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Modelling the effectiveness of counter-terrorism interventions

Gentry White, Lorraine Mazerolle, Michael D Porter and Peter Chalk

Foreword | *This paper models the connection between the rate of terrorist events and the occurrence of counter-terrorism interventions in order to examine the relative effectiveness of the interventions. Using data from the Global Terrorism Database and information on interventions collected by the authors, model results show that for Indonesia, the Philippines and Thailand, reactive types of interventions, such as arrests, indictments, imprisonments, assassinations and other operational activities show the strongest association with the rate of terrorism incidents over time. Maximum effectiveness—as measured by the number of days after an intervention exhibits its full inhibitory effect on the risk of subsequent terrorist attacks—was found to be greatest in Indonesia and the Philippines (11 days and 8 days respectively) and least effective in Thailand (impacting only on the day the intervention occurred). This paper also examines the number of days after an intervention that the response was able to maintain a high level of effectiveness—17 days in Indonesia, 13 days in the Philippines and one day in Thailand. There were significant differences across these three countries and these results highlight a new approach to conceptualising the interaction between terrorism and counter-terrorism efforts.*

Adam Tomison
Director

After the terrorist attacks in the United States on 11 September 2001, terrorism and counter-terrorism efforts moved to the front of popular consciousness and became the focus of national security for governments worldwide. With this increased attention came an urgent interest in understanding and identifying what works in fighting terrorism (Belasco 2010). For Australia, understanding the relative effectiveness of counter-terrorism efforts in nearby neighbours of Indonesia, Thailand and the Philippines is highly relevant for our country's national security. Indonesia, Thailand and the Philippines are all countries that are important to Australia not just because of geographic proximity, but also because of a history of economic ties and the role these countries play as Australia's regional partners.

Understanding the effectiveness of counter-terrorism efforts requires a conceptual framework for counter-terrorism interventions. The Australian National Counter-Terrorism Plan (NCTP) establishes a framework consisting of four categories of interventions—Legislative and Administrative, Prevention and Preparedness, Response, and Recovery (NCTC 2005). These types of interventions all use theoretically different mechanisms to effect changes in patterns of terrorist activity, which it is proposed, require the development of different analytical tools for assessing the various types of interventions. This paper proposes a new analytic model for assessing the effects of Response category interventions (ie direct responses to terrorist activity or threats, such as arrests, convictions, or materiel seizures). These methods are applied to interventions in Indonesia, Thailand and the Philippines for the period between 2000 and 2007. A database of counter-terrorism interventions categorised using the NCTP framework was created from a systematic search of open-source documents and the results were verified by subject area expert review.

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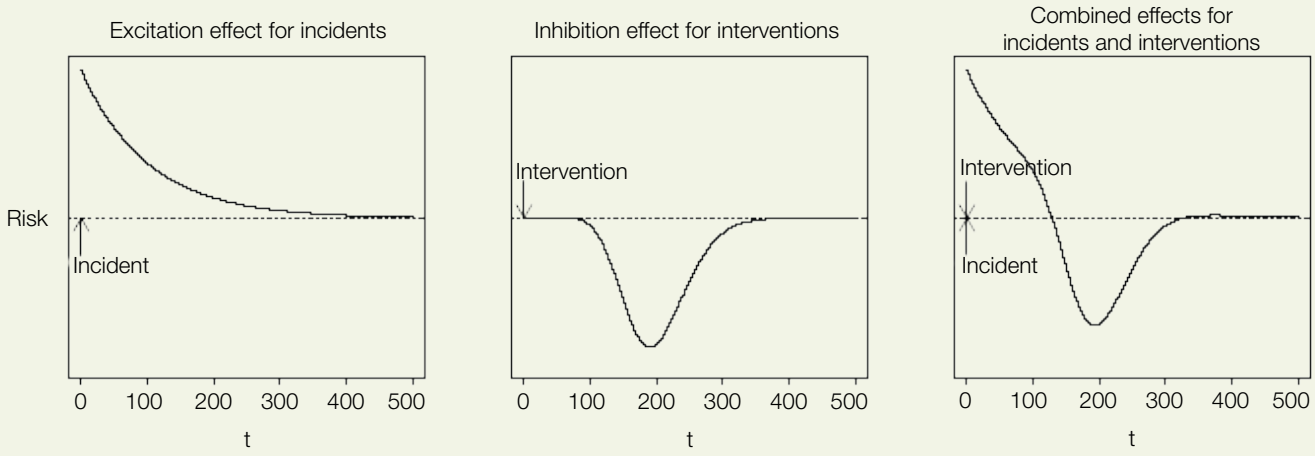
Figure 1 The three graphs (l–r) describe the effect on risk from attack, an intervention and their combined effect



The use of a Hawkes process model to describe the clustering behaviour of terrorist activity is well-established (Porter & White 2012; White, Poerter & Mazerolle 2012); this model was modified to include an additive inhibition term to describe the transient effects of Response-type interventions.

