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## Government protection against terrorism and crime

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A game theoretic model is developed where a government protects against a terrorist seeking terrorism and criminal objectives. A terrorist can recruit a benefactor providing funds by remaining ideologically pure, or may resort to crime. The model accounts for the players' resources, unit costs of effort, unit benefit and valuations and contest intensities for terrorist and crime objectives. We determine and quantify how these factors and the government impact a terrorist's terrorism and crime efforts and relative ideological orientation on a continuum from being highly ideological to being highly criminal. We also consider how the terrorist group is impacted by support of benefactor(s), the central authority's ability to impose greater sanctions for terrorist activities compared to criminal actions and the ideological orientation of the group's leadership. We discuss insights from the model and consider a few historical perspectives.

**Keywords:** terrorism; terrorist organisations; organised crime; terrorism theory; ideologues; mercenaries; capital funding

### 1. Introduction

Nearly all terrorist groups are initially ideological and politically motivated. Some maintain their ideology and sustain themselves over a long period of time (such as the Irish Republican Army (IRA), Hamas, Laskar-i-Taiba, or Hezbollah); some devolve into criminal organisations (such as Revolutionary Armed Forces of Colombia (FARC), or Abu Sayyaf, the Islamic Movement of Uzbekistan); a rare few crime syndicates engage briefly in politically motivated violence (e.g., Dawood Ibrahim's group in Mumbai<sup>1</sup>), and most terrorist groups die out (such as the Japanese Red Army, or Baader Meinhof).<sup>2</sup> From a policy standpoint, the funding of violent dissident groups and whether they are purely ideological, purely criminal, or a mixture of these two extremes are important questions. Although there have been a number of excellent case studies, scholarly discourse is largely devoid of discussions based on motivations of those who participate in violent uprising against an organised political order. The purpose of this article is to develop a theoretical framework, within which the operation of terrorist groups can be understood. Having performed an extensive study of "threat-convergence" between terrorism and organised crime, Picarelli<sup>3</sup> argued that "threat convergence is more complex than policy makers and practitioners often realise".<sup>4</sup>

Although, to our knowledge, there is a dearth of theoretical understanding of the issue, the linkage between terrorism and crime has received a significant amount of scholarly attention. Ehrenfeld,<sup>5</sup> for instance, argued that since both terrorist groups and criminal organisations engage in extra-legal activities, it is natural that they may develop a

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symbiotic relationship. Lyman and Potter<sup>6</sup> suggested that, ‘political agendas and profit motivation may be concurrent variables in many acts of terrorism’. Sanderson<sup>7</sup> held that the line between terrorism and organised crime is getting increasingly blurred. Kenney<sup>8</sup> showed how both Osama bin Laden and Pablo Escobar evolved and adapted their tactics.

In the paranoid days of the immediate aftermath of the 9/11 attacks, the UN Security Council observed (Resolution #1373, 9/28/2001) ‘the close connection between international terrorism and transnational organised crime, illicit drugs, money-laundering, illegal arms trafficking and illegal movement of nuclear, chemical, biological and other potentially deadly materials’.<sup>9</sup> Yet, a much closer examination of the issues demonstrates a much more complex picture.

In this article, we build a micro-level game theoretic model. We assume that a group can engage in two kinds of activities, ideological (political) and criminal. The ideological activities are aimed at achieving public goods for the community, which the group purports to represent. The ideology may be driven by supreme values.<sup>10</sup> In contrast, the criminal activities are designed for obtaining private or club goods that benefit exclusively the individual members and/or the immediate members of the group as a whole.

In choosing the mix of activities, a group faces three exogenous (to our model) forces, which impact its overall ideological orientation. These are the sources of revenue, the relative costs of taking part in political versus criminal activities, and the perception of benefits by the group’s leadership resulting from the two types of activities. Let us examine these three more carefully.

### **1.1. Sources of funding**

Similar to all other organisations, terrorist groups need funding to achieve their political objectives. Those, which fail to have reliable funding, either veer off to criminality or disappear from the pages of history. This is consistent with Rapoport’s<sup>11</sup> finding that over 90% of the terrorist groups disappear from the pages of history within the first few years of their existence. There are two sources of funding. Funding can be provided by benefactors, such as state government, as in the case of Iran supporting Hezbollah<sup>12</sup> or Pakistan, Laskar-i-Taiba,<sup>13</sup> the Diaspora, as in the case of the IRA and the Tamil Tigers (LTTE), or by voluntary contributions from within their own community, such as the *zakat* money going to al-Qaeda.<sup>14</sup> Without benefactors, a terrorist organisation is forced to raise money on its own by engaging in criminal activities, running the full gamut from drug/gun/human trafficking to kidnapping/hostage taking to charging protection money.<sup>15</sup> A terrorist organisation, however, operates from its primary motivation based on achieving ideological goals, which separates it from common criminals.<sup>16</sup> When a group does not have to engage in criminal activities in order to carry out its political mission, it can remain true to its ideological orientation. However, with a steady source of funding, a terrorist organisation must turn towards criminal activities, which, in turn, attracts those whose primary motivations are not ideological. As a result, as a group gets more and more involved in criminal activities, its ideological orientation gets diluted and the group risks losing its political support base. To understand this common yet rarely studied phenomenon, a game theoretic model is developed where a terrorist allocates a resource into terrorism and crime, and a government allocates a resource into protecting against terrorism and crime. The model accounts for resources, unit costs of effort, a unit benefit, valuations of terrorism and crime by both players and contest intensities. A benefactor impacts a terrorist’s resource and unit effort costs.

### ***1.2. The relative costs of engaging in violent activities***

Gupta<sup>17</sup> identified two primary types of actors within terrorist organisations. Ideologues have a strong commitment towards the group's political objectives and are willing to sacrifice their own individual interests (or lives). In contrast, mercenaries have a weak commitment towards the group and a strong personal financial interest. A terrorist organisation's ideologues may be religious, nationalistic, Marxist, etc. In some cases, terrorist ideologues are partly mercenary, and vice versa, and so this dichotomy is neater than in practice. Ambiguities and hybridities may exist between criminal and ideological actors. For example, kidnapping or taxing wealthy individuals may be an ideological act, a criminal act, or both. We settle such issues by considering the purpose. If the purpose is terrorism, the act is ideological. If the purpose is to raise money, the act is criminal.

If a terrorist organisation is lucky enough to find a steady benefactor(s) in an organised state or a willing group within its Diaspora, it can maintain its ideological purity by keeping the mercenaries at a minimum. However, if the need for money to carry out their operations exceeds what can be raised from these 'capital funders,' or the leadership of the organisation changes relative ideological orientation, terrorist groups are forced to include a sizeable number of mercenaries to raise money from criminal activities. As the percentage of the mercenaries increases, the group starts changing its character; some transform themselves from ideological groups to essentially criminal organisations. By correlating their method of financing, Gupta<sup>18</sup> placed terrorist groups on a continuum from strictly ideological to almost totally criminal. For example, the Colombian group, FARC (Revolutionary Armed Forces of Colombia) was created as a Marxist revolutionary group. Yet, the lure of easy money and weakened government due to decades of civil war transformed it into a drug trafficking cartel.<sup>19</sup> Similarly, several splinter groups of the IRA in Northern Ireland, the longest surviving terrorist organisation in history, have turned to criminal activities<sup>20</sup> as did groups, such as the Abu Sayyaf of the Philippines.<sup>21</sup>

### ***1.3. Leadership orientation***

Leadership is extremely important in determining the ideological orientation of a group. There are certain cultural mores that a group (and its leadership) would not cross. For instance, the IRA did not want to deal directly in the drug trade. In 1990, however, a splinter group of former IRA members formed Irish People's Liberation Organisation (IPLA), where they veered towards criminality and drug trading. Fearing that their reputation was going to be sullied, the IRA struck back and on 31 October 1992 the offending group was wiped out in an operation known as the 'night of the long knife'.<sup>22</sup>

Transformation from criminality to terrorism is also possible, but is more rare. An example is Dawood Ibrahim, the head of D-Company in a criminal gang in Mumbai. In 1992 after a band of fanatical Hindus destroyed an old mosque ('Babri Masjid'), riots ensued all over India. Many Indian Muslims lost their lives. Seeing an opportunity, the agents of the Pakistani secret service, the ISI approached Dawood Ibrahim,<sup>23</sup> appealing, perhaps, to his duty as a Muslim to take revenge on his secular nation. Ibrahim used his network to smuggle explosives and planted bombs in the financial district of Mumbai.<sup>24</sup> Whereas as a criminal boss, he had attracted but scant attention from Indian law enforcement, his involvement in these terrorist acts brought the full force of the authorities causing Ibrahim to flee India and live in exile under the protection of his Pakistani handler. Although an anomaly, without the appearance of his benefactor, Dawood Ibrahim would not have traversed the path of terrorism.

