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Terrorist Signalling and the End of Violence

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Abstract: *This paper revisits the signalling literature of the interactions between terrorist organisations and governments. It argues that the theoretical literature to date, and particularly the signalling literature, builds models from the very singular backdrop of transnational terrorist spectaculars. Accordingly, policy recommendations cannot be extended to a broader realm of terrorist threats. By inverting the nature of the signalling, flipping it from a violent act to a peaceful one, this paper more accurately represents the continued interactions between terrorists and governments. A Revolutionary organisation exists and engages with the Incumbent government in order to affect material change to some aspect of the status quo. The Revolutionary believes that violence action and, in some cases, peacemaking, can achieve these goals. The Incumbent is suspicious of the Revolutionary and cannot observe if the Revolutionary is committed to violence or uses it, only, as a political tool. In the first period, the Revolutionary uses a costly peacemaking signal, selected from a continuous set, in an attempt to reveal its type and intentions to the Incumbent. In the second stage, both players engage simultaneously, choosing to devote resources to joint peaceful interaction or unilateral violence. This model sets out conditions that support pooling equilibria in which the signalling phase is ineffective and a separating equilibrium where the structure of the Incumbent's beliefs leads to differences in the Revolutionary's equilibrium behaviour. Accordingly, this model supports outcomes where Incumbent's beliefs and incentives can deter a nominally peaceful terrorist organisation for ceasing violence, whilst also providing a rational as to why political resolutions are the most common means to end terrorist conflicts.*
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Terrorist Signalling and the End of Violence

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This paper revisits the signalling literature of the interactions between terrorist organisations and governments. It argues that the theoretical literature to date, and particularly the signalling literature, builds models from the very singular backdrop of transnational terrorist spectaculars. Accordingly, policy recommendations cannot be extended to a broader realm of terrorist threats. By inverting the nature of the signalling, flipping it from a violent act to a peaceful one, this paper more accurately represents the continued interactions between terrorists and governments. A Revolutionary organisation exists and engages with the Incumbent government in order to affect material change to some aspect of the status quo. The Revolutionary believes that violence action and, in some cases, peacemaking, can achieve these goals. The Incumbent is suspicious of the Revolutionary and cannot observe if the Revolutionary is committed to violence or uses it, only, as a political tool. In the first period, the Revolutionary uses a costly peacemaking signal, selected from a continuous set, in an attempt to reveal its type and intentions to the Incumbent. In the second stage, both players engage simultaneously, choosing to devote resources to joint peaceful interaction or unilateral violence. This model sets out conditions that support pooling equilibria in which the signalling phase is ineffective and a separating equilibrium where the structure of the Incumbent's beliefs leads to differences in the Revolutionary's equilibrium behaviour. Accordingly, this model supports outcomes where Incumbent's beliefs and incentives can deter a nominally peaceful terrorist organisation for ceasing violence, whilst also providing a rational as to why political resolutions are the most common means to end terrorist conflicts.

Keywords: Terrorism, domestic conflict, game theory, signalling, Northern Ireland, South Africa, Spain, transnational terrorism, domestic terrorism.

1. Introduction

It seems common to begin economics of terrorism research with some reference to the events that happened in New York, Pennsylvania and Washington D.C. on September 11, 2001. Whilst this paper follows in this convention, it aims to do so for different purposes. The vast expansion in the literature since this date is suggestive of the singular role this event has played in determining the nature of academic thinking, with regards to terrorism. Particularly in the theoretical literature, the focus has predominantly looked at transnational organisations with strategies and incentives that seem broadly set around those used and expressed by al-Qaeda. Such notions are typified by the nomenclature employed by Behrens *et al.* (2006), who model a game between "The West" and an international terrorist organisation.

In this paper, I suggest that the work that has stemmed from this way of thinking suffers from two potentially fatal flaws; firstly, that it characterises terrorists too specifically, despite drawing examples from an array of terrorist threats. Secondly, these models are ill-suited to the notion of terrorist threats as an on-going phenomenon, rather than as static and isolated events. Whilst a number of al-Qaeda attacks can be considered as such - the motives involved in 9/11 were different to those in Bali, for example, suggesting they can be separated in such a way - it is less immediately obvious why on-going terrorism in Colombia or Turkey, for example, should be considered similarly.

Too often, the view of terrorism offered suggests it is an act of pure violence that can be deterred but not resolved. Whilst I am happy to defer to the frequently cited definition of terrorism provided by Enders and Sandler (2006)[1], this definition seems applicable, only, to the act of terrorism and not to the organisations who carry out such acts. I propose that the act of terrorism, whilst expressly violent, should be considered separately from the organisations that carry them out. These organisations, whilst willing to act violently, may have incentives to behave differently under the right conditions. This is in fitting with the second portion of the Enders and Sandler definition, which notes the "political or social objective," that is inherent in acts of terrorism. To date, the literature seems to treat terrorism and "terrorist organisations" in broadly the same terms.

[1] Enders and Sandler (2006) define terrorism as, "…the premeditated use or threat to use violence by individuals or subnational groups in order to gain a political or social objective through intimidation of a large audience beyond that of the immediate victims."

In following the notion that terrorist organisations, as well as the act of terrorism itself, are expressly violent, the literature seems to ask a question that is not relevant to the full spectrum of terrorist threats that exist, or have existed, throughout the world. In essence, the question asked almost treats terrorism an inevitable realisation of an underlying and permanent risk and asks, "How should governments respond to the threat and realisation of this violence?" A more reasonable question to ask seems to be, "Why do terrorists feel they have to act in the way that they do." Broadly speaking, this is not considered in the literature to date.

Policy suggestion, therefore, focuses on mitigation and deterrence, rather than active engagement with terrorists. In the context of a multifarious terrorist threat, such policy recommendations are too narrow. A significant proportion of these models have a working assumption that (potential) terrorists spend all resources on violence, or on some unrelated consumption. In short, these models suggest terrorists believe that violence is the only means by which they can achieve their goals and the alternative strategic choice is to forego these aims and go off and do something else. Accordingly, a subsequent question, "Why do people become terrorists," or, "Why do terrorist organisations act," is implicitly asked. Again, I propose that the more general and broadly applicable question, "How do (terrorist) organisations attempt to achieve their goals," should be asked.

The more typical notions are supported by Sandler and Enders (2004), who discuss the terrorists' problem in terms of target selection. Bueno de Mesquita and Dickson (2007) show a terrorist organisation that uses violence in order to generate a government backlash that radicalises the population, leading to further violence, and Siquiera and Sandler (2007) discuss the notion of terrorist popularity but only in the context of choosing violence to maximise support, as well as outcomes. Siquiera and Sandler define popularity in terms of terrorist funding, which is then used to unleash further violence.