There are three principal hubs of terrorist activity in southeast Asia—Indonesia, Mindanao and the Sulu Archipelago in the Philippines, and the Malay-Muslim provinces of Narathiwat, Yala and Pattani in southern Thailand. These areas host a complex array of terrorist activity, executed by diverse groups who are motivated by a range of ideological and religious beliefs (eg see Chalk et al. 2009 for a detailed analysis). The broad strategic framework for counter-terrorism in these three countries differs significantly and is generally conditioned by assumptions regarding the root causes of violence in the respective countries. In the Philippines, terrorism is regarded mainly as an issue of poverty and economic marginalisation; hence, the thrust of mitigation has been directed at development assistance. In Indonesia, extremist violence is seen to be a product of subverted ideology. Accordingly, counter-measures have been largely aimed at disengagement using religious leaders and elders to discredit radical Islamic rhetoric. In Thailand, by contrast, the assumption is that radicalism emerges from a misunderstanding of the government's efforts to foster a single, unified state based on cultural and religious assimilation, including loyalty to the monarchy and adherence to the Buddhist faith. In this case, the strategic measures for shaping remedial action have focused on 'correcting' Malay–Muslim perceptions through educational, economic and vocational training programs. While the broad thrust of strategic counter-terrorism in Indonesia, the Philippines and Thailand has differed according to specific national contexts, all three countries have instituted similar tactical intelligence, law enforcement and judicial responses or interventions to deal with the threats they have confronted. This paper examines the relative effectiveness of these operational counter-terrorism interventions in the three countries.

Indonesia

The Bali bombings of 2002 left 202 people dead and 209 seriously wounded (START 2012), and are still considered some of the most serious acts of terrorism since the attacks of 11 September 2001. Prior to these bombings, the Indonesian Government largely dismissed concerns that it had a serious internal Islamist terrorism threat (Singapore Ministry of Home Affairs 2003). Following the attacks, the government could no longer ignore that there was a growing problem of terrorism in the country and issued two legal counter-terrorism regulations (Laws 15/2003 and 16/2003). The first empowered the police to detain terrorism suspects for up to six months before indictment and gave prosecutors and judges the right to block bank accounts belonging to individuals or organisations suspected of funding terrorist activities. The second, dealing specifically with the Bali attack, allowed the retroactive prosecution of those implicated in the bombings (Interviews with Indonesian officials, Jakarta, January 2008. All interviews were conducted in-country by Peter Chalk. By request, names of individuals and their affiliated organisations have not been noted to ensure confidentiality). In 2006, the Indonesian Attorney General's Department established a new Terrorism and Transnational Crime Task Force. Supported by US State Department funds, the Terrorism and Transnational Crime Task Force is primarily designed to help Indonesia cope with the increasing number of terrorist-related trials in the post-2002 period (US Department of State 2007). In addition to these initiatives, substantial efforts were made to enhance and expand law enforcement counter-terrorism activity. One of the main developments was the creation of a dedicated national counter-terrorism