Section 2 presents the model. Section 3 solves the model. Section 4 calibrates the parameters. Section 5 discusses insights. Section 6 places the model into a broader historical perspective. Section 7 concludes.

## 2. The model

### 2.1. Nomenclature

#### Variables

- $t$  terrorist's terrorist effort
- $T$  government's terrorism protection effort
- $x$  terrorist's crime effort
- $X$  government's crime protection effort

#### Parameters

- $r$  terrorist's resource
- $R$  government's resource
- $a$  terrorist's unit cost of terrorist effort
- $A$  government's unit cost of terrorism protection effort
- $b$  terrorist's unit benefit, provided by a benefactor, of terrorist effort
- $c$  terrorist's unit cost of crime effort
- $C$  government's unit cost of crime protection effort
- $d$  terrorist's additional unit cost, imposed by a benefactor, of crime effort
- $m$  terrorism contest intensity
- $n$  crime contest intensity
- $s$  terrorist's valuation of terrorism objectives
- $S$  government's valuation of terrorism objectives
- $q$  terrorist's valuation of crime objectives
- $Q$  government's valuation of crime objectives

### 2.2. Model development

The terrorist has a resource  $r$  (usually capital, but can also be labour, competence, skills, information) provided by a benefactor and transformable into two kinds of efforts. The first is terrorist effort  $t$  at unit cost  $a$  aimed at terrorist goals. The second is crime effort  $x$  at unit cost  $c$  aimed at crime goals. These efforts involve preparation, planning, information gathering, leadership, persuasion, execution, coercion, cover-up, avoiding being detected, etc., directed to obtain objectives related to terrorism and crime. The terrorist's benefactor provides an additional unit benefit  $b$ ,  $b < a$ , for terrorist effort and imposes a unit cost  $d$  for crime effort. This is because the benefactor values a pure terrorism ideology and punishes an organisation corrupted by crime. If  $b$  increases towards  $a$ , the terrorist's actual unit cost  $a - b$  of terrorist effort decreases towards zero. The terrorist's actual unit cost of crime is  $c + d$ . For example, if the terrorist emphasises crime rather than terrorism so that  $dx > bt$ , the terrorist's resource provided by the benefactor is less than  $r$ , i.e.  $r + bt - dx$ . The government has a resource  $R$  (usually capital, but can also be labour, competence, etc.) transformable into terrorism protection effort  $T$  at unit cost  $A$ , and crime protection effort  $X$  at unit cost  $C$ . These efforts also involve preparation, planning, information gathering, leadership, persuasion, execution and using the various government agencies equipped and trained for the various tasks. The government efforts may also

involve various clandestine operations (e.g. the United States Naval Special Warfare Development Group (commonly known as SEAL Team Six) 2011 operation to kill Osama Bin Laden), various forms of coercion (e.g. interrogation techniques such as water boarding), freezing of bank accounts, avoiding being detected, etc., directed to prevent terrorism and crime. The resource equations are

$$r + bt - dx = at + cx \Leftrightarrow r = (a - b)t + (c + d)x, \quad R = AT + CX \quad (1)$$

The terrorist exerts efforts  $t$  and  $x$ , and the government exerts efforts  $T$  and  $X$ , which means fighting over terrorism objectives valued as  $s$  by the terrorist and  $S$  by the government, and crime objectives valued as  $q$  by the terrorist and  $Q$  by the government. The terrorist has one strategic choice variable  $x$ , and  $t$  follows from Equation (1). The government has one strategic choice variable  $X$ , and  $T$  follows from Equation (1). The terrorist and government choose their strategies simultaneously and independently and have opposite objectives. The term ‘fighting’ is to be understood as a metaphor. As Hirschleifer<sup>25</sup> puts it, ‘falling also into the category of interference struggles are political campaigns, rent-seeking maneuvers for licenses and monopoly privileges,<sup>26</sup> commercial efforts to raise rivals’ costs,<sup>27</sup> strikes and lockouts, and litigation – all being conflictual activities that need not involve actual violence’. Fighting is a subcategory of competition. We prefer to use the narrower and therefore more precise word fighting, which can be substituted with synonyms such as struggle, conflict, battle, etc.

The values  $s$ ,  $S$ ,  $q$  and  $Q$  are symbolic, economic and human. For example, the 11 September 2001 attack aimed at a symbolic value represented by a core centre of trade in the Western world, the economic value expressed by the value of the destroyed buildings with assets and lost business, and the human value of 2996 deaths. Stiglitz and Bilmes<sup>28</sup> estimated the total direct and indirect costs of the 2003–2011 Iraq war to be over \$3 trillion. The players’ success obtaining their objectives is determined by the contest success function.<sup>29</sup> The terrorist obtains and the government loses the fractions

$$p_{\text{terrorism}} = \frac{t^m}{t^m + T^m}, \quad p_{\text{crime}} = \frac{x^n}{x^n + X^n} \quad (2)$$

where  $m \geq 0$  and  $n \geq 0$  are the contest intensities. When  $m = n = 0$ , efforts have no impact,  $0 < m, n < 1$  gives a disproportional advantage of investing less than one’s opponent,  $m = n = 1$  gives proportional distribution,  $m > 1$  and  $n > 1$  give a disproportional advantage of investing more effort than one’s opponent (economies of scale) and  $m = n = \infty$  gives ‘winner-takes-all’. Applying Equations (1) and (2), the terrorist’s and government’s utilities  $u$  and  $U$  are

$$u = \frac{t^m}{t^m + T^m} s + \frac{x^n}{x^n + X^n} q = \frac{\left(\frac{r-(c+d)x}{a-b}\right)^m}{\left(\frac{r-(c+d)x}{a-b}\right)^m + \left(\frac{R-CX}{A}\right)^m} s + \frac{x^n}{x^n + X^n} q, \quad (3)$$

$$U = -\frac{t^m}{t^m + T^m} S - \frac{x^n}{x^n + X^n} Q = -\frac{\left(\frac{r-(c+d)x}{a-b}\right)^m}{\left(\frac{r-(c+d)x}{a-b}\right)^m + \left(\frac{R-CX}{A}\right)^m} S - \frac{x^n}{x^n + X^n} Q$$

### 3. Solving the model

Solving the first order conditions (Appendix) gives

$$\begin{aligned} x(X) &= \frac{qSrCX}{(c+d)(qSCX - QsCX + QsR)}, t(X) = \frac{Qrs(R - CX)}{(a-b)(qSCX - QsCX + QsR)}, \\ \frac{t(X)}{x(X)} &= \frac{(c+d)Qs(R - CX)}{(a-b)qSCX} = \frac{(c+d)QsAT}{(a-b)qSCX} \end{aligned} \quad (4)$$

which are the reaction (or best-response) functions of  $x$ ,  $t$  and  $t/x$  as functions of  $X$  and  $T$ , where  $T = (R - CX)/A$ .

Property 1.  $\partial(t(X)/x(X))/\partial(T/X) > 0$ .

Proof. Follows from Equation (4).

Property 1 states that the ratio  $t(X)/x(X)$  of the terrorist's efforts into terrorism relative to crime increases, as a reaction (or best-response) function, in the ratio  $T/X$  of the government's efforts into terrorism relative to crime, where  $T = (R - CX)/A$ . This means that a terrorist's ideological orientation  $t/x$  depends positively on the government's ability or willingness to impose sanctions in its choice of  $T/X$ .