Counter-terrorism literature, too, broadly seems to suffer from the same assumptions, where the focus looks at defensive and proactive policies to combat terrorism (e.g. Sandler and Siqueira (2006), Farrow (2007), Bier, Oliveros and Samuelsen (2007), Zhang and Bier (2007), Powell (2007), Bandyopadhyay and Sandler (2009)). Again, the view here is that terrorism is a violent risk and that policy should aim to reduce the realisation of this risk, or to reduce the impacts, should an event occur. Again, however, this is built on the notion that

terrorists are intrinsically violent. Standing in contrast to these notions, however, long-term terrorist conflicts in both Northern Ireland and South Africa have reached, broadly, peaceful outcomes with terrorists laying aside their arms and engaging in active and democratic politics.

Indeed, in an analysis of 648 terrorist groups active between 1968 and 2006, Jones and Libicki (2008) show that 43% of these groups ended up joining a political process. This is depicted as the most frequent end of terrorist conflicts. Second most frequent was due to infiltration and counter-terrorism policy by domestic police. Despite such real-life outcomes, much of the current theoretical literature offers no real suggestion for how terrorist threats and conflicts end and seem to pit governments and terrorists against each other in perpetuity. Government strategies in these models seem aimed at discovering the kind of terrorist they are faced with simply dealing optimally with that threat, or giving in to the terrorists' demands. In response, terrorists win, adapt their organisational structure or simply go away. Again, in the context of a wider threat, such notions simply don't seem realistic.

I propose that such models have also informed the direction of much of the empirical work in this area. Studies tend to look at, for example, provision of welfare, the type of political regime and a whole host of other economic proxies in discussing the incidence and causes of terrorism. Li and Schaub (2004), Blomberg *et al.* (2004), Li (2005) and Burgoon (2006) typify this kind of work but this seems based on an extension of the rather specific questions discussed on the previous page. It is unclear, however, if all terrorist organisations are concerned about such things or if their choice to act is based on the attainment of specific goals and of facing particular constraints, incentives and capabilities. In the case of the later suggestion, the role of peacemaking seems more explicitly obvious than in the former.

Frey and Leuchinger (2003) and Frey (2004) touch, implicitly, on the potential role of political engagement[2] as a counter-terrorism strategy, noting the "carrots" offered to Sinn Fein. By including Sinn Fein in open political dialogue, for example, the British and Irish governments

[2] Frey (2004) and Frey and Leuchinger (2003) are not the only papers to include the notion of "political terrorists". These ideas also variously enter Addison and Murshed (2005), who view violence is a transnational spillover and include domestic peacemaking in the utility functions of these organisations and Siquiera (2005), where competing political and military wings vie for scarce resources. Neither of these papers expressly allow peacemaking and violence to act as substitutes, or even compliments, in terms of achieving strategic goals, however.

were able to facilitate a peaceful end to The Troubles. At the same time, suggestion is made that terrorists could exploit these moves. Terrorists could, for example, pretend to be peaceful in order to unleash a wave of further violence against an unsuspecting and unprepared government, such as ETA, who attacked Barajas Airport in Madrid whilst engaging in formal peacemaking talks with the Spanish government. I aim to use a signalling model to overcome the informational asymmetry inherent in these papers.

The second, and perhaps more worrying, concern in the literature is that previous models only seem to be relevant to the opening stanzas of any given conflict. In dealing with particular organisations with no central leadership and where each attack can be considered as at least a quasi-stand-alone event, this again may seem a valid modelling approach. In longer-term contexts, however, such intuition seems less logical.

The signalling literature, for example, seems to paint a government that is blissfully unaware of any impending terrorist threat and sits twiddling its thumbs until the violent events of the signalling phase unfold. Any government that approaches a continued terrorist threat in such a manner seems entirely unlikely to be able to defend itself, let alone appropriately interpret the signal. Only after these first-period events occur does the government act. Having watched some level of first-stage violence unfold, it then attempts to discern whatever information it can about the scale and / or intentions of the terrorist organisation. Whilst it is possible to view the October, 2000 attack on the USS Cole and the subsequent 9/11 events in such a way, this approach does not seem broadly applicable to the full array of terrorist threats but rather, a specific application to one single event, or at least, one single threat-type.

The earlier signalling offerings of Lapan and Sandler (1993) and Overgaard (1994) seem to suffer both of the ailments suggested above, despite pre-existing 9/11. The terrorist groups depicted in these games attempt to hide their true size from their government adversary[3], in order to maximise outcomes, but then use all remaining resources to engage in violence. Arce and Sandler (2007) make a significant step forward, in the first regard, suggesting that there can be political-type terrorists and militant-type terrorists. The terrorist organisation engages in an attack in the signalling phase and the government attempts to infer the type

[3] In these papers, a large terrorist organization may wish to appear smaller than they are, in order to prevent stringent counter-terrorism measures from the government in the second period. Alternatively, they may wish to appear larger than they are, in an attempt to maximize government concessions.

of organisation with which it has to interact. This model still paints a "thumb-twiddling" government, however, as does more recent work by Hendel (2012).

In the context of al-Qaeda, for example, such notions may not be too far from the truth. Modern Islamic terrorism is complex; these organisations, typically, do not have a single leadership and the desires of individual militants vary drastically. In effect, each attack perpetrated by such organisations could be considered in isolation. The motives of 9/11 were not the same as those which led to attacks in Bali in 2000, for example. Accordingly, it may seem possible to treat each event as a singleton, rather than as a part of an on-going conflict between "The West" and terrorists.

Indeed, even in the context of the first stanza of an on-going conflict, the idea of a political-type terrorist organisation engaging in violence seems entirely reasonable; an attempt to draw attention to its cause, for example. The notion of a political-type terrorist organisation continuing to announce its presence through acts of violence, say, or continuing to attempt to signal its political or peaceful intentions to a government by continued acts of violence, however, seems bizarre, at best.

The post-signalling action sequence in these models, too, seems to pertain, rather directly, to one type of terrorism. Terrorists signal, government responds, terrorists act optimally, given the observed government action. In essence, this relies on each kind of terrorist having a pre-mandated response to each potential government action and following through with that response in the final move of the game. That a terrorist views a government's response and then chooses its next action, based on full information, seems like a gross simplification of reality. Similarly, a government knowing precisely how each type of terrorist will respond to its second-period action seems equally unrealistic. Particularly under less "spectacular" terrorist threats, the likelihood of a government following a prescribed strategy, based on expectation of type and knowledge of terrorist's outcomes seems remote, particularly in terms of the "give up" versus "stand and fight" strategies in Arce and Sandler (2007).

Similarly, comparatively small, guerrilla-type terrorists are unlikely to have the luxury of sitting around waiting for the government's response before choosing their next action. Terrorist organisations are unlikely to observe the moves of the government and only then plan attacks, particularly in situations where violence is more frequent. The PIRA in Northern Ireland, for example, did not stop to observe infiltration of its ranks by British intelligence

officers and retaliate based on this counter-terrorism strategy. Instead, they continued with what was considered as “normal operations” and continued violent attacks against security forces and civilian targets, some of which were foiled due to the information provided.