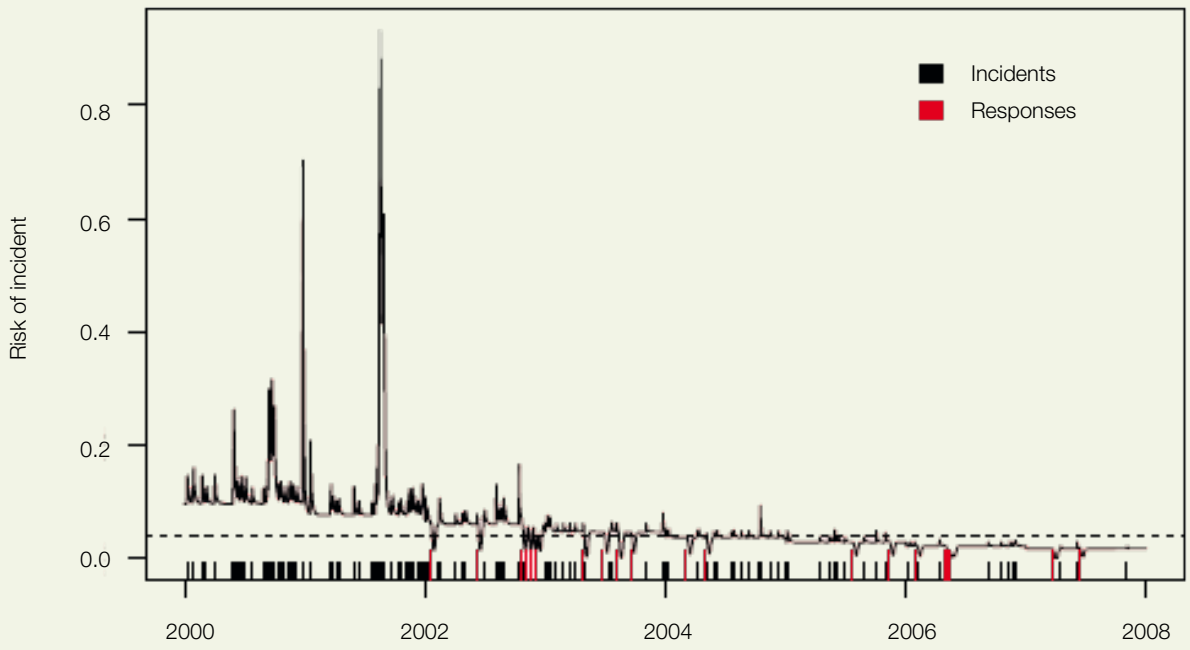
unit, set up with multinational financial support. The unit is split into divisions that respectively focus on investigations, intelligence, logistical support and hostage rescue (Conboy 2008). In addition, provincial-level teams established in 2004 have since spearheaded counter-terrorism efforts across the country (Haseman 2004). The government also moved to institute a national bomb task force (Conboy 2008). Finally, a number of changes took place in the domestic intelligence community. In 2002, the then President issued a law that firmly established a National Intelligence Agency, Badan Intelijen Negara, as the focal point for coordinating national surveillance and monitoring activities across the country, including those falling under the auspices of the military. Two new intelligence schools were also established to train career-track analysts, and a Terrorism Eradication Coordinating Desk was set up to streamline counter-terrorism cooperation among the police, army and intelligence communities (Conboy 2004; Kingsbury 2003; Sebastian 2003).

Despite this broad approach, Indonesia has not shied away from harder measures. At the forefront of these endeavours has been Detachment 88 (the National Police counter-terrorism unit), which has been deployed extensively to disrupt active terrorist cells and apprehend or otherwise eliminate cell members (Ng 2008; Schmitt 2008). The unit has also sought to sever the links of prominent extremist groups with other smaller movements inside Indonesia, including entities that have sprung up in West and Central Java, North Sumatra and Sumatra (International Crisis Group 2011).

The Philippines

The thrust of Philippine counter-terrorism has fallen to the Armed Forces of the Philippines rather than the Philippine National Police (PNP). This runs counter to the approach in most liberal democratic countries, which view counter-terrorism as primarily a law enforcement task (Chalk 1995). The PNP has played a secondary role in counter-terrorism for several reasons, including a legacy of suspicion of the police from their role in the Marcos era, a history of nepotism and corruption, a lack of continuity in leadership and a history of poor investigative techniques and an over-reliance on questionable confessions (Interviews, Australian and Philippine officials, Manila, January 2008). The weakness of and suspicion surrounding the PNP has, by default, thrust the Armed Forces of the Philippines into the forefront of Philippine counter-terrorism. The Marines, working with various Special Forces units, have led the fight against the main terrorist groups. The Marines have worked closely with the United States, which has provided assistance in the areas of operations intelligence fusion, unit interoperability, logistics and civil-military operations. This training is an integral feature of the so-called Operation Enduring Freedom-Philippines, which commenced in 2002 following the Bali bombings and has since been coordinated under the auspices of the Joint US Mutual Assistance Group (Interviews, US and Philippine officials, Manila and Zamboanga, January 2010).