Analytical solutions are possible when  $x$  is proportional to  $X$  and  $t$  is proportional to  $T$ , which are satisfied in Equation (4) when  $q = Qs/S$  which gives

$$x(X) = \frac{Xr/R}{(c+d)/C}, \quad t(X) = \frac{Tr/R}{(a-b)/A}, \quad \frac{t(X)}{x(X)} = \frac{(c+d)/C}{X(a-b)/(R - CX)} \quad (5)$$

We refer to  $\frac{r/R}{(c+d)/C}$  as the terrorist's crime superiority ratio, which makes the terrorist superior to the government if larger than one, and otherwise inferior. The terrorist is superior when advantaged with a larger resource  $r > R$  or a lower actual unit crime cost  $c + d < C$ . Analogously,  $\frac{r/R}{(a-b)/A}$  is the terrorist's terrorism superiority ratio, which makes the terrorist superior to the government if larger than one, and otherwise inferior. The terrorist is superior when advantaged with a larger resource  $r > R$  or a lower actual unit terrorism cost  $a - b < A$ .

The second order conditions (Appendix) are satisfied as negative when

$$\begin{aligned} \left(\frac{r/R}{(c+d)/C}\right)^n &> \left(\frac{n-1}{n+1}\right)^{1/n} \quad \text{and} \quad (n-1)^{1/n} \left(\frac{r/R}{(c+d)/C}\right)^n < (n+1)^{1/n}, \\ \left(\frac{r/R}{(a-b)/A}\right)^m &> \left(\frac{m-1}{m+1}\right)^{1/m} \quad \text{and} \quad (m-1)^{1/m} \left(\frac{r/R}{(a-b)/A}\right)^m < (m+1)^{1/m} \end{aligned} \quad (6)$$

Solving the first order conditions and inserting into Equation (5) gives



$$Z = \frac{mS \left( \frac{r/R}{(a-b)/A} \right)^m \left( 1 + \left( \frac{r/R}{(c+d)/C} \right)^n \right)^2}{nQ \left( \frac{r/R}{(c+d)/C} \right)^n \left( 1 + \left( \frac{r/R}{(a-b)/A} \right)^m \right)^2}, \quad X = \frac{R/C}{1+Z}, \quad T = \frac{RZ}{A(1+Z)}, \quad (7)$$

$$x = \frac{r}{(1+Z)(c+d)}, \quad t = \frac{Zr}{(1+Z)(a-b)}, \quad \frac{t}{x} = \frac{(c+d)Z}{(a-b)}$$

which are inserted into Equation (3) to give

$$u = \frac{s}{1 + \left( \frac{r/R}{(a-b)/A} \right)^{-m}} + \frac{Qs/S}{1 + \left( \frac{r/R}{(c+d)/C} \right)^{-n}}, \quad (8)$$

$$U = -\frac{S}{1 + \left( \frac{r/R}{(a-b)/A} \right)^{-m}} - \frac{Q}{1 + \left( \frac{r/R}{(c+d)/C} \right)^{-n}}$$

Property 2.  $\partial(t/x)/\partial a < 0$ ,  $\partial(t/x)/\partial b > 0$ ,  $\partial(t/x)/\partial c > 0$ ,  $\partial(t/x)/\partial d > 0$ ,  $\partial(t/x)/\partial S > 0$ ,  
 $\partial(t/x)/\partial Q < 0$ ,  $\partial(t/x)/\partial A < 0$  if  $\frac{r/R}{(a-b)/A} > 1$ ,  $\partial(t/x)/\partial C > 0$  if  $\frac{r/R}{(c+d)/C} > 1$ .

Property 2 states that the ratio  $t/x$  of the terrorist's efforts into terrorism relative to crime decreases in the unit cost  $a$  of terrorist effort (since terrorist effort gets cheaper) and decreases in both players' valuation of crime objectives (since crime then becomes more attractive for the terrorist and more crime protection by the government is needed,  $q = Qs/S$ ). Furthermore,  $t/x$  increases in the terrorist's unit benefit  $b$  of terrorist effort, increases in the terrorist's unit cost  $c$  of crime effort (since crime effort gets more expensive), increases in the terrorist's additional unit cost  $d$  of crime effort and increases in the players' valuation  $S$  of terrorism objectives.<sup>30</sup>

Property 3.  $\partial u/\partial a < 0$ ,  $\partial U/\partial a > 0$ ,  $\partial u/\partial b > 0$ ,  $\partial U/\partial b < 0$ ,  $\partial u/\partial c < 0$ ,  $\partial U/\partial c > 0$ ,  
 $\partial u/\partial d < 0$ ,  $\partial U/\partial d > 0$ ,  $\partial u/\partial A > 0$ ,  $\partial U/\partial A < 0$ ,  $\partial u/\partial C > 0$ ,  $\partial U/\partial C < 0$ ,  
 $\partial u/\partial r > 0$ ,  $\partial U/\partial r < 0$ ,  $\partial u/\partial R < 0$ ,  $\partial U/\partial R > 0$ ,  $\partial u/\partial s > 0$ ,  $\partial U/\partial S < 0$ ,  
 $\partial u/\partial q > 0$ ,  $\partial U/\partial Q < 0$ ,  $\partial u/\partial m > 0$  if  $\frac{r/R}{(a-b)/A} > 1$ ,  $\partial U/\partial m < 0$  if  $\frac{r/R}{(a-b)/A} >$   
 $1$ ,  $\partial u/\partial n > 0$  if  $\frac{r/R}{(c+d)/C} > 1$ ,  $\partial U/\partial n < 0$  if  $\frac{r/R}{(c+d)/C} > 1$ .

Property 3 advantages a player with low unit costs and large resource, advantages the terrorist of large unit benefit  $b$  and large valuations  $s$  and  $q$  and disadvantages the government of large valuations  $S$  and  $Q$ . The terrorist prefers increased contest intensities  $m$  and  $n$  if its terrorism superiority ratio and crime superiority ratio are larger than one, and otherwise prefer decreased contest intensities.

#### 4. Calibrating the parameters

Our sample includes the 51 most active terrorist organisations listed in the START database (<http://www.start.umd.edu/start/gtd/>) and are shown in Tables 1 and 2. START lists the activities of the groups. As has been noted in the extant literature,<sup>31</sup> nearly all groups tend to specialise in the attack types. In fact, for these groups, the top three activities comprise nearly 90% of their total. This section calibrates the 14 parameters, i.e. seven terrorist parameters  $r$ ,  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $s$ ,  $q$ , five government parameters  $R$ ,  $A$ ,  $C$ ,  $S$ ,  $Q$  and

Table 1. Categorisation of 51 terrorist organisations according to attack, target, capital funding, ideology and ability to coerce.