A third, and more minor, contention made in this paper is that the tendency dichotomous nature of the signalling phase in the prior literature underspecifies the range of first-period actions that are available to terrorist organisations. Despite these concerns, this paper proposes that one-shot signalling models remain a valid method for modelling terrorism, even when the threat-profile is considered in more dynamic terms. Accordingly, I aim to present a unifying model that is more broadly applicable to the array of terrorist threats and that provides a more realistic basis on which to inform government policy.[4]

Accordingly, in the first period, I introduce a continuous strategy space for the signal, which can, in principle, range between zero and all of the resources available to the terrorist organisation. A second development in the signalling phase can be regarded, perhaps, as simply notational but removes the notion of a signal being an act of violence. Rather, this model suggests that a signal should be a costly act of peacemaking, such as the terrorist organisation calling a ceasefire or decommissioning its weapons. The government, as before, then attempts to discern the type of terrorist and aims to interact appropriately.[5]

Especially in the context of continued terrorist conflict, such an approach seems significantly more realistic. A terrorist organisation engages in a long-term, violent conflict with a government and only attempts to signal to the government if it wishes to pursue an alternative, peaceful, strategy to attain its goals. Of course, the informational asymmetry here is two-fold; if a signal can induce a peaceful response from the government, one can easily imagine that a terrorist organisation devoted to violence may wish to attempt to trick the government to avoid a violent government counter-terrorism strategy.

[4] It is accepted that, in reality, no single model exists that can unify the array of terrorist threats. A growing literature, typified by Young and Findley (2011), for example, discusses the issues that arise though poor definitions of terrorism and failures to differentiate. The aim of this paper is to provide a model that provides policy recommendations that are more generally applicable than those which focus, rather specifically, on one kind of terrorist threat.

[5] Even to a politically motivated terrorist organization, calling a ceasefire or decommissioning is going to be costly and may not add any political collateral. In short, the view presented here is that the terrorist organization does not strengthen its peaceful capacity through these signalling acts but does reduce its military capacity.

Two further innovations in the post-signalling phase complete this model. Firstly, that the interaction between the government and terrorist is explicitly simultaneous, such that neither organisation observes the strategic choice of the other before acting and, secondly, that peacemaking, rather than unrelated consumption, directly enters into the strategy space of both the terrorist and the government. Whilst these innovations may appear subtle, they offer a more general method for modelling terrorism than has typically appeared in the literature. Furthermore, they have profound impacts on the policy implications of this model, not least as the outcomes support the peaceful resolution to violent terrorist threats found in Jones and Libicki (2008).

This notion of terrorist peacemaking seems inbuilt into the underlying definitions of terrorism – violence should be considered as a method, but not the only method, to achieve the political or social objectives described by Enders and Sandler (2006). Of course, the notion of peacemaking can be considered as something of a poisoned chalice – if peacemaking is available to terrorists, why do they act violently at all?

I propose that violence is a response to (perceived) exclusion from the normal political processes, either locally or globally. In such situations, the returns to the terrorist organisation from peacemaking are regarded as being so low in this situation that other alternatives, such as violence, appear more desirable. This is easy to elucidate in the context of both Northern Ireland and South Africa. Apartheid had excluded South Africa's black majority from the political system for almost half a century before uMkhonto we Sizwe's (MK) violent campaign. Similarly, Catholics in Northern Ireland had faced economic and social horizontal inequalities and political exclusion during the era of the 1922 – 1971 Parliament of Northern Ireland. Such discrimination endured in the state for almost fifty years before the beginning of terrorist violence.

In this regard, even if a terrorist organisation is willing to engage in peacemaking, that organisation must believe that the political system does, or at least can, promise returns and outcomes that are not available by following a violent route. The political complexities

required to facilitate or engender such feelings are certainly a barrier to peacemaking but are not insurmountable.[6]

The rest of this paper is set out as follows; in Section 2, I introduce a signalling model of the interaction between terrorists and governments. In Section 3, I discuss the equilibrium outcomes that are supported by this model. Finally, in Section 4, I discuss these results in the context of outcomes witnessed in real-life conflicts and close with policy recommendations and conclusions.

1. A Signalling Model of Terrorist Violence, and Peace

In this section, I present a signalling model of the strategic interaction between a terrorist organisation and a government. To this end, I introduce the Revolutionary; the Revolutionary is an organisation with both Political and Militant wings and aims to affect some material change to the status quo. The Militant wing believes that outcomes can be achieved only through strength of arms, whilst the Political wing believes that violence, peaceful politics, or even some mix of the two, can achieve their stated goals[7]. In the case of domestic terrorists, such aims could include nationalism, secession or economic / political regime change, whilst violence has also been used in a transnational sense to draw attention to domestic issues, as discussed in Murshed and Addison (2005).

Naturally, a government (or governments) attempts to deter terrorist violence due to the well documented social and economic costs imposed by such events. To this end, I introduce the Incumbent, whose primary aim is to minimise terrorist violence in the region it / regions they represent. Unsurprisingly, the Incumbent is likely to favour the status quo and, therefore, holds a second aim that involves opposition to the aims of the Revolutionary. Accordingly, the Incumbent aims to strategically interact with the Revolutionary, in an attempt to achieve these goals; the Incumbent believes that terrorism can be deterred through violent counter-terrorism measures but also realises that political engagement with

[6] The current Northern Ireland assembly, for example, uses the STV voting system to elect its members and the D'Hondt system to build its ministerial cabinet to ensure the parliament and legislature are ethnically representative. Despite this, this assembly has broken down on a number of occasions since its inception, suggesting some of the pitfalls of following the political route.

[7] Admittedly, notions of peacemaking may seem irrelevant to any group that lacks a central leadership or strategic aim. Despite the potential criticism that this model is also restrictive in the kinds of terrorist threat it can explain, however, I argue that it supports outcomes and intuitions where groups are devoted to violence and where governments have no incentive to engage peacefully them. This model supports situations where all resources are devoted to terrorism and counter-terrorism, as well as the more peaceful outcomes.

a willing adversary can avoid violent outcomes altogether. These notions fit with the deterrence mechanisms discussed in Jones and Libicki (2008).

The Revolutionary is depicted as having a leadership that favours either the political or the military wing. In some respects, this contrasts to the notion in Siquiera (2005), who views political and military wings as discrete entities competing for hearts and minds. There are also comparisons with Siquiera's notions, however, as the political and military wings compete for access to resources. This model takes the outcome of such competition as exogenously determined by a move of Nature.[8]

The Revolutionary organisation observes the move of Nature which determines its leadership type. The outcome of this move of Nature is not observed by the Incumbent. The Incumbent, therefore, has incomplete information about the type of Revolutionary it aims to confront. The impact of this incomplete information is twofold; firstly, as would be easily anticipated, a military-type Revolutionary has an obvious incentive to mimic a political-type in an effort to avoid violent Incumbent response. Due to the costly nature of the signal, however, there may also be a disincentive for the political-type to signal, particularly when the Incumbent is expected to respond violently to a terrorist threat in all circumstances, and save all resources for the second period of the game.