Figure 2 Terrorism incidents and interventions, Indonesia 2000–07



Thailand

Counter-terrorism in Thailand has been heavily influenced by the state's highly nationalistic character, which has historically paid little regard to regional diversity or autonomy. This reflects the acute sensitivity on the part of the central government to any challenge that might threaten the territorial integrity of the country, a normative perception that has entrenched assimilation rather than accommodation as the preferred means for dealing with potential centrifugal forces. As a result, Bangkok has dealt with counter-terrorism and political violence in its southern Malay provinces on the basis of the three pillars of Thai nation building—monarchy (loyalty to the royal family), religion (Buddhism) and unity (political, economic and societal; Interviews, Thai academics, Bangkok and Pattani, September 2007). In line with its assimilationist view, Thailand's counter-terrorism approach has largely aimed to forcibly contain separatist sentiment, while simultaneously trying to encourage Malay–Muslim acceptance of national assimilation. This involves the deployment of regular troops and elite units from the Royal Thai Army who have worked closely with special police shock squads trained in small-team tactics, long-range surveillance and hostage rescue (Interviews, Royal Thai Army officials, Bangkok and Yala, September 2007).

In addition, considerable emphasis has been given to creating irregular paramilitary forces and village-based self-defence militia. The former serves as a border patrol and light screening force, whereas the latter serves as a reserve capacity for the police. Both are viewed as a vital security 'multiplier' and they have increasingly assumed responsibility for the counter-terrorism and counter-insurgency burden in the southern Malay–Muslim provinces (Ball 2004; Ball & Mathieson 2007; International Crisis Group 2007; Interview, Royal Thai Army and Ranger officials, Pattani, September 2007). In common with the PNP, the Royal Thai Police have not been major players in counter-terrorism activities in the south, with the exception of certain paramilitarised units. Like their counterparts in the PNP, they suffer from exceptionally poor forensic capabilities and an over-reliance on unsubstantiated confessions and eyewitness statements. Moreover, low pay rates have failed to attract high-calibre recruits and have encouraged institutional graft, which is now so endemic that the Royal Thai Police is one of the least respected of all of Thailand's public services (Interviews, western officials and Thai academics, Bangkok, July 2008). Following the 2006 bloodless coup that led to the ousting of Prime Minister Thaksin Shinawatra, efforts have been made to improve the Royal Thai Army's operational capabilities. This reform drive has been instituted as part of a general attempt to buttress hard-line counter-terrorism and counter-insurgency with a more nuanced policy mix of economic and dialogue initiatives (Chalk et al. 2009). However, experts such as Peter Chalk report that little progress has been made in Thailand on the twin emphasis on military containment and assimilation (Personal correspondence with Thai academics and western journalists, January–May 2011).