	Attack type	Target type	Capital funding	Ideology	FSI
Abu Nidal organisation	13 Ass,B,AA	12 G	18 Syria, Libya, Iraq	25	26.5
Abu Sayyaf group	5 K	6 C,Bu,RF/M	9 E rackets and K-for-ransom	11	83.2
Al-Aqsa Martyrs brigade	19 B,AA,Ass	15 C,M,G	18 al-Fatah	34	91.4
al-Gama'a al-Islamiyya	20 AA,Ass,B,	15 Hard	18 Iran,Afghan militant groups, islamic NGOs	35	90.4
al-Haramain foundation	18 Ass	18 P	18 Saudi intelligence	36	73.4
Al Ittihad Al Islamia	18 AA,Ass,B	18 Ethiopian army	18 Middle East financiers, remittances	36	114.9
al-Qaeda	20 B,AA,Ass	8 C,G,T	18 Ch	28	26.5
All Tripura Tiger Force	18 AA	6 C	9 E	24	78
Amal	15 B,Ass,AA	12	18 G,C,M	27	85.8
Ansar al-Islam	15 B,AA,Ass	14 P,G,C	18 al-Qaeda	29	104.3
Armed Islamic group	16 ArA,B,Ass	13	9 C,M,Bu	29	78.1
Asbat al-Ansar	16 ArA,B,Ass	15 M,C,RF	18 al-Qaeda, etc.	31	85.8
Aum Shinrikyo	17 Ass,AA,B	15	18 C,M,P	32	43.5
Communist Party of India (Maoist)	13 ArA,B,K	11	9 Remote villagers	24	78
Communist Party of Nepal (Maoist)	13 B,AA,F	14 M,C,P	14 Expatriate Nepalese,E,bank R	27	93
Continuity IRA	13 B,AA,F	13 P,C,G	9 E,bomb-making for hire,R	26	26.5
East Turkestan Islamic Movement	18 AA	6 C	14 al-Qaeda,Taliban	24	81.78
Eritrean Liberation Front	10 H,B,AA,	18 P,M,C	18 Iraq, Syria	28	94.5
Basque (Euskadi ta Askatasuna)	17 Ass,AA,B	13	9 K,E,R	30	42.8
Hamas M Wing	19 S	13 Hard	18 Iran, Islamic Ch, Arab expatriates, enterprises	32	82.2
Hezbollah	19 S	11 Hard	18 Iran, Syria, world-wide	30	85.8
Harakat ul-Mujahidin	14 AA,B,H	13	18 Pakistanis Kashmiris, ISI	27	101.6
IRA	16 B,Ass,F	16 M,C,G	13 E, bank R, Catholic-Irish descendants	32	26.5
Jamaat-ul-Mujahideen Bangladesh	16 AA,B	10 G,Pr C	18 Pr C, Persian Gulf NGOs	26	92.2
Jemaah Islamiya	18 AA	18 P	18 Ch, al-Qaeda	36	83.2
Jund Ash Sham	16 B,AA,H	14 C,M,P	18 al-Qaeda	30	106
Jaish-e-Mohammed	12 B,AA,F	14 C,M,P	18 Do	26	78
Kurdistan Workers Party (PKK)	20 AA,B,F	15 M,T	10 D, E, Ch, Syria, Iran, Iraq	35	71
Lashkar-e-Taiba	14 AA,B,F	14 C,M,P	18 Pakistani ISI	28	78
Lashkar-e-Jhangvi	15 B,AA,Ass	10 C,G,P	18 Karachi benefactors	25	78
Loyalist Volunteer Force	10 F,AA,B	6 C,RF,Bu	9 Narcotics, crime	16	26.5
Kach and Kahane Chai	14 B,AA	6 J,NGO	18 Do	20	82.2

Mahdi Army	13 B,AA,H	11 C,G,M	18 Iran	24	104,3
Moro National Liberation Front	13 B,AA,Ass	6 Bu,C,M	14 Tun Mustapha, Malaysian state of Sabah, Iran	19	83.2
Mujahedin-e Khalq	15 B,AA,Ass	17 M,G,	18 Iraq, expatriate Iranians, Ch	32	89.6
National Liberation Army	13 B,AA,H	17 M,G,	14 Cuba, E, K	30	84.4
Liberation Tigers of Tamil Eelam (LTTE)	20 AA,Ass,B,	17	18 Tamil communities	37	92.2
Palestinian Islamic Jihad	15 B,AA,Ass	13 C,M,G	18 Iran	28	82.2
National Democratic Front of Bodoland	14 ArA,B,K	6 C,Bu,T	9 K,E	20	78
National Liberation Army (Colombia)	13 B,AA,H	10 C,U,M	14 Cuba (past),E,K	23	84.4
People's Revolutionary Party of Kangleipak	13 B,AA,H	6 C,Bu,U	9 E	19	78
Popular Front for the Liberation of Palestine	13 U,C,M	14 B,AA,H	18 Syria, Libya, USSR and China	27	82.2
Real IRA	15 B,AA,Ass	13 P,C,G	18 Do	28	26.5
Sipah-e-Sahaba Pakistan	18 AA,B,Ass	6 C,RF,Bu	18 Ch, Sunnis, madrasses	24	101.6
Students Islamic Movement of India	12 B	6 C,Bu,T	18 Hizb-ul-Mujahideen,ISI	18	78
Tehrik-i-Taliban Pakistan	13 B,AA,H	16 M,C,G	12 D,ISI	29	101.6
Ulster Defence Association	17 Ass,B,AA	16 M,C,G	9 D, E, counterfeiting	33	26.5
Ulster Volunteer Force	17 Ass,AA,B	9 C,Bu,M	9 D,E,R	26	26.5
Revolutionary Armed Forces of Colombia (FARC)	13 B,AA,H	14 C,M,P	9 Co,E,K,Hi	27	84.4
Shining path	15 B,Ass,AA	8 C,Bu,P	9 Co	23	73.5
United Self-Defence Forces of Colombia	14 AA,K,Ass	6 C,Bu	12 D,Do	20	84.4

Notes: Ass = assassinations, AA = armed assault, ArA = armed attack, B = bombing, K = kidnapping, H = hostage, S = suicide, Hi = hijacking, F = facilities, G = government, M = military, P = police, C = citizens, RF = religious figures, J = journalists, Pr = private, U = utilities, T = transportation, E = extortion, R = robberies, D = drugs, Co = cocaine, Bu = business, Do = donations, Ch = charities, NGO = non-governmental organization.

Source: <http://www.start.umd.edu/start/>.

Table 2. Thirteen additional columns for Table 1.

	Be	R	R	$a - b$	$c$	$d$	$A = C$	$m$	$n$	$x$	$t$	$X$	$T$
Abu Nidal organisation	Y	4.5	8.7	1	2.5	1.5	1	1.3	1.67	0.25	3.48	1.96	6.71
Abu Sayyaf group	N	1.1	2.8	4	1	0	3.14	1.15	1.33	0.66	0.11	0.53	0.35
Al-Aqsa Martyrs brigade	Y	5.4	2.5	1	2.5	1.5	3.45	1.38	1.83	1.06	1.14	0.57	0.15
al-Gama'a al-Islamiyya	Y	5.5	2.5	1	2.5	1.5	3.41	1.38	1.83	1.08	1.17	0.59	0.16
al-Haramain foundation	Y	5.6	3.1	1	2.5	1.5	2.77	1.45	2	1.05	1.4	0.85	0.28
Al Ittihad Al Islamia	Y	5.6	2	1	2.5	1.5	4.34	1.45	2	1.18	0.87	0.39	0.07
al-Qaeda	Y	4.8	8.7	1	2.5	1.5	1	1.2	1.44	0.31	3.55	2.26	6.41
All Tripura Tiger Force	N	2.4	2.9	1.11	1	0	2.94	1.15	1.33	1.17	1.11	0.49	0.51
Amal	Y	4.7	2.7	1	2.5	1.5	3.24	1.3	1.67	0.86	1.25	0.61	0.22
Ansar al-Islam	Y	4.9	2.2	1	2.5	1.5	3.94	1.35	1.78	0.98	0.99	0.45	0.11
Armed Islamic group	N	2.9	2.9	1.25	1	0	2.95	1.33	1.72	1.33	1.26	0.46	0.54
Asbat al-Ansar	Y	5.1	2.7	1	2.5	1.5	3.24	1.38	1.83	0.98	1.19	0.63	0.19
Aum Shmrikyo	Y	5.2	5.3	1	2.5	1.5	1.64	1.38	1.83	0.57	2.93	1.4	1.82
Communist Party of India	N	2.4	2.9	1.54	1	0	2.94	1.28	1.61	1.07	0.86	0.45	0.55
Communist Party of Nepal (Maoist)	Y	4.7	2.5	1	1.5	0.5	3.51	1.35	1.78	1.58	1.53	0.47	0.23
Continuity Irish Republic	N	2.6	8.7	1.54	1	0	1	1.33	1.72	1.57	0.67	5.23	3.44
East Turkestan Islamic Movement	Y	4.4	2.8	1	1.5	0.5	3.09	1.15	1.33	1.36	1.68	0.56	0.35
Eritrean Liberation Front	Y	4.8	2.4	1	2.5	1.5	3.57	1.45	2	0.96	0.95	0.55	0.14
Basque (Euskadi ta Askatasuna)	N	3	5.4	1.18	1	0	1.62	1.33	1.72	1.52	1.26	1.68	1.64
Hamas M Wing	Y	5.2	2.8	1	2.5	1.5	3.1	1.33	1.72	0.97	1.33	0.67	0.23
Hezbollah	Y	5	2.7	1	2.5	1.5	3.24	1.28	1.61	0.92	1.31	0.61	0.22
Harakat ul-Mujahidin	Y	4.7	2.3	1	2.5	1.5	3.83	1.33	1.72	0.92	1.02	0.46	0.13
IRA	Y	5.2	8.7	1	1.4	0.36	1	1.4	1.89	1.22	3.09	3.52	5.15
Jamaat-ul-Mujahideen	Y	4.6	2.5	1	2.5	1.5	3.48	1.25	1.56	0.85	1.2	0.53	0.19
Jemaah Islamiya	Y	5.6	2.8	1	2.5	1.5	3.14	1.45	2	1.1	1.18	0.69	0.19
Jund Ash Sham	Y	5	2.2	1	2.5	1.5	4	1.35	1.78	1	0.98	0.44	0.11
Jaish-e-Mohammed	Y	4.6	2.9	1	2.5	1.5	2.94	1.35	1.78	0.82	1.33	0.71	0.29
Kurdistan Workers Party (PKK)	Y	5.5	3.2	1	1.1	0.07	2.68	1.38	1.83	2.57	2.56	0.65	0.56
Lashkar-e-Taiba	Y	4.8	2.9	1	2.5	1.5	2.94	1.35	1.78	0.86	1.35	0.72	0.28
Lashkar-e-Jhangvi	Y	4.5	2.9	1	2.5	1.5	2.94	1.25	1.56	0.77	1.42	0.68	0.32
Loyalist Volunteer Force	N	1.6	8.7	2	1	0	1	1.15	1.33	1.05	0.27	5.71	2.97