I consider a two-period model with dichotomous Revolutionary type set. In keeping with the nomenclature of Arce and Sandler (2007), I introduce a Revolutionary leadership drawn from the dichotomous type set {P, M}, where P refers to a 'Political' leadership who favour the Political wing and M refers to a 'Militant' leadership. I assume that the leadership of the Revolutionary is united and can only favour one wing at any given time. Accordingly, there is no possible mixed characterisation of the leadership.

Whilst the Militant wing has an obvious dedication to violence, with peacemaking acting as a pure cost, the characterisation of the Political wing is more complex. The Political wing considers both peacemaking and violence as potential means to achieve their goals. This hinges on the assumption that terrorist organisations are not solitary bodies; instead, they are, or at least consider themselves to be, the representatives of some subsection of society.

[8] I accept that an extension of this model could endogenise the leadership's support of one wing or the other but this is beyond the scope of the work presented here. As with the previous signalling literature, the interest is in the incentives to signal and the outcomes this supports.

Republicans in Northern Ireland, for example, claimed to represent the Catholic minority; MK in South Africa, black South Africans; ETA the Basque people and so on.

The leitmotif of all of these groups is that they were, or perceived themselves to be, the victims of political or economic discrimination. Against this backdrop, it is perhaps easy to understand why P-Type terrorist organisations that claim to represent such groups would gain from violence, as well as peace. A terrorist organisation engaging in peacemaking with a government that continues a violent crackdown could stand to lose at least a portion of its community support through, for example a perception of weakness. This seems even more intuitive in the case where society feels "put upon" by the government in question. Accordingly, even P-Type organisations may be conservative in their willingness to act peacefully. It seems likely that governments will also recognise this phenomenon and be weary of engaging in peacemaking, even if they believe the terrorist organisation to be P-Type.

Such "joint fronts", where the same group has behaved peacefully and violently, often at the same time[9], have been seen in a number of conflicts, where terrorist organisations have maintained political wings, whilst also engaging in acts of terrorism. The well-publicised links between the PIRA and Sinn Fein and the Republican strategy of the "Ballot Box and Armalite" in the mid-1980s is a pertinent example of the characterisation of a political-type terrorist organisation but there have also been links between The ANC and MK in South Africa, FARC and the Union Patriotica in Colombia and between ETA and Batasuna in Spain. In principle, I impose an assumption that a P-Type Revolutionary would rather a peaceful solution than a violent one but can be deterred from seeking such a resolution.

Following the issues raised in Frey and Leuchinger (2003) and Frey (2004), the Incumbent may be unwilling to engage peacefully with the Revolutionary in situations where the Revolutionary could costlessly pretend to be interested in engaging in peace. In such a situation, it is obvious that both P-Types and M-Types would pretend to be P-Type, in order to avoid government counter-terrorism measures. Accordingly, I introduce a costly signal, through which P-Types attempt to differentiate themselves from M-Types, in an attempt to ensure a political, rather than military, resolution to the conflict. By attempting to

[9] In the context of this model, this would represent a mixed strategy following the signalling phase.

differentiate themselves from M-Types, P-Types believe they can open the door to a political process that can lead to the long-term attainment of their goals.

In period two, the Revolutionary and the Incumbent engage simultaneously. Upon observing the Revolutionary's action in the signalling phase, the Incumbent decides whether to pursue a peaceful political response, or a violent counter-terrorism response. At the same time, the Revolutionary must choose its strategic action in the second period, devoting all (remaining) resources to peacemaking or terrorism. Any devotion of resources to peace acts as a pure cost to M-Types, both in the signalling phase and in the second period of the game, as they do not believe their goals can be achieved through politics. It also follows logically, therefore, that the Incumbent does not gain from any devotion to peacemaking when facing an M-Type Revolutionary. P-Types gain through both strategic actions and base their second period action on the beliefs and incentives of the Incumbent, although the signal is still regarded as a sunk-cost that can facilitate the peace process.

The Revolutionary receives an endowment from a non-strategic benefactor at the start of the game, denoted R. It is assumed that, through information collection, the Incumbent can accurately approximate the scale of this endowment. The Incumbent exogenously earmarks a binding resource constraint, I, for dealing with the Revolutionary, which is assumed to be common knowledge. The Revolutionary can spend its resources across both periods of the game, or save them all for action in the second period, only. The Incumbent spends all resources in the second period. In the first period, the Revolutionary chooses a signal from the continuous set, $S \in [0, R]$. Therefore, the signal, denoted s, is some proportion of available resources, R and where it is assumed; $0 \leq s < 1$.

The signal, s, is also important in determining the beliefs of the Incumbent in the second stage of the game. Logic would dictate that that greater the scale of a signal, the more willing an organisation is to engage peacefully.

The game is illustrated in Figure 1. The decision set is listed below:

1. Nature (N) selects the Revolutionary's type from the set, {P, M}
2. In the first period, the Revolutionary selects its signal from the set $S \in [0, R]$
3. Following the signalling phase, the (Revolutionary) Incumbent devotes (remaining) resources to either peaceful or violent action.

Payoffs to action profiles in this model are expressed as Π_P and Π_M for P-Types and M-Types respectively and as Π_I for the Incumbent. Payoffs are calculated as follows:

1. The Revolutionary receives the endowment R and the Incumbent earmarks a binding budget, I
2. The Revolutionary faces the cost of sending a signal in the first period and chooses a signal that is some proportion of its resources. Signalling, therefore, depletes the Revolutionary's resources in a linear manner. Remaining resources are denoted δR, where δ = (1 – s) and s is the proportion of resources spent on sending the signal.[10]
3. Payoffs are defined in terms of preferences and (remaining) resources and are denoted as follows:
    a. Revolutionary peacemaking: γδR for P-Type and 0 for M-Type
    b. Revolutionary terrorism: αδR
    c. Incumbent peacemaking: βI when facing P-Type and 0 when facing M-Type
    d. Incumbent counter-terrorism: υI
4. Payoffs to action profiles are formalised in Equations (1) – (3) and presented in their familiar form in Tables (1) and (2). Returns to peacemaking are assumed to require participation from both players to yield positive returns, whilst violence is shown to be private. Furthermore, M-Types have no incentive to engage to peacemaking in the second period of this game. Accordingly:

$$\Pi_P = \lambda_R \lambda_I (\gamma \delta R) + \lambda_I (\beta I) + (1 - \lambda_R)\alpha\delta R - (1 - \lambda_I)\upsilon I \quad (1)$$

$$\Pi_M = \lambda_I (\beta I) + (1 - \lambda_R)\alpha\delta R - (1 - \lambda_I)\upsilon I \quad (2)$$

$$\Pi_I = \lambda_I \lambda_R (\beta I) + \lambda_R (\gamma \delta R) + (1 - \lambda_I)\upsilon I - (1 - \lambda_R)\alpha\delta R \quad (3)$$

Where: λ_R and λ_I take the value of 1 when the Revolutionary and the Incumbent, respectively, act peacefully and 0 when they act violently.