Figure 3 Intervention effects for Indonesia, The Philippines and Thailand

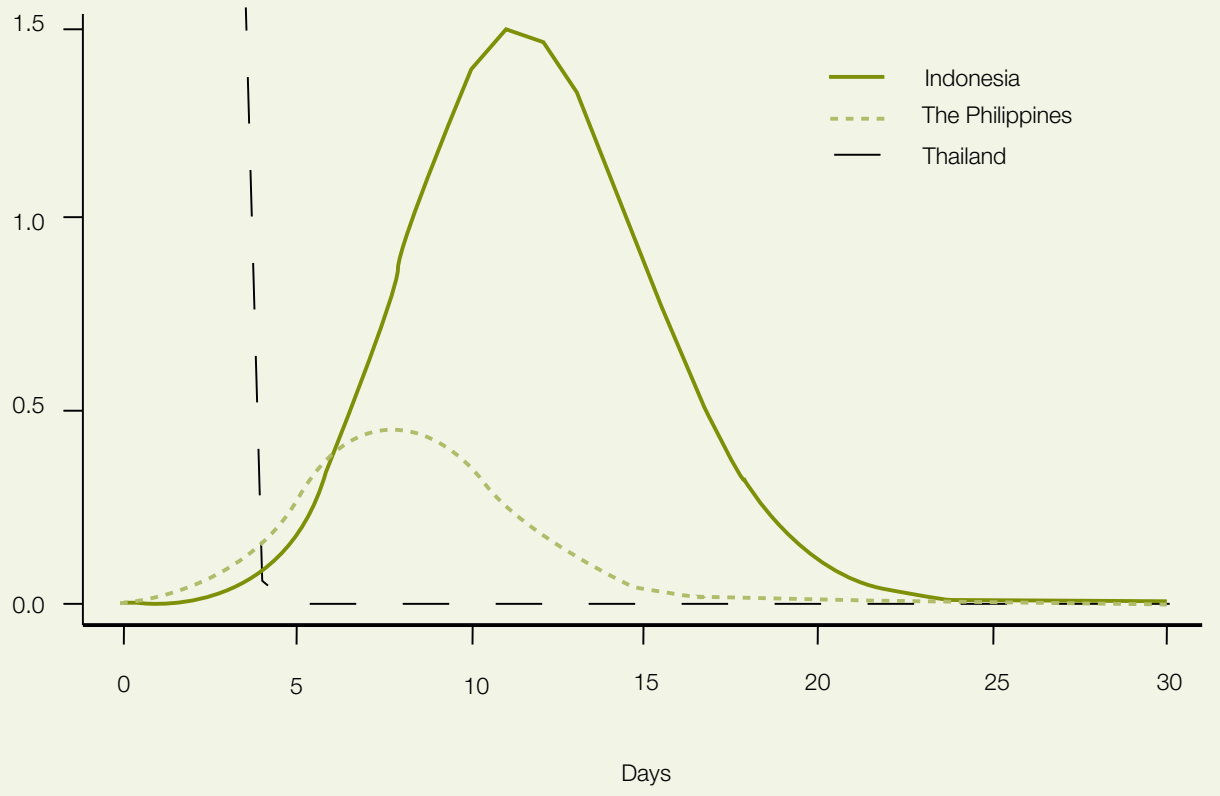
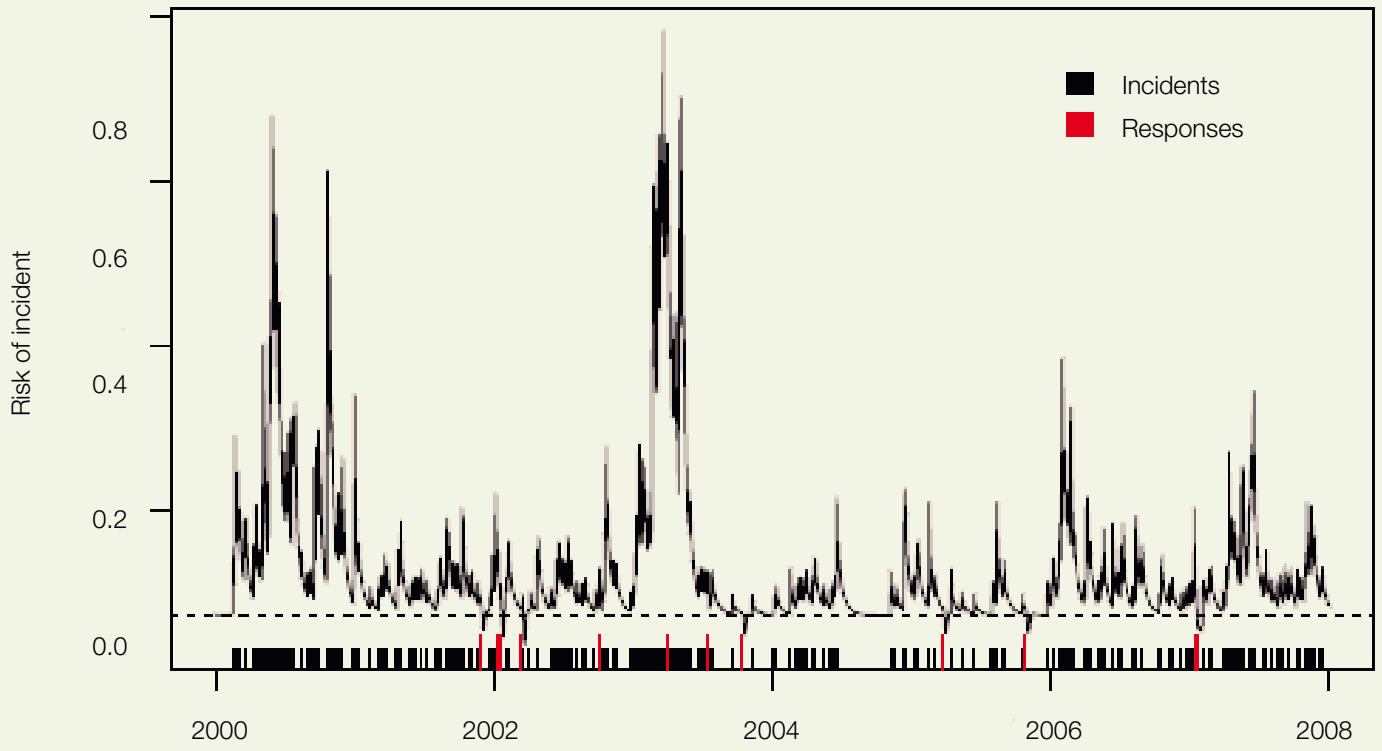


