The Lethality of Suicide Terrorism

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Abstract

Many scholars have assumed that suicide terrorism is the most lethal form of terrorism. Lethality is important for the terrorists’ expected ability to coerce target governments and may explain its increasing popularity after the early 1980s. This article statistically analyzes the lethality of suicide terrorism and suicide bombings with 96,649 terror incidents in the Global Terrorism Database. The results corroborate the hypothesis that suicide terrorism inflicts more casualties than other terrorist tactics. However, suicide bombings are not associated with a greater increase in the casualty rates than terrorist tactics involving e.g. the use of firearms. Moreover, the results depend on how well guarded the target state is.
Suicide terrorism increased dramatically after the early 1980s (Pape 2002; Atran 2004). The phenomenon has since then become a major security concern for many states, including those that previously were spared this threat to national security. Consequently, an understanding what causes terrorists to resort to this tactic has become ever more pressing. Many analysts assume that suicide terrorism kills more people than other terrorist tactics, which can be a reason for its popularity. This article presents a statistical analysis of the lethality of suicide terrorism and suicide bombings. It argues that suicide terrorism, which can involve the use of several different weapons, is associated with the greatest increase in lethality. However, suicide bombings do not increase the casualty rates more than other terror tactics such as the use of firearms.

Several explanatory variables have been suggested in the literature. As suicide terrorism became more prevalent so did popular images of the perpetrators as being “evil, deluded, or homicidal misfits” (Atran 2004:73). However, the idea that terrorists in general must be sociopaths or psychopaths has little empirical support (Rasch 1979; Silke 1998; Post and Gold 2002; Post, Sprinzak and Denny 2003; Horgan 2003; Stern 2003; Reuter 2004). Empirical studies even have had difficulty in defining a terrorist profile based on some typical psychological characteristics that drive people to join terrorist groups or to commit terrorist acts (Sageman 2004; Hudson 1999).

Based on interviews with 15 failed Palestinian suicide attackers, Merari (2010:95-96) suggests that suicide bombers are characterized by a high prevalence of depressive and suicidal tendencies. Brym and Araj (2012:432-443), however, counter that this sample was not representative and, based on their interviews with family members and friends, they argue that the real prevalence of depression among suicide bombers is no higher than in the population at large. Araj (2008:285) also argues that terrorist
organizations may have a need to avoid unstable people for reasons of organizational security.

Also environmental predictors of suicide terrorism have been suggested in the literature, including religious and cultural diversity (Berman and Laitin 2006), the rise of political Islam (Crenshaw 2002; Atran 2004; Sageman 2004; Gambetta 2006), and lacking economic development and literacy rates (Khashan 2003; Pedahzur, Perliger, and Weinberg 2003). Pape (2002, 2005) holds that terrorist organizations resort to suicide terrorism in response to foreign occupation by democracies (See Piazza 2008 for a critical view), whereas Bloom (2004, 2005) argues that such operations should be seen in the context of political competition among rivaling groups and as a method in recruitment. Also Kydd and Walter (2002) suggest that suicide terrorism has an “internal” purpose as is can be used to derail peace processes against the wishes of more moderate groups. In a somewhat similar argument, Bueno de Mesquita and Dickson (2007) hypothesize that extremist groups uses violence to provoke a counterterrorism response that will radicalize the population and diminish support for more moderate groups.

**Strategic logic**

It is also possible that there is a strategic logic to suicide terrorism. Inability to match a stronger and better-armed enemy makes a terrorist organization prone to look for new tactics (Sprinzak 2000). For example the head of the Al Qaida faction in Iraq, Al Zarqawi, explains the resort to suicide tactics by arguing that they “faced the strongest and most advanced army in modern times... When the holy warriors noticed this disparity in
numbers and armaments between them and the enemy, they looked for alternatives to amend this deficiency..." (Hafez 2007:121).