[10] Accordingly, in a situation where the Revolutionary does not signal, δ = 1 and δR = R.

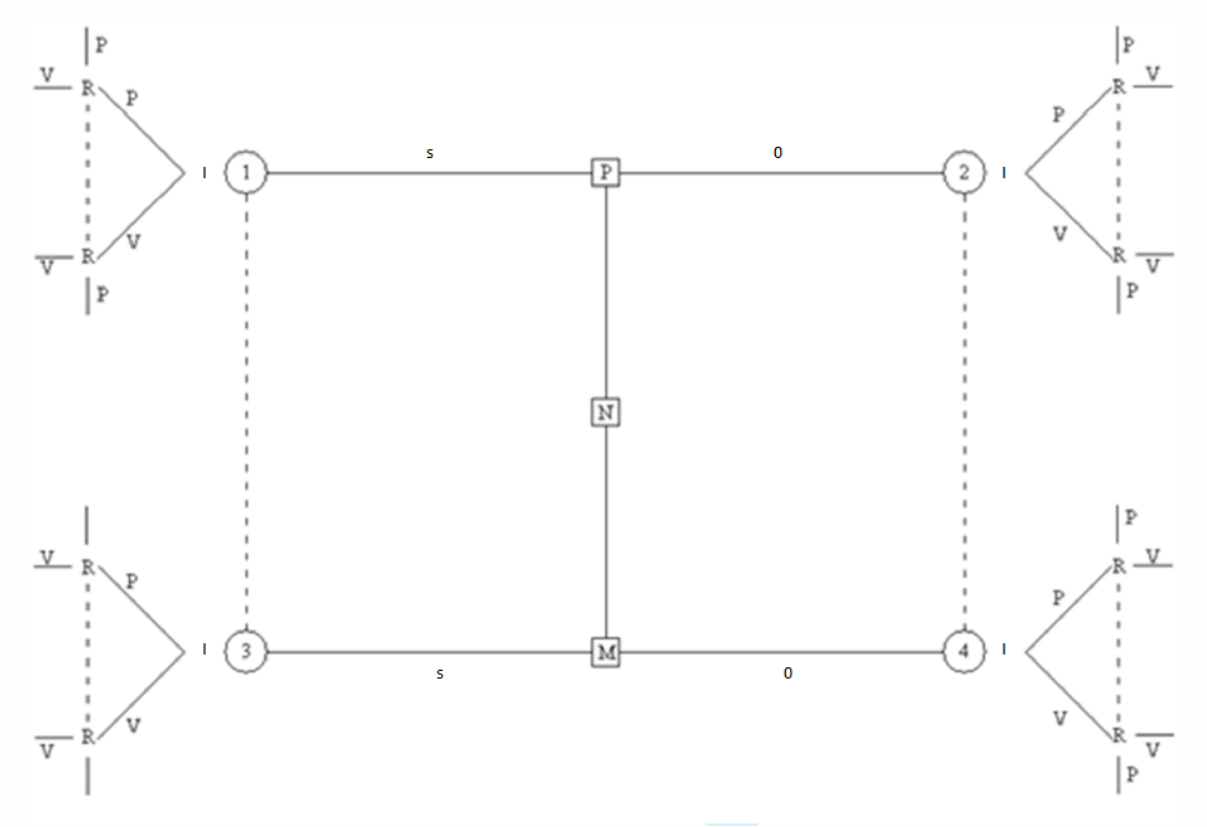

Figure 1: Extensive form of the Model

There are two sets of critical beliefs in this model. The first refer to the conditional probabilities such that the Incumbent believes it is at Node 1 or Node 3 following a first period signal, or if they are at Node 2 or Node 4 when they observe no signal. Nature selects the type of Revolutionary with some probability at the start of the game. The Incumbent attaches a belief, μ, to Nature having selected a P-Type Revolutionary and 1-μ that she selects an M-Type. The Incumbent additionally believes that the Revolutionary will choose to signal with probability θ_P if they are P-Type and θ_M if they are M-Type. I refer to each of these conditional probabilities as χ_i at nodes $i \in [1, 2, 3, 4]$. Using Bayes law, it can be shown that $\chi_1 + \chi_3 = \chi_2 + \chi_4 = 1$.

The second set of beliefs refers to the Incumbent's beliefs about how the Revolutionary will behave in the second period of this game. In following from the assumption that a large signal would indicate a greater willingness to act peacefully, the Incumbent sets its belief that the Revolutionary will act peacefully equal to the proportion of resources spent on the signal. Under separation, the Incumbent can determine, from the information presented in Table 2, that violence is the dominant strategy when dealing with an M-Type. In games

involving the P-Type, however, the outcomes are more complex and beliefs again play a role in governing outcomes.

		Incumbent	
Revolutionary		Peace	Violence
	Peace	$\Pi_P = \gamma\delta R + \beta I$ $\Pi_I = \beta I + \gamma\delta R$	$\Pi_P = -\nu I$ $\Pi_I = \nu I + \gamma\delta R$
	Violence	$\Pi_P = \alpha\delta R + \beta I$ $\Pi_I = -\alpha\delta R$	$\Pi_P = \alpha\delta R - \nu I$ $\Pi_I = \nu I - \alpha\delta R$

Table 1: Revolutionary and Incumbent payoffs when Nature selects P-Type Revolutionary

		Incumbent	
Revolutionary		Peace	Violence
	Peace	$\Pi_M = \beta I$ $\Pi_I = \gamma\delta R$	$\Pi_M = -\nu I$ $\Pi_I = \nu I + \gamma\delta R$
	Violence	$\Pi_M = \alpha\delta R + \beta I$ $\Pi_I = -\alpha\delta R$	$\Pi_M = \alpha\delta R - \nu I$ $\Pi_I = \nu I - \alpha\delta R$

Table 2: Revolutionary and Incumbent payoffs when Nature selects M-Type Revolutionary

This infers that the signal plays two roles in determining Incumbent action in this model. Firstly, that it can differentiate between the types of Revolutionary and, secondly, that it informs the Incumbent as to the potential intentions of the Revolutionary in the second period. As may expected, therefore, the larger the signal, the more likely it is to induce peace from the Incumbent, even in situations where it does not differentiate between types of Revolutionary. Although not affecting these outcomes, I make an assumption that $\gamma > \alpha$; accordingly, P-Types would rather meet Incumbent peace with peace, rather than with

violence. In the context of P-Types believing their goals can be achieved through a political process, this claim should by uncontroversial.