Figure 4 Terrorism incidents and interventions, the Philippines 2000–07



Modelling the effectiveness of counter-terrorism interventions

Modelling conflict dynamics began in the early twentieth century with the development of a set of mathematical equations to describe the outcome of a conventional military engagement between two parties (Lanchester 1914; Ospiov 1915). These equations incorporate a set of coefficients describing the ability of each side to inflict damage on the other and their respective attrition rates. The mathematics of this area of research (see also Richardson 1960) form the basis for much of the analytical research in conflict and warfare (see also Lepingwell 1987; Taylor 1983). Sapperstein (2008) extends this concept to a similar set of equations that describe the interaction between terrorists and counter-terrorism efforts. These approaches are similar to dynamic linear models used in other fields like ecology, for example, where they describe the dynamic relationships between predators and prey (West & Harrison 1997). The conflict dynamic framework adopted for this quantitative analysis extends the self-exciting model presented in Porter and White (2012), and White, Porter and Mazerolle (2012) to include an inhibitory effect based on counter-terrorism interventions. The self-exciting model (Hawkes 1971a, 1971b) states mathematically that the occurrence of an event increases the probability of an event in the future, with the increase diminishing over time. The model presented here builds on this by assuming that counter-terrorism efforts have a similar inhibitory effect that tends to reduce the probability of future terrorist events, with this inhibition effect diminishing over time. Examining the fitted model parameters allows for a quantitative examination of the effects of a particular type of counter-terrorism response on the overall risk, volatility and resilience of a population.

The application of the self-exciting model to counter-terrorism interventions

Data

Information on terrorist attacks collected from the Global Terrorism Database (LaFree & Dugan 2007) and the Institute for the Study of Violent Groups (www.isvg.org) was merged to create a comprehensive database of terrorist attacks that occurred from 2000 to 2007. Information on counter-terrorism interventions was taken from the Counter-Terrorism intelligent Library (CTiL) (Mazerolle et al. 2011), a collection of open-source records of counter-terrorism responses in Indonesia, Thailand and the Philippines occurring between 2000 and 2007. The content of CTiL is categorised across four broad types of interventions, based on the Australian NCTP (NCTC 2005), including Legal and Administrative, Prevention and Preparedness, Response

(including the arrest, trial, killing and/or imprisonment of terrorists, and the seizure of materiel) and Recovery. A stepwise selection procedure was used to select the most informative class of interventions. This was implemented as a generalised linear model (Nelder & Wedderburn 1972), with classes chosen to maximise the correlation between the number of incidents and interventions per year. The selection of yearly counts is meant to be a robust means of accounting for the variability in the relationship between different intervention types and the lag before their effects are felt. For example, arrests of terrorists could have a more immediate short-term effect on the number of incidents, while legislative or prevention efforts would most likely take more time to have an effect. This method was applied to each of the three countries in this study and showed that the Response category had the strongest association with the rate of terrorism incidents over time. These results guided the decision to focus the analysis on the Response class of interventions. A similar approach is presented in Dugan and Chenoweth (2012) using a non-parameteric model. The advantage in this case is the ability to directly compare the effects between contexts via the model parameter estimates.

The intervention effects model

The model for the intervention effects is written as a logistic model for ***pt***, the probability, or the risk, of an attack on day ***t***.