In Afghanistan the Taliban also changed their tactics in response to local tactical considerations. A prominent Taliban commander in Kunduz said that in many places in Kunduz, as a result of government pressure, the group had withdrawn its fighters from combat. Their response has been to shift to a reliance on suicide attackers. "Our tactics have changed, and now instead of doing grouped and organized attacks, we prefer the suicide attacks..." In consequence, in many of the attacks, the bombers have managed to penetrate heavy security around their target (New York Times, March 14, 2011, Bomber Kills 36 Outside Afghan Recruiting Center).

In general, it is likely that terrorists do not pick their targets randomly but make rational choices of which targets to strike (Sandler and Lapan 1988; Enders and Sandler 1993, 2006; Sandler and Siqueira 2006). Moreover, suicide tactics allow terrorist groups to attack new and better-defended targets. Berman and Laitin (2008:31) argue that "suicide attacks are reserved for targets which are well enough defended that their destruction is unlikely using conventional means." Suicide terrorism can also be a tactical necessity if it is the only or most reliable way to get a bomb to a target area and then detonate it. For example, the most secure way of delivering a bomb to a target in Israel is usually by carrying it under the clothes of the militant Palestinian, as a bag would be prone to a search by security forces after ethnic profiling. Furthermore, leaving a bag in a public place whilst the attacker escapes would risk arousing the suspicion of bystanders who might flee before detonation.

Sometimes, if a gate or wall protects the target, which often is the case in Iraq and Afghanistan, the most efficient way to reach it is to break through with a truck, which makes it near impossible for the driver to survive. Using a truck also enables the
delivery of a much more powerful explosive device. Moreover, a moving target can make it difficult for the perpetrator to have enough time to leave the scene and ensure an effective explosion.

In the light of these advantages, it is no wonder that one might expect suicide terrorism to be more lethal than other tactics. Pape argues that “suicide attacks are generally more destructive than other terrorist attacks” and likely to “cause maximum damage to the target” (2003: 346). He is not alone in this suggestion. Crenshaw writes in a review essay that suicide attacks are “tactically efficient” (2007:141) and in a recent book she argues further that suicide attacks are “typically more lethal than regular terrorist attacks” (2011:65). Harrison (2006:1) believes that a suicide terrorist “accepts certain death in order to kill with high probability”. And Hoffman and McCormick (2004:249) argue that “suicide attacks, on average, offer a more reliable means of inflicting higher casualties than any other conventional terrorists operation.” Atran (2004:70) too holds that “terrorists are becoming increasingly effective by using suicide attacks...”. Others go further than that. Ganor (2002:5) argues that suicide attacks “create maximum carnage”. And Sprinzak (2000) believes that the tactic “guarantees mass casualties”.

Pape (2002, 2005) presents descriptive data from 1980 to 2001 indicating that suicide terrorism is more lethal than other forms of terrorism. Thus, the literature lacks a comparative analysis of different terror tactics. Moreover, the terms suicide terrorist and suicide bomber are sometimes used interchangeably as most suicide terrorist use bombs. However, it is important to analytically differentiate between the weapon (e.g. a bomb) and whether the attack involved a suicide. This study contributes to the literature on the possible tactical advantages by empirically testing how efficient suicide terrorism and suicide bombings are in terms of lethality. A suicide terrorist is a terrorist who does
not intend to escape from the attack alive. A suicide bomber is a suicide terrorist who uses a bomb. Thus, we have two hypotheses to test:

*Hypothesis 1:* Suicide terrorism inflicts more casualties than other terrorist tactics.

*Hypothesis 2:* Suicide bombings inflict more casualties than other terrorist tactics.

While an attacker who does not intend to escape can be expected to increase the average number of casualties, as he can focus on killing rather than escaping, we should doubt that suicide bombings are more lethal than other terrorist tactics. Neither suicide bombers nor other suicide terrorists need to worry about escaping. Although this advantage gives a suicide bomber access to better-protected targets, in terms of lethality it may be more beneficial to a suicide terrorist who does not use a bomb as he gets more time to kill people with e.g. firearms. Even if suicide bombings were reserved for the most guarded targets, it does not automatically follow that that they cause more casualties than other tactics, e.g. those involving the use of firearms, directed at less guarded targets. Moreover, if hiding a bomb under clothing is the best way of delivery to the target, the capacity of the carrier does pose limits to the size of the explosive device and destructive potential. Since the size of the explosive device carried by the suicide bomber is limited, human bodies, including the bomber, often effectively block shrapnel and reduce the probability of bystanders being killed (Kaplan and Kress 2005:10401).