3. Signalling Equilibria

Signalling games of this type support four potential equilibrium outcomes. In accordance with the specific nomenclature of this paper, these outcomes can be described as the situation where P-Types signal and M-Types do not, (denoted an S, 0 equilibrium), two pooling equilibria in which both types follow the same course of action in the signalling phase (S, S and 0, 0) and a situation where M-Types signal and P-Types do not (0, S).[11]

In the context of these potential outcomes, the source of incomplete information can easily be elucidated. Given prior assumptions on the Incumbent's beliefs, incomplete information raises a concern than M-Types may pose as P-Types in order to induce a peaceful response from the Incumbent in the second period. A second concern is that the beliefs or Incentives of the Incumbent are such that a P-Type determines violence to be the best course of action and mimics M-Types by not signalling and expending all resources on violent terrorism it is not committed to. In principle, a situation could arise where both types simultaneously mimic each other. This outcome, however, is counter-intuitive and is not support by this model.[12]

In the sections below, I discuss each of these potential equilibria and the conditions that are required to ensure their feasibility.

3.1 S, 0 Separating Equilibrium

In this situation, the Incumbent sets its beliefs that the Revolutionary is P-Type equal to 1 if the Revolutionary sends a signal, s*, that M-Types do not have an incentive to send.[13] Accordingly, if the Incumbent does not receive a signal, it sets its belief that the Revolutionary is an M-Type equal to 1. Formally, this implies that, $\chi_1 = 1$, $\chi_4 = 1$, $\chi_2 = 0$ and χ_3

[11] The convention of listing P-Types equilibrium signal first, then M-Types is used throughout the rest of this paper.

[12] This outcome is feasible when mixed strategies are allowed to prevail. For notational and intuitive ease, however, mixed strategies are assumed to be infeasible in this model. This occurs under the assumption that the Revolutionary's best response to a mixed strategy is violence and the same for the Incumbent.

[13] This s* can be considered an optimal signal in the sense that any s > s* indicates an inefficient use of resources; s* is the minimum signal which ensures separation AND which fulfils Condition 1. Similarly, any s < s* is ineffective and also represents a waste of resources, suggesting that the signals sent in separation will be s* and 0.

= 0 for any s≥s*. Given the earlier assumption that δ = (1 – s), δ* is then the proportion of resources not spent on s*: δ* = (1 – s*)

Table 2 shows violence to be the dominant strategy when dealing the M-Types. Accordingly, in the situation when the Revolutionary does not signal, a violence-violence outcome ensues in this situation. Outcomes following a signal are slightly more complex, however, and relate to the scale of s*. Whilst it might seem like a bizarre suggestion that a government would wish to respond violently to a terrorist organization it *knows* to be politically motivated, it is easy to imagine a risk-averse government in the situation of on-going conflict, for example. Similarly, the incentives of the Incumbent, such as representing a population broadly supportive of violence action against terrorist organisations, could be such that violence is still a desirable strategy.

In discussing the feasibility of this outcome, I first derive a condition for the behaviour of the Incumbent when it receives a signal. This occurs, quite obviously, when the Incumbent's expected return from peacemaking, given its beliefs, is greater than from violence.[14] This formally occurs when:

$$(1-\delta^*)[\beta I+\gamma\delta^* R]+[1-(1-\delta^*)](-\alpha\delta^* R)\geq(1-\delta^*)[\nu I+\gamma\delta^* R]+[1-(1-\delta^*)](\nu I-\alpha\delta^* R)$$

Although apparently a superficially ugly condition, this can be rearranged to give:

$$(1-\delta^*)\geq\frac{\nu}{\beta} \qquad \text{(Condition 1)}$$

This suggests that when the Incumbent's returns to counter-terrorism are greater than those from peacemaking, they will always respond violently to the terrorist organisation, regardless of its type, or signal. Accordingly, despite the rather counter-intuitive notion of the Incumbent behaving violently towards a political terrorist organisation, this shows a comprehensible elucidation of this outcome. In addition, Condition 1 also shows that the greater the signal sent by P-Types, the more likely the Incumbent is to act peacefully. It is assumed that both types of Revolutionary know the beliefs and incentives of the Incumbent. Accordingly, Revolutionary's strategic choices can now be considered.

[14] This model assumes that the incentives of both players are common knowledge. Similarly, the policy that dictates the Incumbent's beliefs in the second-period is considered common knowledge. The Revolutionary can deduce whether or not Condition 1 holds and chooses its best response accordingly. The Incumbent, similarly, can deduce the intended action of the Revolutionary, accordingly, and chooses its best response.

Contingent on whether or not Condition 1 holds, P-Types will choose to signal if their expected outcome from doing so is greater than the outcome from not doing so and engaging in a violence-violence strategy with the Incumbent. In this discussion, it is assumed that Condition 1 holds, assuring that a peace-peace outcome when the Revolutionary signals and a violence-violence outcome when the Revolutionary does not. Accordingly, in this situation, the Revolutionary's signalling choice relates to trade-off between inducing the Incumbent into peaceful action and the expense of inducing this outcome. For P-Types, this occurs when: $\gamma\delta^* R + \beta I \geq \alpha R - \nu I$, which simplifies to:

$$\frac{R}{I} \leq \frac{(\beta + \nu)}{(\alpha - \gamma\delta^*)} \qquad \text{(Condition 2)}$$

Similarly, M-Types will choose to signal when: $\alpha\delta^* R + \beta I \geq \alpha R - \nu I$, which can be simplified to:

$$\frac{R}{I} \leq \frac{(\beta + \nu)}{\alpha(1 - \delta^*)} \qquad \text{(Condition 3)}$$

Separation, therefore, occurs when P-Types have an incentive to send the signal, s*, M-Types do not and when the Incumbent has an incentive to respond peacefully following a signal. Thus, separation occurs under Conditions 1, 2, ~3, where ~ denotes that a condition does not hold.

When Condition 1 fails, violence-violence ensues, whether or not the signal is sent. As the signal is costly, this in turn ensures the signal will never be sent as outcomes are greater for both P-Types and M-Types when they save all resources for violence in the second period. This suggests that an Incumbent representing a society strongly supportive of violent counter-terrorism should work towards reducing such desire for a violent response in that society, if it genuinely wishes to avoid terrorism. Similarly, however, it also suggests a direct role for the government in determining appropriate methods for determining beliefs appropriate to the situation in which it finds itself. In this situation, a political organisation would have been willing to differentiate itself from a violent one and engage in peace but is deterred from doing so by the government's beliefs and subsequent action.

The PIRA, for example, called a binding ceasefire in Northern Ireland in August 1994 and promised to engage only on democratic politics. The Conservative government of the time

refused to openly engage with Sinn Fein, however, stating that it would only accept full decommissioning of PIRA weapons as a signal. This resulted in the PIRA subsequently breaking this ceasefire in 1996 and returning, temporarily, to violence. In 1997, the New Labour government entered power and stated that a reinstatement of the previous ceasefire would facilitate Sinn Fein entering political talks. The PIRA, subsequently, reinstated its ceasefire and have since followed a peacemaking strategy.

