TERRORIST GROUP BRUTALITY AND THE EMERGENCE OF THE ISLAMIC STATE (ISIS)

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We assess the certainty with which terrorist groups can repeatedly inflict fatalities in terrorist attacks. A terrorist group is particularly dangerous that can inflict higher levels of fatalities with more certainty than other groups. We develop a fatalities–to–variability (*F*-*V*) measurement statistic to shed some light on the risk-adjusted brutality of terrorist groups. A relatively high *F*-*V* ratio indicates that a terrorist group demonstrates a capability to inflict fatalities with less variable outcomes across attacks than other groups. An increasing *F*-*V* ratio indicates an enhancement of this capability. Terrorist groups observed to be increasing the *F*-*V* ratio of their actions may be special cause for concern, especially when *F* increases concomitant with decreases in *V*. We compute the *F*-*V* statistic for every terrorist group that was active during the period 2000 to 2008. We assess the results and compare the relative brutality of terrorist groups. We examine several prominent cases including Algerian terrorism, Al-Qa`ida, the Taliban, the Lord's Resistance Army (LRA) and the Islamic State (ISIS). ISIS has been accorded considerable attention recently. However, its emergence as a terrorist group with a relatively high *F*-*V* ratio can be traced to as early as 2007.

Key Words: terrorism, terrorist, terrorist group, risk, brutality, capability, transitory, persistent, fatalities, Algeria, Al-Qa`ida, Taliban, Lord's Resistance Army, LRA, Islamic State, ISIS.

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I. Introduction

Each terrorist attack method is characterised by an expected number of injuries and fatalities and a level of variability that makes it more or less likely that the actual outcome will be different from that which was expected. Because of this variability or risk, it is difficult for terrorist groups to consistently inflict a level of fatality and injury. However, some groups will demonstrate an ability to inflict fatalities and injuries with less variability over time than other terrorist groups and, more worryingly, some groups will demonstrate an ability to inflict increasing numbers of fatalities and injuries over time with stationary or decreasing variability. In this paper we introduce the fatalities-to-variability (*F*-*V*) ratio. The *F*-*V* ratio is the ratio of average fatalities inflicted per unit of variability over time[1]. A relatively high ratio implies that the terrorist group inflicts a higher average number of fatalities per unit of risk than other groups. A relatively high ratio signals relatively superior capability. An increasing ratio signals an improving capability. An increasing ratio driven by increases in average inflicted fatalities signals enhanced brutality. A group whose actions are characterised by enhanced capability and enhanced brutality undertakes its actions expecting to inflict more fatalities with a higher degree of certainty than before. Early identification of such groups is important.

This paper contributes to the terrorism studies literature, including economics (Landes 1978, Sandler et al. 1983, Im et al. 1987, Enders et al. 1992, Enders and Sandler 2002, Frey and Leuchinger 2003, Sandler and Arce 2003, Sandler and Enders 2004, Siqueira and Sandler 2006, Barros, Proenca, Faria and Gil-Alana 2007, Llussa and Tavares 2008, Phillips 2009, Brandt and Sandler 2010, Schneider et al. 2010, Kollias et al. 2011; Freytag et al. 2011 Kis-Katos et al. 2011, Santifort, Sandler and Brandt 2013)[2], psychology (Victoroff 2005), sociology (Turk 2004), critical studies (Jarvis 2009) and political science (Crenshaw 1981, Pape 2003 and 2005, Cronin 2006, Hoffman 2006 and Abrahms 2006, 2008, 2011). As the diversity of this literature shows, the terrorism context is complex and presents a number of theoretical and analytical challenges. The *F*-*V* ratio developed in this paper encompasses at least several important aspects of the terrorism context in a single statistic. The *F*-*V* ratio may prove to be useful when used in conjunction with other analytical results and investigative and counter-terrorism processes to help identify terrorist groups that appear to be more capable than others at inflicting fatalities and injuries through acts of terrorism. This contribution to the literature will be a worthwhile one if it assists law enforcement agencies to complete this identification process *before* superior relative capability becomes improving capability and, most importantly, before superior capability is combined with enhanced brutality.

II. Terrorism: Average Fatalities and Variability of Outcomes

For each attack method, there is a generally positive relationship between the average number of inflicted fatalities and the variability (standard deviation) of the outcomes. The data for individual attack methods is presented in Table 1. Not surprisingly, there is a positive relationship between the average fatalities a terrorist

[1] Formally, $\frac{F}{\sigma}$, where F is the average number of fatalities per attack and σ is the standard deviation of those outcomes over time.

[2] Recent surveys of the economic analysis of terrorism have been undertaken by Intriligator (2010) and Sandler (2011).

group inflicts by its (aggregated) actions and the variability of those fatalities over time. In 2008, for example, there were 106 terrorist groups that inflicted one or more fatalities. The five groups with the highest average number of fatalities across the twelve months of 2008 and five groups with a lower average number of fatalities across the twelve months of 2008 are listed in Table 2. The groups with the highest average also experienced the highest amount of variability in the outcomes of their terrorist actions. The monthly correlation between the monthly average fatalities inflicted by each group and the level of monthly standard deviation that characterised the outcomes of the group's terrorist actions was 0.90 in 2008.

Table 1

Average Fatalities and Risk: Terrorist Attack Methods 2000 to 2008

Attack Method	**Armed Assault**	**Assassination**	**Bombing**	**Hostage Taking**	**Hijacking**
Monthly Standard Deviation	2.29	1.49	2.81	1.47	4.92
Monthly Average Fatalities	4.18	1.69	3.49	0.7348	0.8981
Monthly Variance	5.26	2.22	7.92	2.17	24.27
Annual Standard Deviation	7.94	5.16	9.75	5.10	17.06
Annual Average Fatalities	50.22	20.37	41.97	8.81	10.77

Notes: Table 1 shows the average fatalities inflicted by the five most common attack methods deployed in violent terrorist attacks. The data cover the period 2000 to 2008. The source of the data is the Global Terrorism Database (GTD). The GTD operates a different classification scheme to RAND. Because we wish to avoid the problem of weighting injuries and fatalities equally, injuries have been excluded. It should also be noted that Table 1 includes all terrorist attacks. Unlike the RAND database, it is not exclusively focussed on transnational terrorism. The data reflect attacks, for example, within Iraq that resulted in fatalities only to Iraqis and not to foreign nationals.