Large truckloads of explosives are more lethal than e.g. bomb belts but they do not always have to be delivered by a suicide bomber, as it is not always a tactical necessity
for the driver to be in the truck at detonation. On 27 March 2007 in a Tal Afar market, Iraq, the driver remotely detonated a bomb in his truck after having attracted a crowd around the truck with a promise of free flour, killing 152 people. In this case the creation of a crowd around the truck by deceit was all that was needed, rather than a suicide bomb. Indeed, not all local conditions require a suicide terrorist to function as a “human guidance system” (Hoffman and McCormick 2004:249) to deliver the bomb to the target. Thus, we can expect that the impact of suicide bombings is not greater than that of other terrorist tactics and that the second null hypothesis cannot be rejected:

Null hypothesis 1: Suicide terrorism does not inflict more casualties than other terrorist tactics.

Null hypothesis 2: Suicide bombings do not inflict more casualties than other terrorist tactics.

Political motivation

Why should we be interested in the lethality of different terrorist tactics? Especially democracies use all relevant information to improve their counterterrorism efforts and to reduce the number of casualties as they have an interest in protecting their citizens. But the question of lethality is also theoretically important because of the presumed political motivation of terrorists. Pape (2003, 2005) describes suicide terrorism as rational coercion and argues that suicide terror campaigns sometimes have coerced the
target governments to make political concessions to organizations responsible for the attacks. In an effort to identify the causal mechanism of such successful coercion, Pape connects increasing lethality with improving ability to coerce. “The central logic of this strategy is simple: suicide terrorism attempts to inflict enough pain on the opposing society to overwhelm their interest in resisting the terrorists’ demands...” (Pape 2003:346).

Pape has been criticized for sampling on the dependent variable – we cannot know why a group chooses one strategy over another if we look at cases that involve only suicide terrorism (Ashworth et al. 2008). Furthermore, it is possible that Pape exaggerates the strategic success of suicide terrorism (Moghadam 2006), i.e. the coercive outcome. This study analyzes instead the number casualties, which is a theoretically important task because of the assumed connection between lethality and ability to coerce.

A simple Hawk and Dove game can be used to explain this link between the number of casualties and the political motivation behind suicide terrorism. In the game two actors, one a terrorist group and the other its target state, are competing, for example, over a piece of land which is valued at more than 0, i.e. $V > 0$. Many nationally inspired terrorist groups, such as the Tamil Tigers in Sri Lanka, have sought to gain control over a “homeland” territory. Religiously inspired groups like Al Qaeda also often strive to expel some state, be it Israel in Palestine or the US in Afghanistan, from a claimed territory. Indeed, Pape (2003:348) argues that the goal of suicide terrorism is “gaining control of what the terrorists see as their national homeland”. However the struggle can also be about a policy that the terrorist group dislikes.

The two game actors both have the option of being reconciliatory (to be a dove) or conflictual (to be a hawk). For the terrorists the latter means making no political
concessions and continuing with suicide attacks. For the target state it means making no political concessions and pursuing an aggressive counter terrorist strategy. Coercion is successful when the target state opts for reconciliation and gets 0, while the attacking terrorist organization gets V. An aggressive counter terrorist strategy is successful when the target state opts for conflict and gets V, while the terrorist organization pursues reconciliation by giving up suicide tactics and gets 0. The latter case can be the result of rational calculations or being unable to engage in conflict.