Condition 1 is also suggestive of the difficulty of engaging peacefully with certain kinds of terrorist organisations, however. Whilst the case of a terrorist organisation with a strong central leadership interacting with a single government, as suggested by a series of domestic terrorist conflicts, fits readily with this notion, it is more difficult to see the peaceful potential in conflicts where terrorist organisations lack this strong central leadership. Similarly, complexity also arises when the terrorist faces more than one government. This issue of unilateral government counter-terrorism measures has been explored before in the literature (Enders and Sandler, 2004).

In the specific situations where a terrorist organisation's strategic goals relate to concessions by multiple governments, peacemaking seems an unlikely strategy. In turn, this may lend some validation to the "terrorist spectaculars" background that seems to inform much of the previous literature.[15] Despite this, however, data included in Rosendorff and Sandler (2005) and Enders and Sandler (2008) suggest that such attacks constitute a significant minority of terrorist activity. Murshed and Addison (2005) model a view of an alternative transnational risk, which suggests organisations engage in transnational terrorism to affect material change in their country of origin. Peacemaking is built into the domestic utility function of the terrorist organisation in this model, suggesting further validation for this modelling approach. Furthermore, domestic terrorist threats, which implicitly deal with only one government, account for a large majority of terrorist events (Rosendorff and Sandler (2005), Enders and Sandler (2008)).

[15] In the case of dealing with a transnational threat, Condition 1 could be aggregated over all of the threatened countries, such that it would become:

$$(1-\delta^{*}) \geq \frac{\nu_i}{\beta_i} \forall i$$

Despite such concerns, this model still offers a rationale for the strategies employed by such organisations. Either they are M-Type and engage only violently, or they are P-Type but lack incentives to signal their true nature, as they cannot hope to elicit a peaceful response from all of the governments they face. Even in the situation where a transnational terrorist organisation would be willing to engage in peace, the idea of Condition 1 holding across all countries seems remote. This again fits with the Enders and Sandler (2004) notion that unilateral government responses to terrorism are likely to deflect, rather than deter violence.

Accordingly, whilst this model does not preclude peaceful outcomes in the transnational sense, it suggests a significantly greater difficulty in ensuring such outcomes, as governments must coordinate their responses and have the incentives to do so. Furthermore, it relies heavily on the unity within a terrorist organisation and the degree of control that the leadership can exert over the membership. In cases of weak leadership, peaceful activity could lead to fractionalisation and radicalisation of the M-Type components of that organisation, ensuring a continuation of violence.

3.2 0, S Separating Equilibrium

For completeness, discussion now briefly turns to the case of separation in which M-Types signal and P-Types do not. It is easy to note that in the context of this model, such an outcome is immediately counter-intuitive as it would require the Incumbent to interpret a peaceful signal as an act of war and no signal as one of peace. In this situation, the Incumbent sets its belief that Revolutionary is M-Type equal to 1 if the Revolutionary sends the signal of at least s*. It then follows that the Incumbent will always interpret a decision not to signal as the action of a P-Type. As violence is the dominant strategy in subgames involving M-Types, the Incumbent then always respond violently when a signal is sent.

Formally, this implies that, in all cases, $\chi_1 = 0$ and $\chi_3 = 1$ whilst $\chi_2 = 0$ and $\chi_4 = 1$ for any $s \geq s^*$. In this case, I again look only at the peace-peace pure strategy outcomes, where P-Types and the Incumbent both act peacefully following the signalling phase. As before, I first look at the incentives for a P-Type to signal. A P-Type will signal when: $\alpha\delta^* R - \nu I \geq \gamma R + \beta I$. As neither υI nor βI are trivial and as δ*<1, this condition never holds. Accordingly, P-Types will never signal in this scenario.

M-Types will choose to signal when: $\alpha\delta^{*}R - \nu I \geq \alpha R + \beta I$. Following the logic in the previous paragraph, it is also easy to see that this condition will never hold and M-Types will also choose never to signal in this scenario. Accordingly, a 0, S separating equilibrium is infeasible in this model.

3.3 Pooling Equilibria

Attention now turns to the situations in which both types of Revolutionary will choose the same signal. Accordingly, the Incumbent learns no new information about the type of Revolutionary it faces in the signalling phase but, as before, second-period beliefs are informed by the scale of the signal. Accordingly, in the 0, 0 pooling case, Incumbent beliefs that P-Types will act peacefully in the post-signally phase are also set equal to zero. In such a situation, the best response of a P-Type Revolutionary is to also engage violently. Accordingly, outcomes in 0, 0 pooling equilibrium, for both types, are: $\alpha R - \nu I$.

The best response of the Incumbent in the S, S pooling situation relates to prior beliefs about the distribution of P-Types and M-Types and the scale of the signal sent. As the signal contains no new information, both Nodes 1 and 3 are reached with positive probability, denoted χ_1 and χ_3, where $\chi_3 = (1 - \chi_1)$. The Incumbent believes that P-Types will act peacefully in period two with a probability 1 - δ. As before, the violence-violence dominant strategy prevails in games involving M-Types.

In the S, S pooling game, the Incumbent will choose to act peacefully if expected returns from doing so are greater than the expected returns from acting violently. This occurs when:

$$\chi_1[(1-\delta)(\beta I + \gamma\delta R) + [1-(1-\delta)](-\alpha\delta R)] + (1-\chi_1)(-\alpha\delta R) \geq \chi_1[(1-\delta)(\nu I + \gamma\delta R) + [1-(1-\delta)](\nu I - \alpha\delta R)] + (1-\chi_1)(\nu I - \alpha\delta R)$$

Again, although this is an ugly condition, it can be easily simplified to:

$$\chi_1 \geq \frac{\nu}{(1-\delta)\beta} \qquad \text{(Condition 4)}$$

Again, this condition suggests that the higher the signal the Revolutionary is willing to send, the more likely the Incumbent will be to respond with peacemaking. Similarly, however, it's also possible to see how the Incumbent's preferences define outcomes, although this is further discounted by the secondary belief about P-Type's post-signal intentions.

As in the S, 0 separating equilibrium, any situation in which Condition 4 does not hold will result in violence-violence outcomes in the second period, which means that neither side has an incentive to signal. Accordingly, the 0, 0 pooling equilibrium will prevail under Condition ~4. Under Condition 4, the incentives of both types of Revolutionary to signal must also be checked, however. When Condition 4 prevails, a peace-peace second period would ensue at Node 1 and a violence-peace game at Node 3. Accordingly, the incentives for P-Types to signal relate back to Condition 2 and M-Types to Condition 3. Accordingly, an S, S pooling equilibrium occurs under Conditions 2, 3, 4. A 0, 0 pooling equilibrium occurs under ~4 and also under 4, ~2, ~3.