$$p_t = \frac{e^{\lambda_t}}{1+e^{\lambda_t}} \quad (1)$$

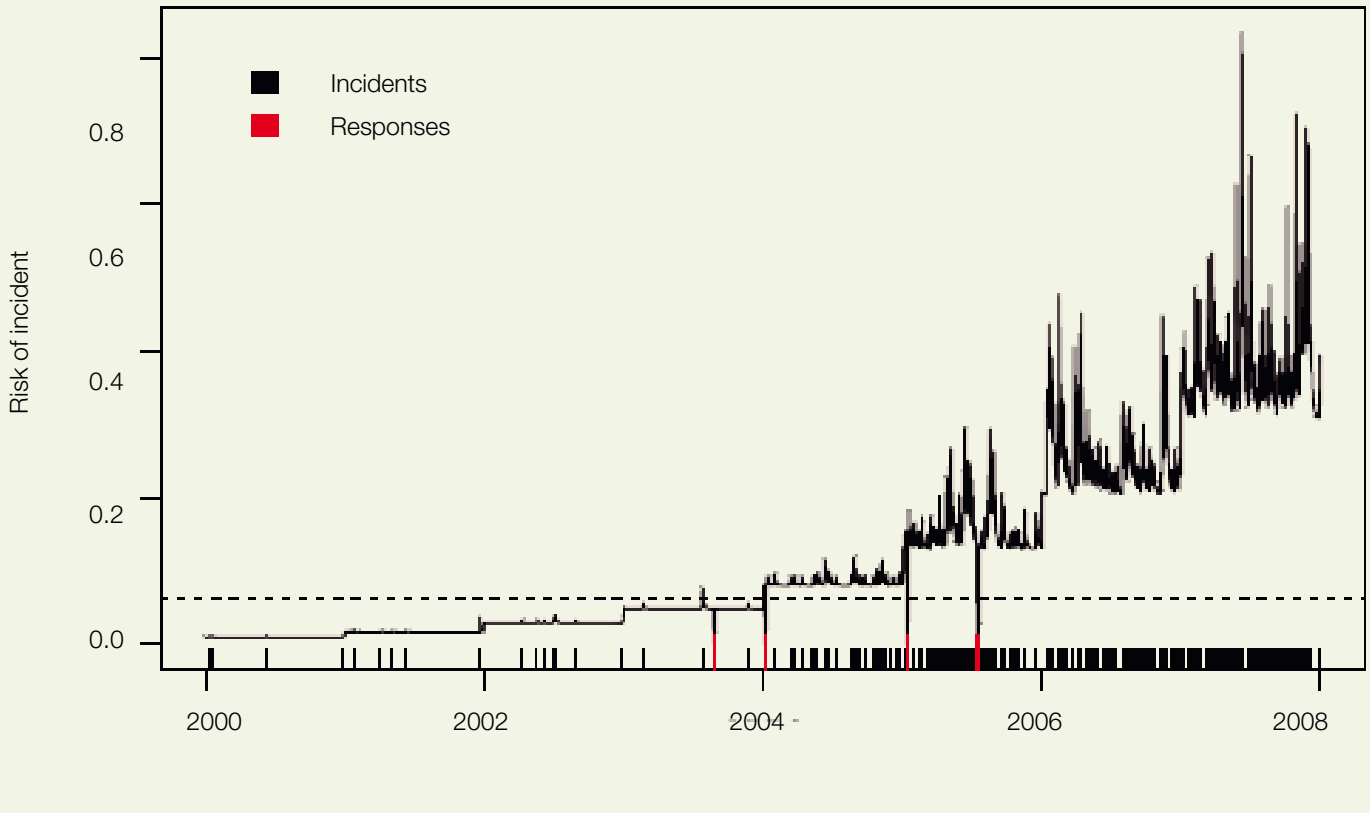
$$\lambda_t = \beta_0 + \beta_1 year_t + \alpha \sum_{i:t_i<t} g(t-t_i;\boldsymbol{\theta}) + \eta \sum_{i:t_i<t} h(t-t_i;\phi) \quad (2)$$

This model includes an annual trend. The functions ***g*** and ***h*** respectively describe the excitation effect of event history and the inhibition effect of intervention history. The combination of excitation and inhibition effects is illustrated in Figure 1. Model parameters are estimated using maximum likelihood estimation. Results can be interpreted in terms of the duration and intensity of the intervention effects in order to assess the relative effectiveness of each country's counter-terrorism efforts.

Results

The model results indicate a wide variety in the levels of effectiveness for counter-terrorism interventions in Indonesia, the Philippines and Thailand. While not conclusive, these results, when compared with expert assessments, give credence to the modelling framework presented.

Figure 5 Terrorism incidents and interventions, Thailand 2000–07



Indonesia

Figure 2 shows the plot of the model-estimated risk for Indonesia from 2000 to 2007. Incidents are portrayed in black and interventions (responses) in red. The effectiveness of a response is indicated by the sharp decrease in risk immediately after the interventions are implemented. This is particularly evident post-2002, when the government moved to overhaul and enhance its counter-terrorism strategy following the first Bali bombing. As time progresses, the period between actual and attempted attacks becomes larger and the overall frequency of incidents decreases.