Figure 1. Suicide Terrorism and the Strategic Logic of Coercion

<table>
<thead>
<tr>
<th>Target state</th>
<th>Conflict</th>
<th>Reconciliation</th>
</tr>
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<tbody>
<tr>
<td><strong>Terrorists</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conflict</td>
<td>(V/2 - C, V/2 - C)</td>
<td>V, 0</td>
</tr>
<tr>
<td>Reconciliation</td>
<td>0, V</td>
<td>V/2, V/2</td>
</tr>
</tbody>
</table>

It would be best for both actors to be reconciliatory and split the contested land in half and thus get V/2 without incurring the cost of conflict (C).\(^1\) However, since to be dovish may result in the other actor choosing conflict and getting all of the land (V) and the dove getting nothing (0), the logical option for both can be to pursue conflict, i.e.
mutual defection. Thus, rational choice leads both actors to defect from mutual reconciliation as long as $C$ is lower than the value of the land that can be gained through mutual conflict, $V/2$. However, if $C$ exceeds it, i.e. $\frac{V}{2} - C < 0$, mutual conflict is no longer the equilibrium and will be avoided. Choosing reconciliation by not resorting to suicide tactics, even when the target state pursues conflict, is then better than mutual conflict.

The order of preferences depends on the value of $C$. For example, if the target state is very responsive to the electorate’s fears of deadly suicide attacks, which raises the $C$ beyond what can be gained by dividing the land, it will choose to be reconciliatory whilst the terrorists pursue conflict. It gets only 0 but it is still more than what can be gained when $\frac{V}{2} - C < 0$. On the other hand, a successful counter terrorist strategy that weakens the organization can raise the terrorists’ cost of conflict. In general, the cost of death is high and therefore suicide tactics are not the first option of resort. However some beliefs such as those about a martyr’s rewards in the afterlife can make the cost of dying low for the perpetrator. Moreover, suicide bombings have been associated in Palestine with increasing public support for terrorist organizations employing the tactic (Bloom 2004, 2005), and thus the tactic becomes a rational option as $\frac{V}{2} - C > 0$.

We can also consider the relationship between $C$ and $V$. When $C > V/2$ and the cost of conflict is high, e.g. because of lethal suicide attacks, the terrorists’ best move is to opt for conflict and the target state’s best reply is reconciliation, which results in successful coercion. However if the state makes the first move, choosing conflict is its best strategy and the terrorists will do best by choosing reconciliation. Thus, which of the two equilibriums is reached depends on who makes the first move. When the cost of conflict is high, it will be beneficial to make the first move and the target state will benefit from aggressive preemptive counter terrorist policies. If the cost of conflict is the same as
what can be gained through reconciliation, i.e. $C=V/2$, the target state’s expected benefits of being hawkish and dovish are the same. However, if $C<V/2$, the sole equilibrium outcome is mutual conflict no matter who makes the first move. Thus, coercion does not succeed when the cost of conflict is low, e.g. when terror attacks do not inflict many casualties.

However, sometimes even modest increases in the number of casualties can have a great impact on $C$ and the prospects of coercion. If other means have been unable to increase casualty levels from a low baseline, then even modest results from suicide terrorism can have an impact. Similarly, if the baseline casualty level due to other tactics is high to start with, then we can expect a resort to suicide tactics to have less coercive potential and yield lower per-unit returns. The reason for this can be derived from Fechner’s Law in psychophysics, which explains that the magnitude of a subjective sensation increases proportional to the logarithm of the stimulus intensity. In the case of terrorism, the relationship between the lethality of attacks and the prospects of coercion through increasing pain is given by the following equation: $C = K + \ln S$.

$C$ is the subjective sensation of pain, or cost of conflict, that influences the level of response to suicide attacks. $K$ is a constant and we can set it at 1 as even non-lethal attacks can be expected to incite fear that is experienced as pain. $S$ is the intensity of stimulus, i.e. the lethality of terrorist attacks.
Thus, if other tactics have already proven to be lethal, the marginal increase in coercive pain and cost of conflict (C) suffered by the target state due to suicide terrorism will not be great and the high cost of suicide missions will not be worth it. However, if the baseline level is low and other tactics have not been very lethal, even small absolute increases in the casualty rates can lead to great marginal increases in C.