Kach and Kahane Chai	Y	4	2.8	1	2.5	1.5	3.1	1.15	1.33	0.66	1.37	0.59	0.31
Mahdi Army	Y	4.4	2.2	1	2.5	1.5	3.94	1.28	1.61	0.85	1.02	0.43	0.13
Moro National Liberation	Y	3.9	2.8	1	1.5	0.5	3.14	1.15	1.33	1.19	1.51	0.54	0.34
Mujahedin-e Khalq	Y	5.2	2.6	1	2.5	1.5	3.38	1.43	1.94	1.03	1.08	0.6	0.16
National Liberation Army	Y	5	2.7	1	1.5	0.5	3.18	1.43	1.94	1.7	1.6	0.58	0.27
Liberation Tigers of Tamil Eelam (LTTE)	Y	5.7	2.5	1	2.5	1.5	3.48	1.43	1.94	1.15	1.09	0.58	0.14
Palestinian Islamic Jihad	Y	4.8	2.8	1	2.5	1.5	3.1	1.33	1.72	0.88	1.29	0.66	0.24
National Democratic Front	N	2	2.9	1.43	1	0	2.94	1.15	1.33	0.94	0.74	0.47	0.53
National Liberation Army	Y	4.3	2.7	1	1.5	0.5	3.18	1.25	1.56	1.37	1.56	0.55	0.31
People's Revolutionary	N	1.9	2.9	1.54	1	0	2.94	1.15	1.33	0.89	0.65	0.47	0.53
Popular Front for the Liberation of Palestine	Y	4.7	2.8	1	2.5	1.5	3.1	1.35	1.78	0.86	1.25	0.66	0.24
Real IRA	Y	4.8	8.7	1	2.5	1.5	1	1.33	1.72	0.27	3.71	1.97	6.7
Sipah-e-Sahaba Pakistan	Y	4.4	2.3	1	2.5	1.5	3.83	1.15	1.33	0.8	1.19	0.43	0.16
Students Islamic Movement of India	Y	3.8	2.9	1	2.5	1.5	2.94	1.15	1.33	0.6	1.4	0.63	0.37
Tehrik-i-Taliban Pakistan	Y	4.9	2.3	1	1.3	0.25	3.83	1.4	1.89	2.03	1.86	0.37	0.22
Ulster Defence Association	N	3.3	8.7	1.18	1	0	1	1.4	1.89	1.77	1.3	4.64	4.03
Ulster Volunteer Force	N	2.6	8.7	1.18	1	0	1	1.23	1.5	1.38	1.03	4.62	4.05
Revolutionary Armed Force	N	2.7	2.7	1.54	1	0	3.18	1.35	1.78	1.13	1.02	0.36	0.5
Shining Path	N	2.3	3.1	1.33	1	0	2.77	1.2	1.44	1.08	0.91	0.53	0.6
United Self-Defence Force	Y	4	2.7	1	1.3	0.25	3.18	1.15	1.33	1.53	1.7	0.49	0.36

Notes: Be = benefactor, Y = yes, N = no.

the two contest intensities  $m$  and  $n$ . For most groups, the top three attack and target types comprise nearly 90% of their respective activities, ranked as 3 (most prevalent), 2 (second most prevalent) and 1 (third most prevalent), respectively.

The START database lists nine terrorist attack types. These are armed assault, assassination, bombing, facility/infrastructure attack, hijacking, hostage taking, unarmed assault and unknown. No separate dataset for suicide bombing and Fedayeen type attacks is listed. We constructed a separate list of groups that carry out these attacks. We assigned the following weights according to the personal risk that the operatives took to perform these: suicide bombing and/or Fedayeen type attacks = 4 reflecting that these are most risky involving loss of life; assassination/armed assault = 3 reflecting that these are less risky not guaranteeing loss of life for the perpetrator; bombing = 2 which is less risky; kidnapping/hostage taking = 1 which is least risky. We designed an attack type index by multiplying the three prevalence rankings 3, 2 and 1 with the corresponding weights 4, 3, 2 and 1 and summing up. This gives an index between 0 and 20 shown in the second column in Table 1. For example, if a group has attack type prevalence rankings bombing (3), suicide bombing (2) and kidnapping/hostage taking (1), the attack type index is  $3 \times 2 + 2 \times 4 + 1 \times 1 = 16$ . We calibrate the unit cost  $a$  of terrorist effort as 20 divided by the terrorist attack type index, which scales to a number between 1 and infinity.

The START database lists 22 target types. We assigned the following weights according to target 'hardness': military = 4 reflecting the possession of the most lethal weapons and skills; police = 3 reflecting less lethal weapons; government = 2 reflecting political persuasion but limited weaponry; civilian/business/facility = 1 which are usually limitedly hardened. Multiplying the three prevalence rankings 3, 2 and 1 with the corresponding weights 4, 3, 2 and 1 and summing gives the target type index between 0 and 20 shown in the third column in Table 1. For example, if a group has target type prevalence rankings: military (3), civilian (2) and police (1), the attack type index is  $3 \times 4 + 2 \times 1 + 1 \times 3 = 17$ . The terrorist contest intensity  $m$  is calibrated as one plus the target type index divided by 40, which gives a number between 1 and 1.5.

For capital funding, we first make a distinction between capital funding by a specific country or the Diaspora or voluntary donations by the community and those derived through criminal activities. If the START database lists all the top three methods of fund raising, the presence of benefactors and voluntary contributions by the Diaspora or the political base, these groups are classified as 'benefactor funded'. If the groups are without any benefactor (which includes community support) and have to raise money through criminal activities, we classify these as 'criminally funded'. Thirty nine of the fifty-one groups (76%) in Table 1 enjoy benefactor support. We assigned the value 4 if there is a benefactor, and value 2 for criminal activities and no benefactor. The START database provides terrorist group profiles, where the method of funding is included. Again, we assign prevalence rankings 3, 2 and 1, multiplied with 4 (if benefactor) and multiplied with 2 (if no benefactor), and summing. Assume, for instance, that a group's three most prevalent sources of funding listed in the START database are ranked as kidnapping (rank 3), 'country  $x$ ' (rank 2) and charitable contribution (rank 1). For kidnapping, we assign 2, for 'country  $x$ ' as the benefactor we assign 4 and for charitable contribution we assign 4. Thus, we calculate the finance index as  $3 \times 2 + 2 \times 4 + 1 \times 4 = 18$ .