Table 2

Average Monthly Fatalities and Risk: Terrorist Groups 2008

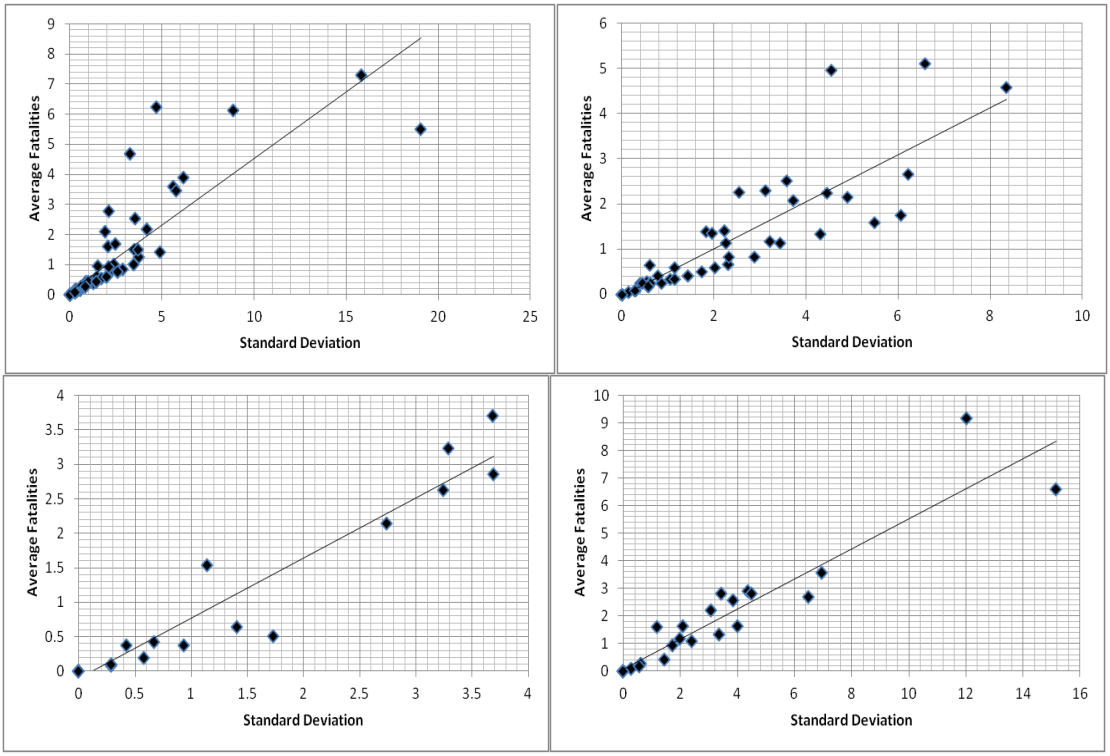
Terrorist Group	**Average Fatalities Per Month**	**Risk (Standard Deviation)**
Justice and Equality Movement (JEM)	12	38.527
Al-Qa`ida	5.875	14.058
Lord's Resistance Army (LRA)	5.739	10.811
Islamic State of Iraq (ISI)	7.451	10.340
Deccan Mujahideen	2.178	7.546
Caucasus Emirate	0.333	0.888
Terai Army	0.306	0.870
Madhesi People Rights Forum (MPRF)	0.250	0.866
Ogaden National Liberation Front (ONLF)	0.250	0.866
Basque Fatherland and Freedom (ETA)	0.308	0.861

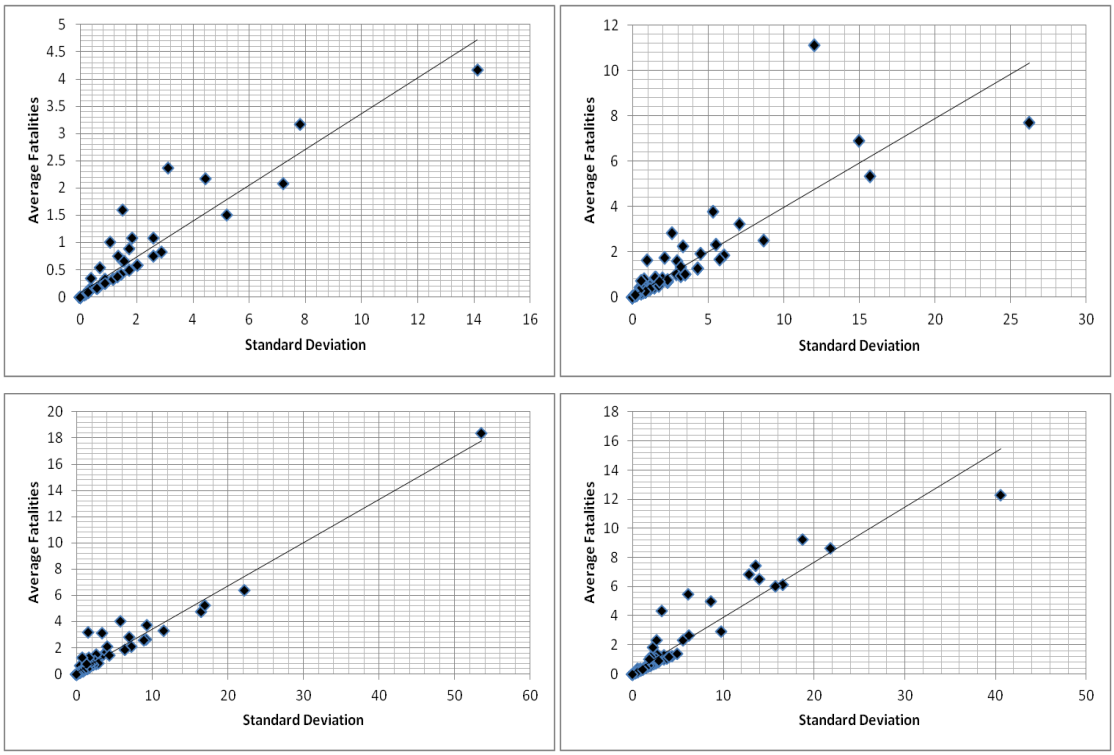
The aggregated data for all groups, presented in Figure 1, shows a positive relationship in each year between average inflicted fatalities and the variability of the outcomes. In years when the trend line is steeper, terrorist groups in aggregate have inflicted more fatalities per unit of variability. This fatalities-to-variability ratio reflects innovations over time in average terrorist capability and innovations in the terrorism context including