These two final results depict a P-Type Revolutionary that devotes all of its resources to violence. Here, the potentially destructive role that government incentives and beliefs can play in perpetrating a conflict it seeks to end are highlighted. When P-Types lose the belief that they can convince the Incumbent that they are peaceful, violence ensues, even though neither party supports it. This outcome is perhaps the most stark that is supported by this model and contrasts with the outcomes of previous signalling models in the literature, not least because it suggests a role for governments in sustaining, as well as avoiding, violence.

Ceteris paribus, the conditions discussed above show that, given a set of beliefs, it is the relative scale of the organisations involved that drives the outcomes of the model. In short, the larger the terrorist organisation, the less likely it is to signal. This fits with some of the findings of other signalling models (Hendel, 2012), although the suggestion in this model is that a large Revolutionary believes it can achieve victory through strength of arms. If, however, the Incumbent devotes a significant proportion of resources to dealing with the Revolutionary, M-Types, as well as P-Types have incentives to signal, as M-Types attempt to avoid a large violent government response.

Such notions can be elucidated in the context of Spain. In the Spanish case, the large government response gave ETA incentives to call a series of “fake” ceasefires in 1989, 1996, 1998 and 2006, all of which were subsequently broken. Such actions are suggestive of an M-Type Revolutionary, attempting to avoid the scale of government backlash. Despite such outcomes, however, this model also shows that in situations where terrorist organisations are willing to engage in peaceful strategies, and when governments set their beliefs suitable,

peaceful resolutions can be found, as shown by the interaction between the PIRA / Sinn Fein and the British Government in 1997.

4. Concluding Remarks

That a government may deter a terrorist threat through a political process, rather than through strength of arms may not seem like a surprising conclusion, particularly to any politician who has aimed to tackle terrorism. The question, however, is when to engage peacefully and which terrorists to engage peacefully with. This model provides intuition behind terrorist's incentives and actions and suggests a very important role for the government, in terms of interpretation of a signal. Each signal is likely to be very specific to the context in which it is sent; ETA, for example, was able to send a series of fake signals and engage in political talks with the Spanish government. The IRA, on the other hand, sent an apparently real signal in 1994 that was deemed too weak for political engagement by the British government of the time.

Governments, therefore, need consider both the costs and incentives involved in sending a signal. ETA, as one of a large number of players in the Basque independence movement, may have been able to signal a ceasefire relatively costlessly, as a result of being only one of many players involved in such a process. In Northern Ireland, however, the IRA's ceasefire of 1994, could be considered as significantly more costly. This organisation dominated the Republican cause in Northern Ireland and represented a section of society who had, or perceived itself to have, been under violent attack from the "occupying forces" of the British Army and from Loyalist paramilitary organisations.

A further recommendation of this model relates to the incentives a government has to act peacefully or violently towards terrorists. Governments, typically, will be concerned with their popularity in society, as well as with dealing with terrorist threats. Accordingly, governments who believe in engaging peacefully with terrorists may not have the incentive to do so, if the society it represents desires a stronger response. Accordingly, a second policy recommendation that stems from this model is that governments must foster the pre-conditions for peace amongst the society it represents.

Given the nature of this game, particularly the post-signalling phase, this model supports a large number of potential conclusions and outcomes. In the formation above, I show conditions that support pooling equilibria both on and off the signal and a separating equilibrium where types signal their true strength. I show how the role of both beliefs and relative resources are important in the derivation of outcomes. This is most specifically poignant in outcomes where P-Type terrorists are incentivised to devote all of their resources to the pursuit of violence.

The three main results supported by the model presented here provide an interesting snapshot of terrorist conflict. Under the conditions for pooling equilibrium, it is shown that Incumbent's beliefs and actions can deter a nominally peaceful Revolutionary organisation from devoting any resources to peaceful action. This provides a notion of how inappropriate responses can perpetuate conflicts that governments are seeking to end. Despite this, I also show the conditions that support a peaceful resolution between the warring factions in terrorist conflicts, which occurs when a P-Type leadership is present and separation possible.

We see these results illuminated in the context of Northern Ireland, for example. In 1986, Sinn Féin recognised the legitimacy of Dáil Éireann, the parliament of the Republic of Ireland and stood candidates for election to both the Irish and United Kingdom parliaments. This began the IRA strategy known as "the Armalite and the ballot box", a strategy fought both on political and violent fronts. Despite these peaceful overtures, the IRA did not cease violence for another 8 years, suggesting that in these years, signalling took place but was ineffective.

Following the IRA ceasefire on 31 August 1994, however, the Combined Loyalist Military Command (CLMC) called their own ceasefire 43 days later, suggesting that the earlier ceasefire had differentiated P-Types and M-Types. Despite the CLMC ceasefire, beliefs of the British government appeared to be such that the signalling phase was ineffective for a further three years. These ceasefires, and the British government response in 1997, led, ultimately, to the signing of the Good Friday Agreement in 1998, which serves as an illustration of how peace can be brought about, through the use of a signal of appropriate scale and a suitable determination of government beliefs and incentives.

Most interestingly, this model shows that the incentives to signal and to separate are based

on the relative scales of the organisations involved. If the Revolutionary is too forceful, the Incumbent cannot provide an effective deterrent, removing the Revolutionary's incentive to interact in a peace process. If the Incumbent is too powerful, however, the deterrent it provides is great enough to incentivise an M-Type Revolutionary to act peacefully in the signalling phase, as witnessed in the interaction between the Spanish government and ETA.

It is accepted that this model could be expanded to account for a continuum of Revolutionary types that can vary across time. This version works on an assumption that the Revolutionary is either entirely P-Type or M-Type at any given time. This seems a poor reflection of reality, where the Revolutionary leadership would have some continuum of peacefulness, based on the internal wrangling of the organisation and the beliefs of those in the upper echelons of power. The degree of peacefulness at any time would be reflected by the scale of signal sent.

This would constitute a further major piece of work but would provide a more accurate portrayal of triangular conflict. This model still goes some way to capturing these effects, however. The Revolutionary's incentives to act peacefully or violently in the second period and its incentive to signal is based, in part, on the relative scale of returns to peace, γ and violence, α. A Revolutionary with a strongly peaceful leadership would expect a higher return to peaceful action than violence, increasing both the likelihood of choosing to signal and of acting peacefully in the post-signalling phase.

Whilst more simplistic than explicitly focusing on the peacefulness of a Revolutionary leadership, the effect captured here is strong and provides an interesting rationale of the structure of the Revolutionary leadership. In this respect, this model provides a strong outline of the interaction between the two major players in terrorist conflicts, whilst offering explanations for the duration of these conflicts - almost thirty years in Northern Ireland and on-going in both Iraq and Columbia, for example - but also a suggestion as to how they can, end with a peaceful resolution – an optimistic outcome that has occurred in recent history, that previous theoretical literature has implicitly ruled out.

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