START provides terrorist group profiles, including the funding method, but not the amount of funds provided which is usually confidential. If the terrorist has a benefactor, we set  $a - b = 1$ , regardless of how  $a$  is calibrated above, and otherwise we set  $b = 0$  and thus  $a - b = a$ . The reasoning is that the benefactor can decrease the terrorist's unit cost of terrorist effort to one, but not below one.

We calibrate a terrorist's resource  $r$  as the sum of the terrorist attack type (between 0 and 20), the target type (between 0 and 20) and the value 20 or 0 dependent on whether the terrorist has a benefactor or not, divided by 10, which gives a value between 0 and 6.

The START database specifies that four crime attack types are specified in the START database; extortion, robberies, drugs, cocaine. For the 12 terrorist organisations in Table 1 engaged exclusively in crime, the unit cost  $c$  of crime effort is low. We define  $c = 15/(24 - \text{finance index})$  which gives  $c = 1$  for these 12 terrorist organisations which have a finance index equal to 9 and a higher unit cost  $c$  of crime effort for terrorist organisations with a higher finance index. The latter is less involved in crime. The crime contest intensity  $n$  is calibrated as one plus the target type index divided by 40, which gives a number between 1 and 1.5.

A benefactor can increase a terrorist's unit cost of crime effort. With no benefactor we set  $d = 0$ . With a benefactor we set  $d = c - 1$ , thus punishing terrorists with large unit cost  $c$  of crime effort. We also set  $s = q = 1$ .

For the government, the parameters are  $R, A, C, S, Q$ . Various economic indicators such as gross domestic product do not necessarily express a government's various unit costs and resource allocated to terrorism and crime. We choose instead to use the failed state index (FSI) (<http://www.foreignpolicy.com/failedstates>) for the countries where the 51 terrorists operate, and which varies from 26.5 (Ireland) to 114.9 (Somalia). If a group is based in one country but operates in other countries, we average the index across the countries. We calibrate the government's resource  $R$  as 229.8 divided by the failed state index, which gives a resource between 2 (Somalia) and 8.7 (Ireland). We calibrate the government's unit costs  $A$  and  $C$  of terrorism and crime protection as the failed state index divided by 26.5. This gives a number between 1 (Ireland) and 4.3 (Somalia). Finally we set  $S = Q = 1$ .

In Table 2, the players' four efforts  $x, t, X$  and  $T$  are shown in the four columns at the right, determined by inserting the parameter values into Equations (5) and (7). For example, row 1 shows the Abu Nidal organisation scoring reasonably high on ideology and low on FSI. The crime effort is thus low,  $x = 0.25$ , and the terrorist effort is high,  $t = 3.48$ . The protection is also high,  $X = 1.96$  and  $T = 6.71$ . The results are similar for al-Qaeda in row 7. Conversely, in row 2, the Abu Sayyaf group scores lower on ideology and higher on FSI implying larger crime effort  $x = 0.66$  and weaker government protection  $X = 0.53$  and  $T = 0.35$ . In row 6, Al Ittihad Al Islamia scores high on both ideology and FSI implying high crime effort  $x = 1.18$ , low terrorist effort  $t = 0.87$  and low government efforts  $X = 0.39$  and  $T = 0.07$ . In the third last row, FARC scores higher on crime than on terrorism,  $x = 1.3$  and  $t = 1.02$  and government protection is weak,  $X = 0.36$  and  $T = 0.5$ . This method is suggested as a tool. Adjusting the parameter values enables determining the impact on the players' strategic choice variables.

Let us consider a few limitations. First, we do not consider the structure of terrorist organisations, e.g. many versus few levels, centrally and hierarchically governed versus decentralised (e.g. into cells unaware of each other's existence), authoritarian versus democratic, etc. Second, we do not consider how terrorist organisations and governments evolve over time as trends within terrorism and crime fluctuate. Third, to allow for a quantitative analysis, we consider one-dimensional variables where we do not distinguish between how different kinds of efforts interact synergistically (government efforts can be e.g. military, political, diplomatic, humanitarian). Finally, although we have not explicitly modelled how government efforts against terrorism may raise hatred or suppress hatred through providing positive and negative incentives,<sup>32</sup> we have focused on the overall impact of combatting terrorism and crime.

## 5. Discussion of insights

Our model reflects the ill-understood reality within a theoretical game theoretic framework. Specifically, our model allows us to discuss the following insights.

- (1) Terrorist organisations remain ideologically pure only by ensuring capital funding by benefactors. Those groups that are able to find steady benefactors, do not have to sacrifice their ideological purity by engaging in nefarious activities that would lower their esteem among their political base. Furthermore, ideologically motivated benefactors may not want to be associated with a bunch of criminals. Therefore, they would insist on maintaining the group's ideological compass. See references<sup>33</sup> for example of benefactors of various terrorist groups. Such groups also avoid crass criminal activities that would put their reputation at risk. On the other hand, a benefactor is also mindful of the reputation of the group it supports. Thus, Rogers<sup>34</sup> reported that in 1990, Abdulrajak Janjalani, a representative of Philippine's Moro Islamic Liberation Group (MILF) established contact with Osama bin-Laden's brother-in-law, Muhammad al-Khalifa. Impressed by the group's adherence to the global Salafi rhetoric, bin Laden started sending money to the emergent group, Abu Sayyaf with Janjalani at its head. However, he soon realised that the group and its leadership was more interested in kidnapping and hostage taking for ransom than carrying out attacks against the West. Realising its true nature, al-Qaeda quickly disavowed its links with Abu Sayyaf.
- (2) Terrorist organisations unable to attract sufficient funding recruit mercenaries to ensure funding through criminality. Military operation against an established regime costs money. A group without sufficient funding will have to supplement its income by engaging in criminal activities. Thus, a 'grass root' jihadi group carried out the 2004 Madrid train bombing financed partially by limited contributions from the Maghreb Diaspora. However, without any financial assistance from al-Qaeda or other deep-pocket benefactors, the group had to finance its operations by dealing in illegal drugs.<sup>35</sup>
- (3) Terrorist organisations attracting no funding will die or become criminal. Rapoport,<sup>36</sup> by drawing on historical evidence, found that most terrorist organisations, similar to all other small businesses, disappear within the first few years of their existence. Those who survive, all develop secured sources of funding.
- (4) Criminal organisations may, at least theoretically, become terrorist organisations. One example is the Mumbai based criminal gang headed by Dawood Ibrahim who was approached and protected by the Pakistani secret service to conduct terrorism in retaliation for Hindu's attacks on the Muslims.<sup>37</sup> The gang carried out the attacks and, facing intense pressure from the Indian government, Ibrahim and his top assistants had to flee India and is rumoured to be living in Karachi under the protection of the ISI.
- (5) In countries with strong central authorities, terrorist organisations suffer diseconomies of scale due to government sanctions. Examples are the Black Panthers,<sup>38</sup> the Symbionese Liberation Army,<sup>39</sup> the Baader Meinhoff group<sup>40</sup> and Aum Shnirikyo.<sup>41</sup>
- (6) In countries with weak central authorities, terrorist organisations enjoy economies of scale due to lack of government sanctions. Such organisations may become criminal dependent on their structure. Eccarius-Kelly<sup>42</sup> showed



how FARC in Colombia chose a decentralised divisionalised structure where each division leader maintained autonomy causing departure from ideology and entry into criminality.<sup>43</sup> Another example is Taliban in Afghanistan.<sup>44</sup> In contrast, Kurdistan Workers' Party (PKK) chose a centralised structure controlling its criminal divisions.