the actions, reactions and precautions of law enforcement agencies. Between 2000 and 2001 there was a 30 percent decline in the average number of fatalities per unit of variability or risk. That is, terrorist groups were able to inflict one-third fewer fatalities at any given level of risk than in the previous year. This capability improved considerably in 2002 and experienced a small decline in 2003. Further increases in terrorist capability are evident during subsequent years. In 2004, average terrorist capability increased by 64 percent. This was followed by a 25 percent decline in 2005, a 45 percent increase in 2006 and declines of 17 percent and 7 percent respectively in 2007 and 2008. Throughout all of these years, terrorist groups were able to inflict 0.40 fatalities per unit of variability or risk. In general, the period 2000 to 2008 was characterised by an initial curtailment in the capability of terrorist groups which is reflected in a decline in the aggregated *F-V* ratio. Subsequently, terrorist groups demonstrated an improved capability to inflict fatalities per unit of risk with intermittent declines. If we measure risk in terms of the variability of the fatalities that result from terrorist actions, we find that there is a positive relationship between risk and the average number of fatalities that can be expected to result from any given deployment of an attack method. What is more, this relationship is persistent over time and it is pervasive whether the focus of the analysis is the attack method choice, the terrorist group's record of violence or the aggregate of terrorist actions. The *F-V* ratio does, however, vary considerably among terrorist groups. Some groups dominate others and inflict a higher average number of fatalities than other groups while experiencing a lower amount of variability (see Sharpe 1966, p.123). The analysis presented in the next section examines the relative capability of terrorist groups. This is accomplished by analysing the *F-V* ratios of each individual terrorist group active at any time between 2000 and 2008.

Figure 1

Average Fatalities and Variability: All Active Terrorist Groups 2000 to 2007





III. *F-V* Ratios: Individual Groups 2000 to 2008

Some terrorist groups have been able to inflict a higher number of fatalities with less variability of outcomes over time than other terrorist groups. For terrorist groups that have operated more or less continuously throughout the period 2000 to 2008 it would be very interesting to know if this feature of the terrorism context reflects relatively superior capability, including better planning and resourcing or whether instances where some terrorist groups have been able to inflict more fatalities with less variability of outcomes over time than their counterparts simply reflects transitory factors, luck and circumstance. Terrorist groups that are persistently able to inflict an average number of fatalities that is higher than other groups whilst bearing the same or a lower amount of variability in the outcomes of their actions over time may be demonstrating a superior capability to inflict fatalities. Not only are the attacks perpetrated by such groups expected to inflict some number of fatalities, they are expected to do so with greater certainty. The first step to distinguishing between these two possibilities is to examine the fatalities-to-variability ratios of each terrorist group in each year and determine whether or not relatively superior capability in any given year persists over time. This attempt is analogous to the risk-reward ranking methodologies developed for use in financial economics by Sharpe (1966), Treynor (1965) and Jensen (1968).

In each period, the relative capability of terrorist groups can be measured and ranked according to the *F-V* ratios that characterise individual terrorist groups. Over time, persistently superior relative capability is more likely to be due to superior planning and organisation. For each terrorist group we determine the average fatalities inflicted per attack in each month and the variability of those inflicted fatalities for every incident recorded in the period January 2000 to December 2008. We then compute the *F-V* ratio for each individual terrorist group for each year and track the ratios over time to determine whether the higher average number of risk-adjusted

fatalities that characterises the outcomes of some groups' actions in some periods is persistent. The dataset for the analysis is the monthly record of each terrorist incident recorded by the Global Terrorism Database (GTD) for the period January 2000 to December 2008. There were 416 terrorist groups involved in the perpetration of acts of armed assault, assassination, bombing, hostage-taking and hijacking during this period. Each year the number of groups involved in the perpetration of these acts of terrorism is a subset of the total 416 groups. This data is presented in Table 3.

Table 3

Number of Terrorist Groups Involved in Acts of Violence Each Year

Year	Number of Groups Involved in Acts of Violence
2000	103
2001	26
2002	95
2003	26
2004	67
2005	111
2006	99
2007	99
2008	165

In the set of tables below, we list those terrorist groups that had the highest *F-V* ratios in each year between 2000 and 2008. The annual lists are different each year with few exceptions. In most years, the terrorist groups that inflicted the highest average number of fatalities per unit of risk do not exhibit a capability to do so consistently over time. These groups move down the list of rankings and are superseded by other terrorist groups. Overall, there is very little correlation in the *F-V* ratios over time. However, there are some exceptions. These exceptions require further investigation because they represent the relatively small number of terrorist groups that not only inflict a higher average number of fatalities per unit of risk but who manage to do so consistently over time. These groups maintain a relatively high *F-V* ratio over time. In some cases, terrorist groups demonstrate improved capability over time. These groups not only maintain a relatively high *F-V* ratio but increase their *F-V* ratio with each passing year.