The Hawk and Dove game can be used to analyze how changes in the costs resulting from deadly terrorist attacks affect the prospects of successful coercion of target states. Rather than merely counting possible cases of successful coercion, as Pape (2005, 2005) does, we can now analyze how changes in the lethality of terrorism can impact its potential to coerce. If suicide terrorism inflicts much more casualties than other forms of
terrorism, which many analysts assume, the causal mechanism of coercion can work as Pape suggests. Resort to suicide terrorism can then be explained with its lethality.

**Data analysis**

Not only has the number of terrorist attacks increased dramatically since the 1990s but the number of casualties per attack has also risen. Indeed, the increased lethality of attacks is what seems to differentiate the new from the old terrorism (Masters 2008: 400). In concert, suicide terrorism and suicide bombs have become more widely used and it is tempting to draw the conclusion that such attacks kill relatively more people.

To test the hypotheses that suicide terrorism and suicide bombings are more lethal than other tactics, i.e. trying to escape and using e.g. firearms, I will perform a negative binominal regression analysis on all attacks recorded from 1970 to 2012 in the *Global Terrorism Database (GTD)*. A multivariate analysis makes it possible to differentiate between suicide bombings and suicide attacks. While most suicide attacks involve the use of a bomb, even other weapons such as firearms can be used when the perpetrator does not intend to escape from the attack alive. The GTD is suitable because it includes information about the type of weapons used in an attack. Moreover, *International Terrorism: Attributes of Terrorist Events* data only includes incidents of transnational terrorism, which makes the GTD data more appropriate for the research question that deals with all types of terrorism.

I will exclude the 9/11 attacks as the extremely high casualty rates make them clear outliers. However, for the sake of comparison, I will also report the main results of an
analysis that also includes the 9/11 attacks. Negative binominal regression is suitable for count data with over dispersion in terms of greater variance than what might be expected in a Poisson distribution. As there are a considerable number of terrorist attacks that do not cause any casualties, a zero-inflated negative binomial regression analysis (ZINB) might be an even more appropriate statistical technique. But the drawback is that its two-stage set-up is difficult to interpret and often produces results sensitive to specification of variables (Findley and Young 2011). For the sake of comparison, I will also report the main results of a ZINB analysis in the text.

The unit of analysis is a terrorist attack and the dependent variable is a count of casualties. The GTD includes 104 689 cases, but because of missing data only 96 649 can be analyzed. Since many suicide attacks have occurred in Afghanistan, and even Israel (including Palestine) has been severely struck by roughly equally many terror incidents, I will also analyze these two countries separately. Moreover, Israel is better-guarded target area, whereas Afghanistan is a state where terrorists more easily get access to potential targets, which makes a comparison theoretically interesting.

*Suicide* is coded as 1 if there is evidence that that the perpetrator did not intend to emerge from the attack alive, and otherwise as 0. Suicide tactics are expected to be associated with high casualty rates. *Hijacking* is similarly coded as 1 if the primary objective was to take control of a vehicle for the purpose of diverting it to some destination and achieving some political objective such as the release of prisoners. Since the primary objective of these cases is not to kill many people, this type of attack is expected to be associated with fewer casualties.

The analysis includes six types of weapons or tactical choices, each with a different expected impact on the number of dead, and all coded as binary variables (1 if used, and otherwise as 0): *melee* (a non-projectile, e.g. a knife), *firearms* (a projectile weapon),
bombs, biological weapons (excluded in the analysis of Israel due to a lack of cases), and chemical weapons. Biological and chemical weapons hold the potential to cause mass casualties if skillfully produced and handled. Acquiring the requisite skill levels however, is a severely limiting factor. Neither firearms nor melee require such a level of skill and, due to ease of procurement and use, are expected to cause the death of more people on average than tactics involving the use of biological and chemical weapons. While bombs usually are associated with high casualty rates, they also require a certain level of technical skill and may not always be most efficient if left to explode unattended. Moreover, many bomb attacks have demonstrative aims and seek to avoid many casualties. Suicide bombs, as a form of guided weapon, are expected to be more lethal than other explosives. The combination of suicide delivery and use of an explosive device is controlled for with the binary variable suicide bomb (coded as 1 if used, and otherwise as 0).