## 6. Some broader historical developments linked to the model

Having discussed the major findings of our model, let us place the model into a broader historical perspective. A terrorist organisation can lose its ideology and become criminal in many different ways. First, the ideology may become obsolete, causing fewer or less ardent ideologues. For example, after Sinn Fein became legitimate in 1974, the Provisional Irish Republican Army (PIRA) lost some of its ideological foundation and partly turned towards criminality.<sup>45</sup> Also, when Spain became democratic after Francisco Francos death in 1975, Euskadi Ta Askatasuna (ETA) requesting Basque independence faced a different environment, and some turned to criminality.<sup>46</sup> Second, the death or imprisonment of a terrorist organisation's leader may cause less ardent ideological supporters. For example, when the Turkish Workers' Party's (PKK) leader Abdullah Ocalan was arrested in 1997, the PKK lost some of its compass and turned temporarily to criminality.<sup>47</sup> Third, new ideologies may replace obsolete ideologies, the world's values change, and switches from terrorist ideologies to criminality may come easily.

The end of the Cold War around 1991 illustrated how external factors may impact terrorist organisations. The sharp distinction between the left and the right became less distinct at the global level as the two former super powers changed their allegiances. For example, the United States' support for the Mujahideen in Afghanistan and National Union for the Total Independence of Angola (Portuguese: União Nacional para a Independência Total de Angola) in Angola changed, and the Soviet Union's support for various revolutionary groups changed. This caused several terrorist organisations to shift focus towards criminality, e.g. the Abu Nidal Organisation.<sup>48</sup> After the end of the Cold War, a pronounced trend of religious fundamentalism has occurred funded especially by benefactors in oil rich Islamic countries.<sup>49</sup>

The 9/11 attacks caused further changes in stances towards terrorism. Rather than conceptualising international terrorism merely as a foreign policy issue, countries developed new attitudes.<sup>50</sup> For example, funding terrorists required more thorough justification and sometimes ceased. International banking developed new rules to prevent or hamper international money transfers between illegal groups.<sup>51</sup> A global war on terrorism emerged, monitoring and infiltrating groups and individuals, supervising social media and internet communications, etc.

## 7. Conclusion

A game theoretic model is developed where a terrorist seeks terrorism and crime objectives, while a government protects. A terrorist enjoying a benefactor may remain ideologically pure, and may otherwise lose its ideological direction by seeking funding through crime. We quantify how a terrorist strikes a balance between terrorism and crime. The START database (<http://www.start.umd.edu/start/gtd/>) and FSI (<http://www.foreignpolicy.com/failedstates>) are used to calibrate 14 parameters; two resources, five unit costs, one unit benefit, two contest intensities and four valuations for terrorist and crime objectives. The FSI expresses, in varying degrees, low

resourcefulness, weak governmental institutions, limited police willingness to repress terrorism and high societal tolerance for terrorism.

We first find that the terrorist's ratio of efforts into terrorism relative to crime, as a reaction (or best-response) function, increases in the government's ratio of efforts into terrorism relative to crime. We interpret this such that the terrorist's ideological orientation on a continuum from a pure focus on terrorism to a pure focus on crime depends positively on the government's ability or willingness to impose sanctions on the terrorist's terrorism and crime efforts. Hence, if the government increases its relative effort into terrorism compared with crime, the terrorist may increase its relative effort into terrorism compared with crime.

We next find support for the eight theoretical results that the terrorist exerts more effort into terrorism than crime when (1) the unit cost of terrorist effort decreases, (2) the unit benefit, provided by a benefactor, of terrorist effort, increases, (3) the unit cost of crime effort increases, (4) the additional unit cost, imposed by a benefactor, of crime effort increases, (5) the value of terrorism objectives increases, (6) the value of crime objectives decreases, (7) the government's unit cost of terrorism protection effort decreases provided that the terrorist is advantaged regarding terrorism and (8) the government's unit cost of crime effort increases provided that the terrorist is advantaged regarding crime. These eight results establish a terrorist's relative ideological orientation on a continuum from being highly ideological to being highly criminal.

The government policy can influence a terrorist's orientation for these eight results as follows: (1) making it costly for terrorists to exert effort through laws, surveillance, detection, prosecution, etc. (2) Prevent benefactors from aiding terrorists, through criminalisation, illumination, freezing asset transfers, etc. (3) Making it less costly for terrorists to exert crime efforts may lure terrorists from terrorism to crime, but here a total assessment is needed. (4) The same logic as point 3, influencing the benefactor, and total assessment. (5) Make terrorist objectives less valuable. (6) Make crime objectives more valuable. (7) If the terrorist is perceived to have advantages with respect to terrorism, the terrorist can be induced to exert higher terrorist effort if the government's unit cost of terrorism protection is low. (8) Conversely, if the terrorist is perceived to have advantages with respect to crime, the terrorist can be induced to exert higher terrorist effort if the government's unit cost of crime protection is high.

We further find empirical support for the theoretical results that a player is advantaged in terms of utility when (9) unit costs are low, (10) resources are large, (11) the unit benefit is large. Furthermore, (12) the terrorist is advantaged by large valuations of terrorism and crime objectives. Conversely, (13) the government is disadvantaged by large valuations of terrorism and crime objectives. Finally, (14) a player prefers increased contest intensities for terrorism and crime when advantaged with so-called terrorism and crime superiority ratios larger than one. A player has a large superiority ratio when its resource is large and its unit costs are low compared with the other player. The terrorist prefers increased contest intensities  $m$  and  $n$  if its terrorism superiority ratio and crime superiority ratio are larger than one, and otherwise prefer decreased contest intensities.

The government policy can influence the utilities for these six results as follows: (9) increase the terrorist's unit costs and decrease the government's unit costs. (10) Confiscate, freeze and prevent the accumulation of terrorist resources. Increase government resources. (11) Prevent benefactors from aiding terrorists. (12) Decrease the terrorist's valuations of terrorism and crime objectives. (13) Decrease the government's valuations of terrorism and crime objectives, which may be impossible when faced

with terrorists with opposing interest. (14) If the government can ensure that its terrorism and crime superiority ratios are superior, which is most straightforwardly ensured by increasing its resources allocated to terrorism and crime, large contest intensities for terrorism and crime are beneficial for the government and not for the terrorist.

A terrorist seeking terrorism and crime objectives recruit ideologues and criminal mercenaries. Ideologues provide ideological purpose and direction. If only ideologues are present, capital funding from outside is needed. If ideologues and mercenaries are present, the mercenaries can provide additional funding, but may corrupt the organisation if they become too numerous. A model is developed that allows for the joint presence of both ideologues and mercenaries, or only one of the two types of actors, dependent on a variety of factors.

That both ideologues and mercenaries are present means that the mercenaries' productive advantage outweighs the decrease they cause in ideological purity. When all benefactors leave, funds cannot be generated legally, and crime is not effectively sanctioned, an organisation substantially involved in crime emerges. Examples are FARC in Colombia, Taliban in Afghanistan, al-Shabab in Somalia and Sendero Luminos in Peru.

### Disclosure statement

No potential conflict of interest was reported by the authors.

### Notes

1. Hiro, *Apocalyptic Realm*, 184.
2. Crenshaw, "How Terrorism Declines"; Rapoport, *Terrorism*; Gupta, *Understanding Terrorism*; Gupta et al., "Terrorism and Organized Crime"; Gaibulloev and Sander, "Determinants of the Demise of Terrorist Organizations."
3. Picarelli, "Osama bin Corleone?," 180.
4. For related research, see Azam, "On Thugs and Heroes"; Gates, "Recruitment and Allegiance"; Humphreys and Weinstein, "Handling and Manhandling Civilians"; Kaplan, "Nudging Armed Groups"; McCormick, "Terrorist Decision Making"; Shapiro, *The Terrorist's Dilemma*; Weinstein, "Resources and the Information Problem"; Weinstein, *Inside Rebellion*.
5. Ehrenfeld, *Narco-Terrorism*.
6. Lyman and Potter, *Organized Crime*, 307.
7. Sanderson, "Transnational Terror and Organized Crime."
8. Kenney, *From Pablo to Osama*.
9. For research on the relationship between terrorism and crime based on motivations see Makarenko, "Transnational Crime"; Napoleoni, *Terror Incorporated*; Shelley and Picarelli, "Methods and Motives"; Dishman, *Terrorism and Counterterrorism*; and Forest, "Intersections of Crime and Terror", see Berman, " Hamas, Taliban, and Jewish Underground"; Berman and Laitin, "Hard Targets"; Berman and Laitin, "Religion, Terrorism and Public Goods"; Hoffman, *Inside Terrorism*. Also, they apply violence, politics, and propaganda, see Schmid, "Links between Terrorism and Drug Trafficking," 8. In contrast, criminal groups aim at securing private goods for their members, see Schelling, "Business of Organized Crime." A common factor conceptualised in this article is that both seek to reach objectives.
10. Bernholz, "Supreme Values as the Basis for Terror."
11. Rapoport, "Terrorism."
12. Constable, *Playing with Fire*; Jones and Catignani, *Israel and Hizbollah*.
13. Shahzad, *Inside al-Qaeda and the Taliban*.
14. Napoleoni, *Terror Incorporated*.
15. Brock Blomberg et al., "Terrorist Group Survival"; Siqueira and Sandler, "Terrorists versus the Government."
16. Hoffman, *Inside Terrorism*.