The solid line in Figure 3 shows a profile of the individual intervention effect for Indonesia. This represents the inhibition effect of a single counter-terrorism measure. The results show that the maximum impact of a response occurs after 11 days. By day 17 the intervention has attained 95 percent of its expected impact. A key feature of the results for Indonesia is that responses occur close together, so that a new response intervention is implemented while a previous one is still having an impact. This approach seems to magnify the overall effectiveness of each new reactive response type of intervention, creating an overall effect much more powerful than if the same interventions had been implemented further apart.

The Philippines

Figure 4 shows the plot of the model-estimated risk in the Philippines from 2000 to 2007. The first noticeable differences between this country and Indonesia are the smaller number of response interventions and the higher overall risk. Although a drop in risk immediately follows most responses, there is a period between 2002 and 2004 where the inhibitory effect of the response class of interventions seems to be negligible, if evident at all. During this time span, the temporal trend remains flat, with little overall reduction in the risk of actual or attempted terrorist attacks. Compared with Indonesia, the Philippines exhibits more local peaks of activity where risk is over 0.5; that is, there is a higher than 50 percent chance of a terrorist attack on any given day. In the seven year timeframe, there were four peak days such as these. This stands in contrast to Indonesia, which showed only two days when the terrorist attack risk was greater than 50 percent.

The broken line in Figure 3 represents the intervention effect profile for the Philippines. According to the model results, isolated response counter-measures are less effective than those in Indonesia. Counter-terrorism responses attained maximum impact eight days after being instituted, with the effect of the intervention being 95 percent complete by day 13.

Thailand

Figure 5 shows the plot of the model-estimated risk for Thailand from 2000 to 2007. The CTiL (Mazerolle et al. 2011) software recorded only four response type interventions for the country, each followed by an immediate and large dip in the risk of terrorist attack. However, the small number of interventions limits their overall effectiveness, reflected by the steady escalation in the rate of events during the time period. The results from this model ultimately point to inconclusive findings in assessing the effects of reactive response interventions in Thailand. The dotted line in Figure 3 displays the intervention effect for Thailand. Model results indicate that peak effectiveness is on day one after the response is instituted and reaches 95 percent of the total impact by day two. The scarcity of data for Thailand does not allow for a valid comparison with the Philippines and Indonesia, other than to note that the steady increase in terrorist risk suggests the absence of an effective counter-terrorism strategy.

Discussion

The analytical approach developed in this paper allows for a quantifiable assessment of one category of counter-terrorism interventions—responses to terrorist events—that can be used to inform national security policies and practices. It shows that the immediate effect of a response type of intervention (like arrest, capture, killing or imprisonment of terrorists) is likely to alter the risk of a subsequent terrorist event. This inhibitory effect of responses to terrorism is indicative of intervention effectiveness, although the model does not rule out the possibility of 'blowback' (ie negative effects that are opposite to the intended outcome). The model also demonstrates that interventions vary by type and their respective impacts, and are typically not constant over time. This is consistent with current expert interpretations and offers a more flexible and comprehensive means for examining the effectiveness of counter-terrorism interventions than is traditionally employed in terrorism research. It is clear from these results that Indonesia has instituted an effective suite of counter-terrorism responses that has reduced internal activity, while interventions in the Philippines and Thailand have not enjoyed similar success. These results suggest promise for adopting mathematical models for understanding the effectiveness of counter-terrorism measures, providing policymakers with a technique that can be usefully applied to other cases in other parts of the world. Future research will focus on expanding the model to include other classes of counter-terrorism interventions such as Legal/Administrative, Preparedness and Recovery. The authors also aim to refine the model to allow for its use as a predictive tool. These more complex simulation models will help determine the relative efficacy of both counter-terrorism and anti-terrorism measures and ultimately, the rational allocation of scarce national security resources.

Gentry White is a Lecturer at the Queensland University of Technology.

Lorraine Mazerolle is a Professor at The University of Queensland.

Michael D Porter is an Assistant Professor at the University of Alabama.

Peter Chalk is a senior political scientist at the RAND corporation.

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GPO Box 2944
Canberra ACT 2601, Australia
Tel: 02 6260 9200
Fax: 02 6260 9299

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