Geographic region is another factor that can have an impact on the casualty rates. North America and Europe are well-guarded regions, and Israel (including Palestine) is a well-guarded state, where the security services have a relatively good control over people entering potential target areas. Sophisticated intelligence services also make it more difficult both to plan large scale attacks and obtain large quantities of explosives. Thus, they are expected to be associated with fewer casualties. On the other hand, Africa, South Asia and the Middle East are regions with lower levels of control and can be expected to be associated with more casualties. These variables are coded as binary variables (1 if applicable, and otherwise as 0).

Terrorists are more likely to feel justified in seeking high numbers of victims when the target is military as opposed to civilian. Military target is coded as 1 if the attack targets army units, including recruiting sites, and otherwise as 0. Several terrorists
cooperating can be expected to cause more damage than just one. If more than one terrorist took part in an attack, the event is regarded as a *coordinated attack*, i.e. coded as 1, and otherwise as 0.

Table 1 reports the incidence rate ratio (IRR) that is arrived at by exponentiating the coefficients from the binominal regression analysis of 96,648 cases in the GTD. The IRR represents the change in the casualty rates given a one-unit increase in the explanatory covariate. For the dichotomous covariates the IRR represents the relative rates of casualties for terrorist attacks with a value of 1 relative to attacks with a value of 0 for the covariate. An IRR that is smaller than 1 signifies a decrease in expected counts whereas an IRR greater than 1 reflects an increase.

Table 1. Negative binomial regression analysis - the correlates of casualties in terrorist attacks 1970-2011.

<table>
<thead>
<tr>
<th>Variable</th>
<th>All cases</th>
<th>Israel/Palestine</th>
<th>Afghanistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hijacking</td>
<td>0.853 (0.856)</td>
<td>0.695 (0.519)</td>
<td>1.086 (0.555)</td>
</tr>
<tr>
<td>Suicide</td>
<td>3.160 (0.741)***</td>
<td>3.199 (1.695) **</td>
<td>1.405 (0.825)</td>
</tr>
<tr>
<td>Suicide bomb</td>
<td>2.422 (0.577)***</td>
<td>4.402 (2.395) ***</td>
<td>2.118 (1.256)</td>
</tr>
<tr>
<td>Bomb</td>
<td>0.918 (0.018)***</td>
<td>1.002 (0.126)</td>
<td>1.473 (0.131)***</td>
</tr>
<tr>
<td>Firearms</td>
<td>2.254 (0.044)***</td>
<td>3.351 (0.417) ***</td>
<td>1.661 (1.157)***</td>
</tr>
<tr>
<td>Melee</td>
<td>2.414 (0.105)***</td>
<td>1.853 (0.272) ***</td>
<td>1.436 (0.303) *</td>
</tr>
<tr>
<td>Biological</td>
<td>0.656 (0.316)</td>
<td>6.393 (9.135)</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>1.715 (0.252)***</td>
<td>0.446 (0.503)</td>
<td>0.053 (0.057)***</td>
</tr>
<tr>
<td>Military target</td>
<td>2.438 (0.481)***</td>
<td>1.329 (0.118) ***</td>
<td>1.350 (0.127)***</td>
</tr>
<tr>
<td>Multiple perpetrators</td>
<td>1.269 (0.026)***</td>
<td>2.741 (0.288) ***</td>
<td>1.153 (0.126)</td>
</tr>
<tr>
<td>North America</td>
<td>0.391 (0.018)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>0.316 (0.007)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Israel/Palestine</td>
<td>0.223 (0.010)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East</td>
<td>1.834 (0.035)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africa</td>
<td>3.243 (0.082)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Asia</td>
<td>1.627 (0.029)***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of attacks 96,648

LRTEST \[\chi^2=440,000\] \[\chi^2=1982\] \[\chi^2=8314\]

Note: IRR reported. Standard error in parenthesis. *p<.10; **p<.05; ***p<.01. Calculations made with STATA 11.2.
The results corroborate hypothesis 1, as suicide tactics were associated with an increase in the number of casualties. The rate of lethality increases by a factor of 3.16 if the attacker did not try to escape *ceteris paribus*. And as was expected, rather than increasing casualties, the use of an explosive device decreased them. Many bomb attacks have demonstrative aims and seek to avoid many casualties. However, a suicide bomber more often seeks to increase the number of dead and can deliver the bomb more precisely to the target. Thus, only when used in combination with suicide tactics did the use of an explosive device succeed in increasing the number of dead.

