
	Canada	Iceland	Nigeria	Togo	United States	
	Cayman Islands	Indonesia	North Korea	Trinidad & Tobago	West Germany	
	Central African Republic	Iraq	North Yemen	Tunisia		
	Chad	Ireland	Norway	Ukraine		
	China	Ivory Coast	Panama	United Arab Emirates		
	Comoros	Jamaica	Papua New Guinea	Uzbekistan		
	Congo	Japan	Paraguay	Vanuatu		
	Costa Rica	Jordan	Poland	Venezuela		
	Croatia	Kazakhstan	Portugal	Western Sahara		
	Cuba	Kenya	Puerto Rico	Yemen		
	Cyprus	Kuwait	Qatar	Yugoslavia		
	Czech Republic	Laos	Romania	Zaire		
	Czechoslovakia	Lesotho	Russia	Zambia		
	Denmark	Liberia	Saudi Arabia	Zimbabwe		
	Djibouti	Libya	Senegal			
	Dominican Republic	Lithuania	Serbia-Montenegro			
	East Germany		Seychelles			

Appendix B4: Classification of Countries/Territories into Terrorism Trajectory Groups, Fatal Attacks

Group 1	Group 2	Group 2	Group 2	Group 2	Group 2	Group 3
Afghanistan	Albania	Denmark	Iraq	Niger	Trinidad & Tobago	Algeria
Bangladesh	Angola	Djibouti	Ireland	Nigeria	Tunisia	Colombia
Burundi	Antigua & Barbuda	Dominican Republic	Italy	North Korea	Turkmenistan	Guatemala
El Salvador	Argentina	East Germany	Ivory Coast	North Yemen	Uganda	India
Kashmir	Armenia	East Timor	Jamaica	Norway	Ukraine	Israel
Nepal	Australia	Ecuador	Japan	Palau	United Arab Emirates	Lebanon
Nicaragua	Austria	Egypt	Jordan	Panama	United Kingdom	Pakistan
Northern Ireland	Azerbaijan	Equatorial Guinea	Kazakhstan	Papua New Guinea	United States	Peru
Russia	Bahamas	Eritrea	Kenya	Paraguay	Uruguay	Philippines
Rwanda	Bahrain	Estonia	Kuwait	Poland	Uzbekistan	South Africa
Spain	Barbados	Ethiopia	Kyrgyzstan	Portugal	Venezuela	Sri Lanka
Tajikistan	Belgium	Fiji	Laos	Puerto Rico	Vietnam	Turkey
Thailand	Belize	Finland	Latvia	Qatar	Virgin Islands US	
West Bank/Gaza	Bermuda	France	Lesotho	Romania	West Germany	
	Bolivia	French Guiana	Liberia	Saudi Arabia	Western Sahara	
	Bosnia-Herzegovina	French Polynesia	Libya	Senegal	Yemen	
	Botswana	Gabon	Lithuania	Serbia	Yugoslavia	
	Brazil	Gambia	Macao	Serbia-Montenegro	Zaire	
	Bulgaria	Georgia	Macedonia	Sierra Leone	Zambia	
	Burkina Faso	Germany	Madagascar	Singapore	Zimbabwe	
	Belarus	Ghana	Malawi	Slovak Republic		
	Cambodia	Gibraltar	Malaysia	Slovenia		
	Cameroon	Greece	Mali	Somalia		
	Canada	Grenada	Malta	South Korea		
	Central African Republic	Guadeloupe	Mauritania	South Vietnam		
	Chad	Guam	Mexico	Soviet Union		
	Chile	Guinea	Moldova	Sudan		
	China	Guyana	Mongolia	Suriname		
	Congo	Haiti	Morocco	Swaziland		
	Corsica	Honduras	Mozambique	Sweden		
	France	Hong Kong	Myanmar	Switzerland		
	Costa Rica	Hungary	Namibia	Syria		
	Croatia	Iceland	Netherlands	Taiwan		
	Cuba	Indonesia	New Caledonia	Tanzania		
	Cyprus	Iran	New Zealand	Togo		