17. Gupta, *Understanding Terrorism*.
18. Ibid.
19. Betancourt, *Even Silence Has an End*.
20. English, *Armed Struggle*.
21. Rogers, "Beyond Abu Sayyaf."
22. Holland and McDonald, *INLA: Deadly Divisions*; English, *Armed Struggle*.
23. Hiro, *Apocalyptic Realm*, 184.
24. Zaidi, *Black Friday*.
25. Hirshleifer, "Anarchy and Its Breakdown," 28.
26. Tullock, "Welfare Costs of Tariffs, Monopolies, and Theft."
27. Salop and Scheffman, "Raising Rivals' Costs."
28. Stiglitz and Bilmes, "True Cost of the Iraq War."
29. Skaperdas, "Contest Success Functions."
30. Furthermore,  $t/x$  decreases in the government's unit cost  $A$  of terrorism protection if the terrorist's terrorism superiority ratio  $\frac{r/R}{(a-b)/A}$  is larger than 1, so that the terrorist is advantaged regarding terrorism, and hence the terrorist exploits a weak government regarding terrorism by exerting relatively less effort into terrorism, and more into crime. Conversely,  $t/x$  increases in the government's unit cost  $C$  of crime protection effort if the terrorist's crime superiority ratio  $\frac{r/R}{(c+d)/C}$  is larger than 1, so that the terrorist is advantaged regarding crime, and hence the terrorist exploits a weak government regarding crime by exerting relatively more effort into terrorism, and less into crime. Furthermore,  $\partial(t/x)/\partial m > 0$  if  $m \ln\left(\frac{r/R}{(a-b)/A}\right) < \frac{\left(\frac{r/R}{(a-b)/A}\right)^m + 1}{\left(\frac{r/R}{(a-b)/A}\right)^m - 1}$  and  $\partial(t/x)/\partial n < 0$  if  $n \ln\left(\frac{r/R}{(c+d)/C}\right) < \frac{\left(\frac{r/R}{(c+d)/C}\right)^n + 1}{\left(\frac{r/R}{(c+d)/C}\right)^n - 1}$ . The dependence of  $t/x$  on  $r$  and  $R$  involves analytically more complicated relationships involving both the superiority ratios, i.e., if  $\frac{m\left(\left(\frac{r/R}{(c+d)/C}\right)^n + 1\right)\left(\left(\frac{r/R}{(a-b)/A}\right)^m - 1\right)}{n\left(\left(\frac{r/R}{(a-b)/A}\right)^m + 1\right)\left(\left(\frac{r/R}{(c+d)/C}\right)^n - 1\right)} < 1$ , then  $\partial(t/x)/\partial r > 0$  and  $\partial(t/x)/\partial R < 0$ .
31. Gupta, *Understanding Terrorism*.
32. Bier and Hausken, "Endogenizing the Sticks and Carrots."
33. Constable, *Playing with Fire*; Shahzad, *Inside al-Qaeda and the Taliban*; Jones and Catignani, *Israel and Hizbollah*; Napoleoni, *Terror Incorporated*; and Berman, "Hamas, Taliban, and Jewish Underground."
34. Rogers, "Beyond Abu Sayyaf."
35. Jordan et al., "Strengths and Weaknesses of Grassroot Jihadist Networks."
36. Rapoport, "Terrorism."
37. Hiro, *Apocalyptic Realm*; Tankel, *Storming the World Stage*.
38. Churchill and Wall, "Agents of Repression."
39. Findley et al., *The Life and Death of SLA*.
40. Aust and Bell, *Baader-Meinhof*.
41. Singer, *Cults in Our Midst*.
42. Eccarius-Kelly, "Surreptitious Lifelines."
43. Betancourt, *Even Silence Has an End*.
44. Piazza, "Opium Trade and Patterns."
45. English, *Armed Struggle*.
46. Spencer and Croucher, "Basque Nationalism and the Spiral of Silence."
47. Cronin, *End of Terrorism*; Roth and Sever, "Kurdish Workers Party"; Eccarius-Kelly, "Surreptitious Lifelines."
48. Wege, "Abu Nidal Organization."
49. Rapoport, "Four Waves of Modern Terrorism."
50. Schmid and Jongman, *Political Terrorism*.
51. Weintraub, "Financing of Terrorism"; Bantekas, "International Law of Terrorist Financing"; Masciandaro, *Global Financial Crimes*; McCulloch, "Financing of Terrorism."

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### Appendix. First and second order conditions

Differentiating Equation (3) with respect to  $x$  and  $X$ , respectively, and equating with zero, gives

$$\begin{aligned} \frac{\partial u}{\partial x} &= \frac{nqx^{n-1}X^n}{(x^n + X^n)^2} - \frac{(c+d)ms\left(\frac{r-(c+d)x}{a-b}\right)^m \left(\frac{R-CX}{A}\right)^m}{(r-(c+d)x)\left[\left(\frac{r-(c+d)x}{a-b}\right)^m + \left(\frac{R-CX}{A}\right)^m\right]^2} = 0, \\ \frac{\partial U}{\partial X} &= \frac{nQX^{n-1}x^n}{(x^n + X^n)^2} - \frac{CmS\left(\frac{r-(c+d)x}{a-b}\right)^m \left(\frac{R-CX}{A}\right)^m}{(R-CX)\left[\left(\frac{r-(c+d)x}{a-b}\right)^m + \left(\frac{R-CX}{A}\right)^m\right]^2} = 0 \end{aligned} \quad (A1)$$

The second order conditions, assuming  $q = Qs/S$  and inserting Equation (5), are

$$\begin{aligned} \frac{\partial^2 u}{\partial x^2} &= -\frac{(c+d)^2 R^2 nQ \left(1-n+(1+n)\left(\frac{Cr}{(c+d)R}\right)^n\right) \left(\frac{Cr}{(c+d)R}\right)^n}{c^2 r^2 x^2 \left(1+\left(\frac{Cr}{(c+d)R}\right)^n\right)^3} \\ &\quad - \frac{(c+d)^2 R^2 sm \left(1-m+(1+m)\left(\frac{Ar}{(a-b)R}\right)^m\right) \left(\frac{Ar}{(a-b)R}\right)^m}{r^2 (R-CX)^2 \left(1+\left(\frac{Ar}{(a-b)R}\right)^m\right)^3}, \\ \frac{\partial^2 U}{\partial X^2} &= -\frac{nQ \left(1+n+(1-n)\left(\frac{Cr}{(c+d)R}\right)^n\right) \left(\frac{Cr}{(c+d)R}\right)^n}{X^2 \left(1+\left(\frac{Cr}{(c+d)R}\right)^n\right)^3} \\ &\quad - \frac{C^2 Sm \left(1+m+(1-m)\left(\frac{Ar}{(a-b)R}\right)^m\right) \left(\frac{Ar}{(a-b)R}\right)^m}{(R-CX)^2 \left(1+\left(\frac{Ar}{(a-b)R}\right)^m\right)^3} \end{aligned} \quad (A2)$$