The first case that we shall highlight is that of the Taliban. No recorded fatality is attributed to the Taliban before 2003. From 2003 onwards, the Taliban inflicted a higher average number of fatalities per unit of risk than the majority of terrorist groups and demonstrated a tendency to improve the deadliness of its attacks per unit of risk throughout 2003 to 2006 without increasing the variability of the outcomes of those attacks. In fact, the Taliban was able to decrease the variability of the outcomes of its attacks. In 2005, 2006 and 2007, the Taliban inflicted a higher average number of fatalities per unit of risk than all other terrorist groups. However, by 2007 the Taliban's *F-V* ratio had passed its peak and was in decline as the variability of the outcomes of the Taliban's attacks finally began to rise. Although the Taliban remained a relatively formidable threat, in 2008 its ability to

inflict a high average number of fatalities per unit of risk had fallen relative to its previous recorded fatalities-to-variability ratio and it had been superseded by other terrorist groups. The way the Taliban's *risk-adjusted* average inflicted fatalities moved up and down over time no doubt reflects the group's engagement in Afghanistan, the group's apparent ability to enhance the execution of its attacks over time and, ultimately, the effectiveness over time of counter-terrorism efforts and the influence of the other factors that are known to affect a terrorist group's life cycle.

The second is the case of political violence and terrorism in Algeria. This is something that has been studied and written about comprehensively within the terrorism studies and conflict resolution literature over a number of years. For example, see Testas (2001) and Miller (2007). The fatalities-to-variability ratios and the rankings of all terrorist groups contribute another dimension to the ongoing study of terrorism in Algeria. The Global Terrorism Database lists both the Algerian Islamic Extremists and the Armed Islamic Group (GIA). The GIA inflicted an average of 0.63 fatalities per unit of variability in 2000. This had increased to 0.81 by 2003 but was followed by a precipitous fall to 0.28 in 2004 which placed the GIA equal last among active terrorist groups for that year. There was an increase to 0.42 in 2005 before the group's ratio finally settled at 0.00 for the remainder of the period. The 'Algerian Islamic Extremists' were more consistently present among the those groups with the highest *F-V* ratios but the decline, when it came, was precipitous from a peak of 1.48 fatalities per unit of variability in 2006 to 0.00 the very next year where it remained through 2008. Before their respective declines both groups demonstrated more than usual persistence in their ability to inflict fatalities per unit of risk.

The third is the case of the group known as Islamic State (IS) and its earlier forms, including the Islamic State of Iraq and the Levant (ISIL), Islamic State of Iraq and Syria (ISIS)[3] and the Islamic State of Iraq (ISI). This group has recently been accorded considerable attention. However, its emergence as a terrorist group with a relatively high *F-V* ratio can be traced to as early as 2007 when ISI was ranked 10th among the approximately 100 groups that were active in that year. Its *F-V* ratio was 0.54. This subsequently increased to 0.72 the next year, an increase of 37 percent. Although there was a small decline—to 0.60 in 2009 and 0.54 in 2010—in the next two years, ISI maintained a relatively high *F-V* ratio throughout the period 2007 to 2010. Then, in 2011, the *F-V* ratio increased significantly to 1.47. This is among the highest *F-V* ratios recorded by any group for the entire period since 2000. Furthermore, it was achieved with both a significant increase in brutality—average fatalities per attack were more than double the previous year—and a decrease in the variability of outcomes. By 2011, ISI could expect to inflict a higher number of fatalities per attack and, what is more, could expect to do so with more certainty. In 2013[4], ISIL continued to maintain a relatively high *F-V* ratio of 0.76. Compared to ISI in 2011, ISIL in 2013 inflicted fatalities with much more certainty (less variability). However, the average number of fatalities per attack had fallen considerably. ISIL has not demonstrated a capability to decrease the variability of the outcomes of its attacks without decreasing the average of those outcomes. This is perhaps the first indication of a diminished capacity to maintain the relatively high capability the group has, in its various forms, managed to maintain for a number of years. Maintaining a high *F-V* ratio has proven to be impossible for all other groups.

[3] It is by the acronym 'ISIS' that the group appears to be most commonly referred to at the time of writing.
[4] The GTD does not report data for ISIS. It does not report data for ISI or ISIL for 2012.

Table 4

Terrorist Groups and *F-V* Ratio Rankings: 2000 to 2008

2000		2001		2002		2003	
Liberation Tigers of Tamil Eelam (LTTE)	1.093	Chechen Rebels	1.343	Hamas (Islamic Resistance Movement)	1.430	Algerian Islamic Extremists	1.330
Basque Fatherland and Freedom (ETA)	1.071	Lashkar-e-Taiba (LeT)	1.003	Armed Islamic Group (GIA)	1.324	Armed Islamic Group (GIA)	0.813
Algerian Islamic Extremists	0.890	Hamas (Islamic Resistance Movement)	0.979	Al-Aqsa Martyrs Brigade	1.313	Moro Islamic Liberation Front (MILF)	0.765
Chechen Rebels	0.774	Basque Fatherland and Freedom (ETA)	0.882	Algerian Islamic Extremists	1.078	Chechen Rebels	0.763
National Union for the Total Independence of Angola (UNITA)	0.762	Armed Islamic Group (GIA)	0.810	Abu Sayyaf Group (ASG)	0.767	New People's Army (NPA)	0.721
New People's Army (NPA)	0.734	Hizbul Mujahideen (HM)	0.781	Revolutionary Armed Forces of Colombia (FARC)	0.713	Taliban	0.666
Moro Islamic Liberation Front (MILF)	0.704	Algerian Islamic Extremists	0.772	Lashkar-e-Taiba (LeT)	0.690	Hamas (Islamic Resistance Movement)	0.662
Salafist Group for Preaching and Fighting (GSPC)	0.696	Al-Aqsa Martyrs Brigade	0.623	Lord's Resistance Army (LRA)	0.673	Salafist Group for Preaching and Fighting (GSPC)	0.623
Armed Islamic Group (GIA)	0.634	Abu Sayyaf Group (ASG)	0.449	Al-Qa`ida	0.636	Hizbul Mujahideen (HM)	0.581