However, it is notable that the IRR for suicide bombings is 2.42. It is a significant increase in lethality, but also the use of firearms (2.25) and melee (2.41) are associated with roughly similar changes in the casualty rates, *ceteris paribus*. The results indicate that the second null hypothesis cannot be rejected: taken together suicide bombings do not cause more casualties than the use of other tactics. In the zero-inflated negative binomial regression analysis the IRR for suicide was still the greatest (3.10) and the impact of firearms decreases to 1.13. But the IRR for suicide bombings (1.24) was not anymore statistically significant, which further corroborates the results. If the 9/11 attacks are included in the negative binomial regression analysis, the impact of firearms remains the same (2.25). However, the incidence rate ratio for suicide increases to 39.99, while suicide bombings become associated with a decrease in lethality (0.19). Such a great change indicates that the 9/11 attacks are a clear outlier and warrants their exclusion.

The IRR for chemical weapons (1.71) points to an increase in the number of casualties, but biological weapons do not have a statistically significant effect. This result suggests that biological weapons may be more difficult for terrorists to produce and handle such that more casualties are inflicted. As expected, attacks against military
targets increase the number of dead by a factor of 2.44. The IRR for a coordinated attack by several perpetrators was somewhat smaller (1.27), but hijackings were associated with a decrease in lethality.

Also the geographic region and the country of an attack had a statistically significant effect. Attacks in Europe, North America and Israel led to fewer casualties, *ceteris paribus*. However, attacks in Africa, the Middle East and South Asia led to an increase in casualties. Attacks in Africa were associated with an incidence rate ratio of 3.24, as compared to just 1.83 and 1.63 in the Middle East and South Asia respectively.

An analysis of only Israel and Afghanistan lead to somewhat different results. In Israel suicide terrorism was associated with an increase in casualties with an incidence rate ratio of 3.20. But more interestingly, the rate of lethality increases by a factor of 4.40 with suicide bombings as compared to only 3.35 with the use of firearms. Thus, suicide bombings had the greatest impact on the casualty rates in Israel. The effect of melee was 1.85 and military target was associated with an incidence rate ratio of 1.33, whereas multiple perpetrators increased the lethality of an attack by a factor of 2.74.

While the effect of suicide was the greatest in Israel, in Afghanistan neither suicide tactics nor suicide bombings had as an impact on the number of casualties. And even if the IRR for bomb and melee were 1.47 and 1.44 respectively, the most efficient terrorist tactic was to use firearms (1.66). Also military target was significantly associated with an increase in lethality with an IRR of 1.35.

In sum, suicide terrorism is associated with the highest casualty rates when analyzing all states. However, suicide bombings are not. The results indicate that the increase in the death toll due to suicide bombings is not greater than when terrorists instead use e.g. firearms. The fact that suicide bombings have been used increasingly during the past decades in Sri Lanka, Palestine, Iraq, Afghanistan and elsewhere since
their emergence in Lebanon does not mean that other methods are unable to achieve equally high casualty rates.

Only in Israel (including Palestine) have suicide bombings increased the casualty rates more than terrorists using e.g. firearms. In Israel most targets are relatively well-protected and difficult to attack, which makes the use of suicide bombings beneficial in terms of increasing casualty rates. In Afghanistan many targets are less protected and easy to attack, which makes a resort to suicide or suicide bombings often unnecessary if the aim is to increase the death toll. A regular bomb or firearms will often do the job without a need for the perpetrator to loose his life.