2004		2005		2006		2007	
Salafist Group for Preaching and Fighting (GSPC)	1.058	Taliban	1.678	Taliban	2.137	Taliban	1.339
Algerian Islamic Extremists	0.961	Liberation Tigers of Tamil Eelam (LTTE)	1.289	Salafist Group for Preaching and Fighting (GSPC)	1.587	Liberation Tigers of Tamil Eelam (LTTE)	0.893
Maoists	0.881	Salafist Group for Preaching and Fighting (GSPC)	1.087	Algerian Islamic Extremists	1.481	United Liberation Front of Assam (ULFA)	0.883
Liberation Tigers of Tamil Eelam (LTTE)	0.786	Algerian Islamic Extremists	1.015	Liberation Tigers of Tamil Eelam (LTTE)	0.926	Revolutionary Armed Forces of Colombia (FARC)	0.802
Taliban	0.756	Al-Qa`ida in Iraq	0.923	Revolutionary Armed Forces of Colombia (FARC)	0.768	Janatantrik Terai Mukti Morcha (JTMM)	0.659
New People's Army (NPA)	0.591	Kurdistan Workers' Party (PKK)	0.904	Communist Party of India - Maoist (CPI-M)	0.695	New People's Army (NPA)	0.586
Lashkar-e-Taiba (LeT)	0.553	Palestinian Islamic Jihad (PIJ)	0.813	New People's Army (NPA)	0.608	Al-Qa`ida	0.576
Tawhid and Jihad	0.513	Lord's Resistance Army (LRA)	0.706	Baloch Liberation Army (BLA)	0.581	Shining Path (SL)	0.553
Ansar al-Sunna	0.487	Thai Islamic Militants	0.680	United Liberation Front of Assam (ULFA)	0.567	Islamic State of Iraq (ISI)	0.547

2008	
Communist Party of India - Maoist (CPI-M)	1.245
Al-Qa`ida in Iraq	1.179
New People's Army (NPA)	0.990
Liberation Tigers of Tamil Eelam (LTTE)	0.928
Taliban	0.907
Revolutionary Armed Forces of Colombia (FARC)	0.863
Baloch Liberation Army (BLA)	0.726
Islamic State of Iraq (ISI)	0.721
Al-Shabaab	0.651

III. Terrorist Group Emergence, Trends and Momentum

From which previous position in the overall rankings did the highest ranked groups in each year emerge from? Given that it is difficult to maintain a high *F-V* ratio, is there any evidence that terrorist groups track gradually higher through the rankings steadily building capability or do they suddenly emerge? In 2005, for example, of the 9 terrorist groups with the highest *F-V* ratios, 4 groups—Al-Qa`ida in Iraq, the PKK, the PIJ and the Thai Islamic Militants—had not previously been among the highest ranked groups. For example, consider the case of Al-Qa`ida in Iraq. It had no recorded *F-V* ratio before 2004. In 2004 it had a relatively low ratio of 0.28 and a ranking of 18th. Then in 2005 it emerged with a ratio of 0.92 and a ranking of 5th. Although this fell considerably to a ratio of 0.40 and a ranking of 20th in 2006 it increased in 2007 to 0.49 and a ranking of 12th and again in 2008 to 1.17 and a ranking of 2nd. Although many groups emerge suddenly and disappear down the rankings just as quickly, many terrorist groups have emerged for the first time one year only to inflict an even higher average number of fatalities per unit of risk in a subsequent year. Although rank correlation is low because relatively high *F-V* ratios are not persistent over the longer term, superior relative capability, while it lasts, may be a phenomenon that exhibits trend and momentum. To see the trend, if any, in terrorist groups' *F-V* ratios over time, some of those groups that inflicted at least one fatality in at least one month in at least six of the years under consideration were singled out for further analysis.

Figure 2

Abu Sayyaf Group (ASG) and Al-Aqsa Martyrs Brigade

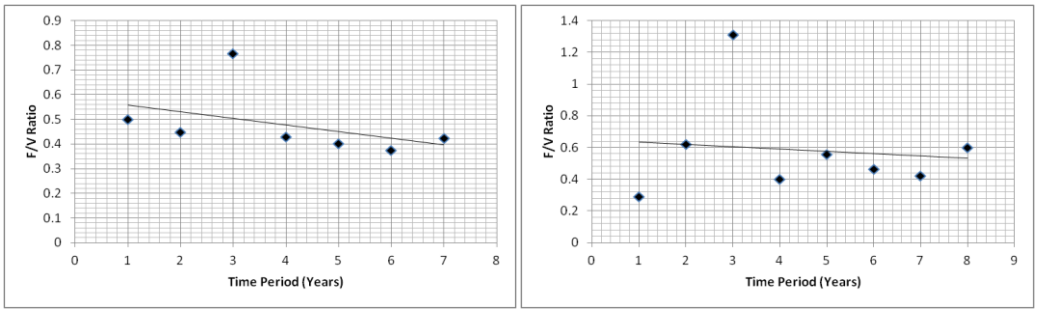


Figure 3

Algerian Islamic Extremists and Al-Qa`ida

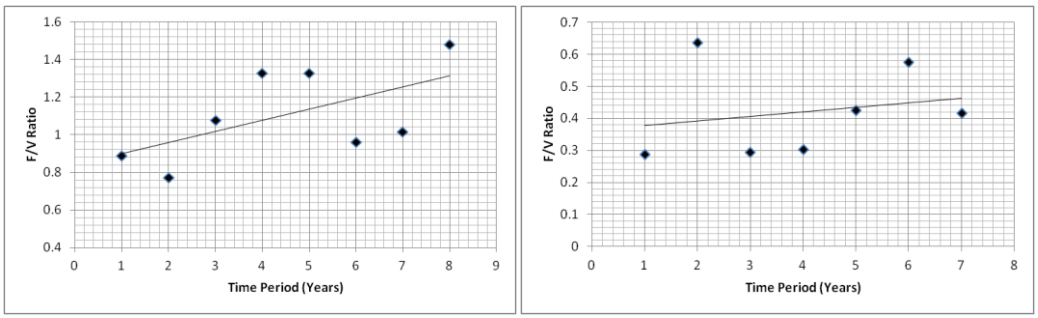


Figure 4

Armed Islamic Group (GIA) and Basque Fatherland and Freedom (ETA)

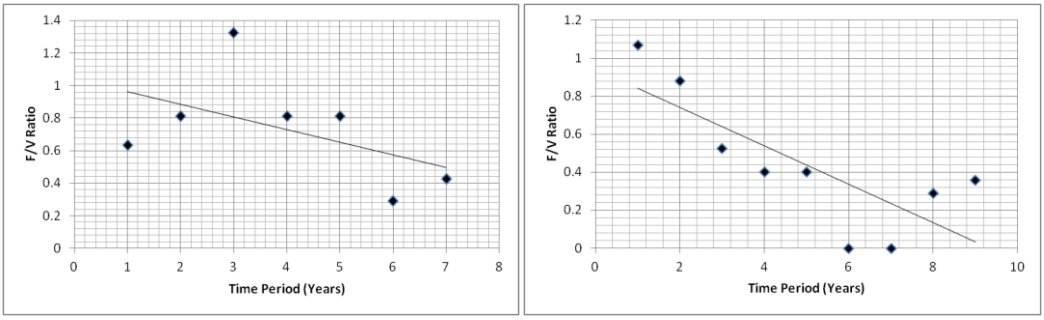


Figure 5

Chechen Rebels and Hamas

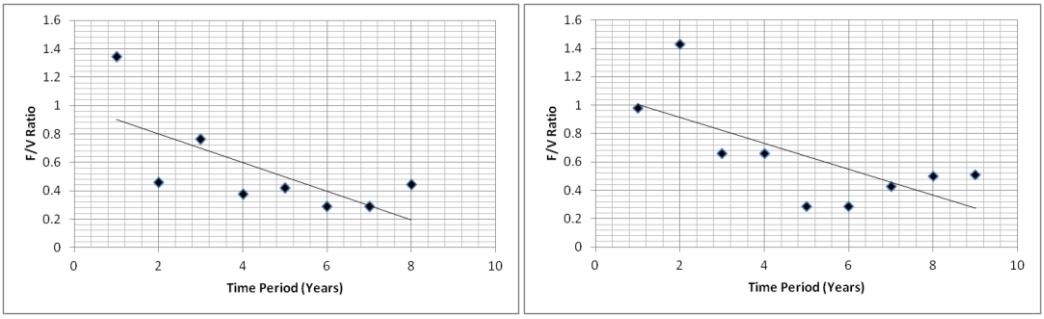


Figure 6

Hizbul Mujahideen (HM) and Kurdistan Workers' Party (PKK)

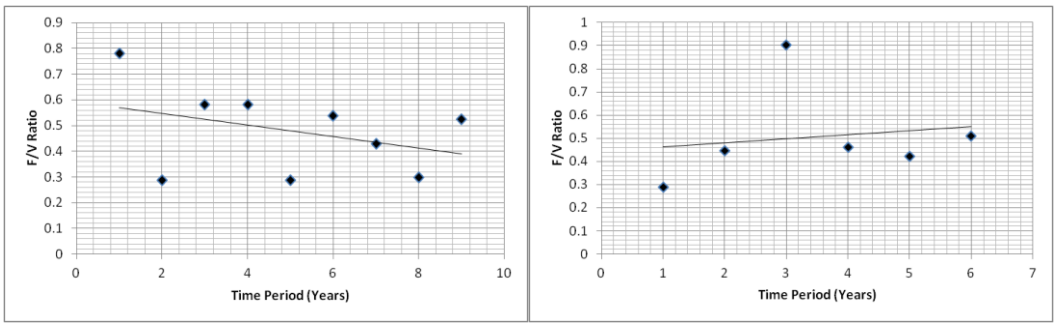


Figure 7

Lashkar-e-Taiba (LeT) and Lord's Resistance Army (LRA)

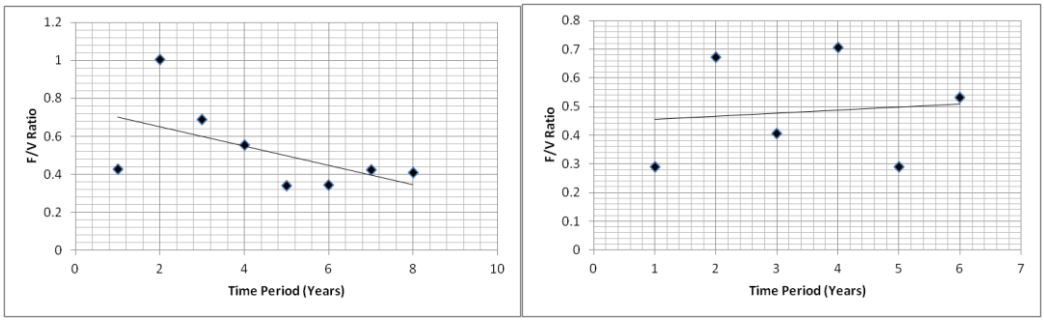


Figure 8

National Liberation Army of Colombia (ELN) and New People's Army (NPA)

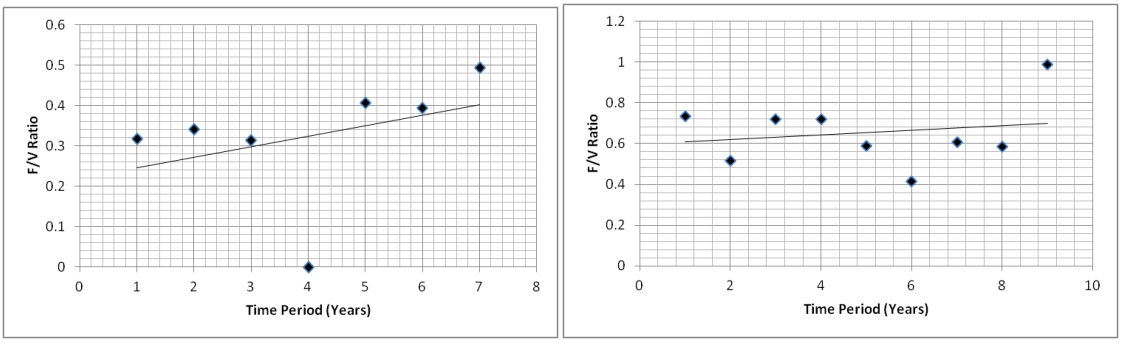


Figure 9

Palestinian Islamic Jihad (PIJ) and Revolutionary Armed Forces of Colombia (FARC)