Israel and Afghanistan present two extreme contrasts, as suicide bombing is the most lethal tactic in the former but neither suicide terrorism nor suicide bombings are associated with high casualty rates in the latter. Even if the incidence rate ratios for both suicide terrorism and suicide bombings point in the expected direction in Afghanistan, they are not statistically significant. Thus, the method of delivering a bomb is not associated with changes in the casualty rates. A possible explanation for this difference is again that in better-guarded areas, such as Israel in this case, suicide bombing is a more efficient way of delivering an explosive device to the target. In less guarded areas, such as Afghanistan, it often becomes an unnecessary waste of resources.

Given the absence of evidence for relatively greater increases in lethality, other than in Israel, we must look for a better explanation of why suicide bombings may be seen as a logical choice for terrorists that seek to coerce the target government. Some possible cases of coercion can be based on suicide bombers’ better ability to attack better-guarded targets, even if the casualty rates do not increase. As a greater variety of targets, including citizens and governmental institutions, become possible to reach, it is easier to spread fear and raise the perceived costs of conflict (C).
The withdrawal of Israel from Lebanon can be possibly explained with the introduction of suicide bombings (Pape 2003) that made terrorist attacks more lethal at least in Israel. Cook (2007:247) argues that the suicide bombings after 1986 did not inflict many casualties and could therefore not have led to the Israeli withdrawal from Lebanon in 2000. But according to Fechner's Law, even small absolute increases in lethality can give rise to a great increase in the subjective sensation of the costs of conflict (C). In the Hawk and Dove game, this increases the prospects of successful coercion of the target state. On the other hand, if the baseline casualty level was already high in Israel due to other tactics, then we can expect the resort to suicide bombings to have had less coercive potential and yield lower per-unit returns.

The empirical results also suggest that possible cases of successful coercion can be explained with a misperception of the relative lethality of suicide bombings. Misperceptions are prevalent in international politics (Jervis 1976) and may influence states’ judgments of the security dilemma in interstate relations (Nilsson 2012). An overestimation of the relative level of lethality can dispose both terrorist organizations to resort to suicide bombings and states to concede in the face of the threat.

It is also possible that suicide bombers can signal a high level of commitment with their willingness to die (Pape 2003). Thus, suicide bombers’ level of commitment and the related difficulty of stopping future attacks makes coercion possible by raising the perceived future cost of conflict. However, in this case the causal variable is suicide rather than suicide bomb.
Conclusion

Popular images of suicide bombers portray them as the most lethal and therefore also the most intimidating terrorists. In general, not intending to escape from an attack alive gives terrorists a tactical advantage, as there is no need to plan for an escape and it is possible to fight to the end with a full focus on killing as many people as possible. However, a suicide bomber's main tactical advantage is to be able to deliver a bomb to a better-protected target, which does not automatically increase the number of casualties.

The results of a negative binomial regression analysis corroborate the hypothesis that suicide terrorism is associated with the greatest number of casualties. This supports the expectations of most scholars and also suggests that suicide terrorism can create more coercive pain as expected by Pape (2003, 2005). However, the empirical analysis did not indicate equally great increases in lethality when terrorists resorted to suicide bombings, i.e. the use of a bomb without the intention of escaping from the attack alive. Thus the hypothesis that suicide bombings inflict more casualties than other terrorist tactics, such as the use of firearms, is rejected. However, Israel and Afghanistan represent extreme cases. Suicide bombers are more lethal than terrorists using other weapons in the former, but neither suicide terrorism nor suicide bombings have a statistically significant impact on the casualty rates in the latter.

Suicide bombers, as is the case with all suicide terrorists, may be more difficult to stop due to the perpetrators’ strong commitment. But if democratically elected leaders and their electorates assume simply that suicide bombers will kill more people than terrorists that use other tactics, they are more likely to give in to the suicide bombers’ demands. Moreover, the terrorists will then probably increasingly resort to the strategy.
Coercion founded on such a misperception would not be a positive development for democracies in their pursuit of national security and legitimate governance.
References


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V/2 is used merely as an example. Terrorist organizations are often weaker than the target state. Thus, also the expected gains can be smaller.