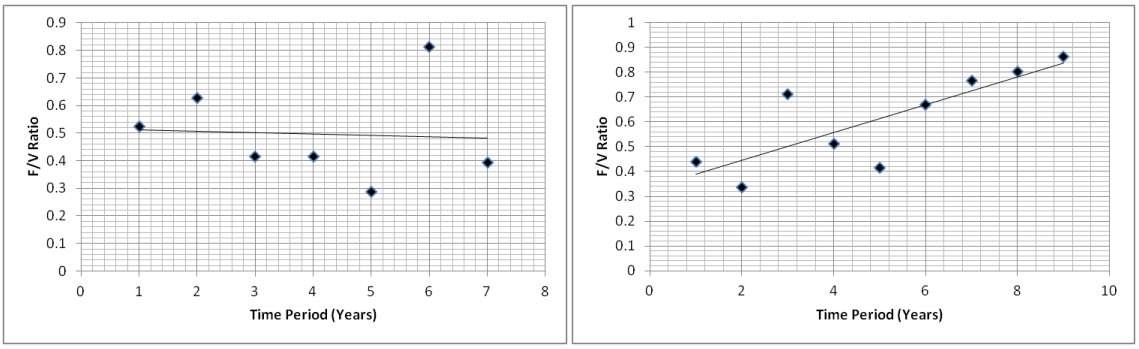
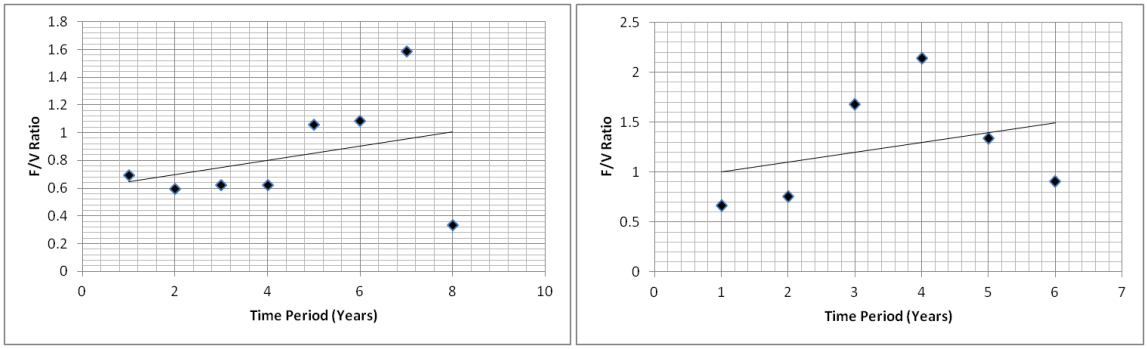


Figure 10

Salafist Group for Preaching and Fighting (GSPC) and Taliban



The *F-V* ratio contains more information than naive averages. For example, FARC exhibits one of the strongest rising trends in a terrorist group's fatalities-to-variability ratio. During this period, the average number of fatalities that the FARC was inflicting in each attack was falling. However, the variability in the number of fatalities that the FARC was inflicting was falling faster. As such, by the early 2000s FARC was demonstrating superior relative capability against the majority of terrorist groups on a risk-adjusted basis. The same pattern is repeated for the Algerian Islamic Extremists. Each attack brought a smaller average expected number of fatalities but this amount was more certain than before. These types of groups may be deserving of close attention because although temporarily bound by the positive trade-off between average outcomes and variability, a capability developed over time to better manage the risk associated with terrorist actions may

enable such groups to increase the scale of attacks in the future without experiencing a commensurable increase in the uncertainty associated with the outcomes. That is, a 'low *F* and low *V*' group may become a 'high *F* and low *V*' group.

The Taliban is representative of the latter type of group. As we know from the discussion presented in the previous section, the Taliban's actions were characterised by a relatively high *F*-*V* ratio over several years during the period 2000 to 2008. Throughout the period, the average number of fatalities that the Taliban was inflicting in each attack shows a tendency to steadily increase. Importantly, however, the Taliban did not bear more variability as time passed but less. Over successive years, the outcomes of the Taliban's attacks came to be characterised by a tendency towards a higher expected average number of fatalities. This increase in average outcomes was not less but more certain by the middle of the decade. Even so, the group found it difficult to maintain a relatively high *F*-*V* ratio. By 2008 the variability or risk characterising the Taliban's attacks had moved sharply higher and the group's fatalities-to-variability ratio fell by enough to see the Taliban superseded by other terrorist groups.

The *F*-*V* ratios of terrorist groups that inflicted at least one fatality in at least one month across at least six of the years 2000 to 2008 exhibited moderate autocorrelation at lag-one. The autocorrelations data is presented in Table 5.

Table 5

Autocorrelation Year-on-Year *F*-*V* Ratio: Lag of One Year

Terrorist Group	Autocorrelation Year-on-Year *F*-*V* Ratio: Lag of One Year	Terrorist Group	Autocorrelation Year-on-Year *F*-*V* Ratio: Lag of One Year
Abu Sayyaf Group	-0.057	Hizbul Mujahideen	-0.223
Al-Aqsa Martyrs Brigade	-0.137	Kurdistan Workers' Party	-0.131
Algerian Islamic Extremists	0.264	Lashkar-e-Taiba	0.275
Al-Qa`ida	-0.383	Liberation Tigers of Tamil	0.349
Al-Qa`ida in Iraq	-0.535	Lord's Resistance Army	-0.83
Armed Islamic Group	0.309	Palestinian Islamic Jihad	-0.451
Basque Fatherland and Freedom (ETA)	0.801	Revolutionary Armed Forces of Colombia	0.46
Chechen Rebels	0.229	Salafist Group for Preaching and Fighting	-0.055
Hamas	0.406	Taliban	0.333

Some groups, those whose *F*-*V* ratios exhibit positive autocorrelation, are more likely to repeat whatever risk-adjusted capability they have demonstrated in one year in the following year. Others, those with negative autocorrelation, are more likely to reverse whatever risk-adjusted capability they have demonstrated in one year in the following year. Negative autocorrelation in the fatalities-to-variability ratio is interesting because it may reveal something about the nature of the engagement of a terrorist group with law enforcement and security

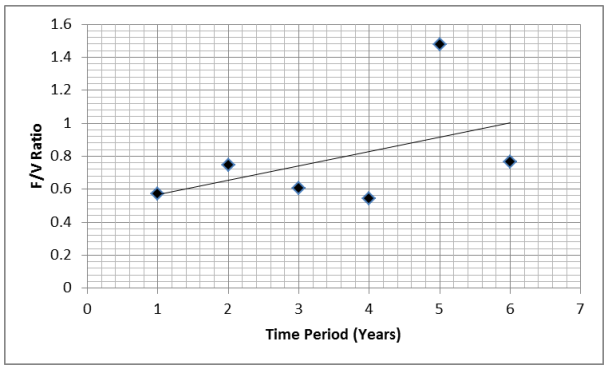
agencies. Positive autocorrelation is interesting because it may reveal something about the nature of momentum in terrorist groups' risk-adjusted capability and it may reveal something about the effectiveness of any law enforcement efforts that have been directed towards a particular group. If the terrorist group has a falling fatalities-to-variability ratio and this decline is correlated year-on-year, it may be reflective of the effectiveness of law enforcement efforts directed towards restricting the group's capability. The opposite may be the case if the terrorist group's fatalities-to-variability ratio is rising with positive correlation year-on-year. In such cases, law enforcement efforts may need to be improved or the resources allocated to such efforts enhanced. Zero or close to zero correlation year-on-year is less often observed than moderately positive or negative autocorrelation.

Of those terrorist groups that are listed in Table 5, the Lord's Resistance Army's (LRA) fatalities-to-variability ratio exhibits the largest autocorrelation of – 0.83. As the data-plot in Figure 7 shows, the LRA's fatalities-to-variability ratio oscillates higher and lower each year, with higher years followed by lower years and vice versa. In a reasonably comprehensive account of the LRA, Kaplan (2007) explains the group's origins in Uganda and the gradual development of violence and murder and kidnapping as a 'way of life'. Interestingly, the group has been characterised as perpetrating 'blind and random' terror, though the utility of the results of such actions for the LRA as a means to achieving its objectives has not been overlooked (Kaplan 2007, p.559). The analysis presented here indicates that 'blind and random' may obscure the efficiency and capability demonstrated by the LRA relative to the majority of other terrorist groups. Although not always ranked among those terrorist groups with the highest fatalities-to-variability ratios in the period 2000 to 2008, the LRA's capability to inflict fatalities per unit of risk showed no signs of declining. Indeed, the oscillations in the fatalities-to-variability ratio may reflect a LRA strategy heightening and lessening its activities periodically over time. Indeed, during the period under consideration both the average number of fatalities per attack per month inflicted by the LRA and the variability in the outcomes of its attacks was increasing in lock-step, indicating a fairly stable positive risk-reward trade-off.

The *F-V* ratio for the Islamic State (IS) exhibits negative autocorrelation at lag one of – 0.211 across the period 2007 to 2013. This reflects the trend that is evident in Figure 11. The group's relative capability to inflict a higher average number of fatalities per unit of risk remains persistently high across the period. Unlike the LRA, the group's relative capability has also remained stable. Although significant momentum is not observed, a generally increasing *F-V* ratio that does not exhibit substantial variation period-to-period places the group in the minority of those that have been able to maintain or increase relative capability over time. The group's average *F-V* ratio for the period is 0.78. When assessed against the aggregate *F-V* ratio data discussed at the beginning of this paper, this places IS/ISIL well above the average for all groups since 2000. This is a position that it has maintained and consolidated in its various forms since 2007.

Figure 11

Islamic State, ISI and ISIL



V. Conclusion

There is a positive relationship between the average number of fatalities inflicted by terrorist groups and the variability in the number of inflicted fatalities per attack. The more fatalities that the terrorist group can expect to inflict, the higher the likelihood that the actual outcomes will be different from that which was expected. Because some terrorist groups dominate others by inflicting a higher average number of fatalities whilst bearing a lower amount of risk or variability, a risk or variability adjusted measure of a terrorist group's relative capability is necessary. In this paper, we measure the relative capability of a terrorist group to inflict fatalities by adjusting the average inflicted fatalities associated with that group by the amount of variability that has characterised the outcomes of the terrorist group's activities. The *F*-*V* ratio permits a ranking of a terrorist group's risk-adjusted capability to inflict fatalities. Naive averages may not be used as the basis for such rankings because they obscure the terrorist group's relative ability to inflict fatalities whilst managing the variability inherent in the deployment of terrorist activities.

The analysis reveals that certain groups have been able to demonstrate superior risk-adjusted capability over time periods of approximately several years. However, evidence that superior relative capability is persistent over longer time periods is difficult to find. The potential uses for the *F*-*V* ratio include the possibility of identifying those terrorist groups that are improving their capability and brutality year-on-year. Even though the average number of fatalities inflicted by a group may be declining, the number that may be expected from any particular attack may be becoming more certain. Of concern are those groups with steadily rising fatalities-to-variability ratios deriving from increasing average inflicted fatalities per attack without commensurate increases in variability. For these terrorist groups, the average number of fatalities that can be expected from any particular attack is becoming both greater and more certain. The early identification of such capability and brutality may guide the efforts of law enforcement agencies.

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