The Moral Hazard of Terrorism Prevention

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Abstract

Since 9/11, democratic governments have responded to terrorist attacks with antiterrorism measures curtailing freedom of expression and other fundamental rights and liberties, all in the name of terrorism prevention. How does a policy of reacting to terrorist attacks with restrictions on free speech protections affect the likelihood of terrorism? In this paper, I develop a dynamic model of an interaction between a security agency and a terrorist organization to study the security consequences of adopting policies that curtail free speech protections and other rights when terror strikes. The paper shows that in a world in which democratic governments respond to major terrorist attacks with restrictions on freedom of expression and other rights and liberties, such policies have a moral hazard effect, which can make a terrorist attack more likely. The analysis suggests that a commitment to respecting fundamental rights and liberties in times of duress can be security-beneficial: if liberal societies were to remain faithful to their fundamental values in the aftermath of terrorist attacks, such a strategy possibly decreases the probability of a terrorist attack.

In a stroke of irony, perhaps, the French government launched a harsh crackdown on speech that allegedly supports terrorism less than a week after the massive public rallies were mounted in defense of free expression in the aftermath of the Charlie Hebdo terrorist attack. In a circular published on January 12, 2015, the Minister of Justice Christiane Taubira instructed prosecutors to take tough action against those who purposely defend or glorify terrorism. Within three weeks, 150 prosecutions were launched resulting in dozens of verdicts, including 18 prison sentences imposed largely for the crime of "apologie du terrorisme."[1] In a similar effort to suppress terror speech, the President Francois Hollande signed on February 9, 2015 a decree allowing the government to ban without a court order websites suspected of advocating terrorism. The French authorities have used this new powers to block five websites, which they claimed condone terrorism.[2]

The French government, of course, has not been alone in rolling back protections on free speech after a terrorist attack; rather the reaction of French authorities to Charlie Hebdo attack is representative of how democratic governments have responded to the threat of terrorism since 9/11. The 9/11 terrorist attacks showed the vulnerability of liberal societies to catastrophic acts and revealed the potentially horrific psychological, social and economic costs of failing to stop a large-scale terrorist attack. The 2004 Madrid train bombings and the 2005 London terrorist attacks added urgency to the issue of devising preventive security policies in an era of rising extremist violence and suicide terrorism. Consequently, governments in the United States and other liberal democracies have adopted various liberty-reducing measures intended to make it harder for terrorist groups to grow and operate inside liberal societies (Heymann 2003; Ignatieff 2004; Posner 2006a; Roach 2011).

For instance, in the United States, the Patriot Act made it a criminal offense to provide support to groups designated as terrorist organizations, provisions that indirectly limit speech and other activities that might intendedly or unintendedly facilitate terrorist activities; in 2002, Denmark enacted an anti-terrorism law to criminalize instigation of acts of terrorism; in 2005, Australia included various forms of seditions into its antiterrorism laws and gave public officials the power to ban groups perceived to advocate terrorism; in 2006, United Kingdom passed the Terrorist Act that made it illegal to glorify terrorism and encourage the commission and preparation of terrorist activities (Roach 2011).

These examples are emblematic of a larger effort of liberal societies to regulate incitement to terrorism (Heymann 2003; Stone 2004; Ronen 2010). The impetus for prohibiting terrorist advocacy and other forms of support is the worry that terrorists can exploit the civil liberties

[1] Angelique Chrisafis, "French dissenters jailed after crackdown on speech that glorifies terrorism," The Guardian, January 30, 2015.

[2] BBC News, "French government orders website block," March 16, 2015.

and individual freedoms on which liberal societies are built to further their violent ends (Schmid 1992). Under the shield of free speech protections, for example, terrorist groups can disseminate their propaganda, recruit operatives, raise money, and so on. The advocacy of terrorism, if left unchecked, can then effectively augment the capacity of terrorist groups to undermine the security of liberal societies. In turn, criminalizing terrorist propaganda and other forms of support raises the costs of being associated with a terrorist group for individuals who would otherwise willingly provide various kinds of support: disseminate propaganda, raise money, recruit operatives, procure supplies, facilitate travel, provide safe houses, etc. Since support and logistical networks are essential for terrorists to succeed (Heymann 2003; Gunaratna 2004; Richardson 2007), liberty-reducing measures intended to make it harder for terrorist groups to operate increase the costs of terrorism.

That democratic governments curtail free speech protections and other fundamental rights and liberties when terrorists strike homeland is a well-documented empirical pattern (Schmid 1992; Stone 2004; Alexander 2006; Jacobson 2006; Wilkinson 2006; Richardson 2007; Donohue 2008; Cronin 2009; Crenshaw 2010; Roach 2011). Regardless of the security rationale for such antiterrorism measures, the political incentives that drive these policy interventions are well-understood: Legislators need to alleviate public fears and respond to citizens' demands to do something about terrorism, especially in the wake of major terrorist attacks (Donohue 2008; Fox and Stephenson 2011; Dragu and Polborn 2014). Perhaps, more importantly, public officials need to insure themselves against the political and electoral costs that would be borne when another terrorist event takes place should they oppose draconic antiterrorism measures in times of crisis (Ignatieff 2004; Cronin 2009; Crenshaw 2010). Notwithstanding the political impetus behind liberty-reducing antiterrorism measures to increase the cost of terrorism, the empirical pattern of curtailing free speech protections and other rights when bombs go off raises the following question: *How does a policy of reacting to terrorist attacks with restrictions on rights and liberties affect the likelihood of terrorism?*

For all the research on how democratic governments are or should be fighting terrorism, scholars and policymakers have neglected this important question. This is problematic since terrorist attacks are not natural disasters: a terrorist attack takes place when terrorists actively plan a strike and when the security agencies in charge of terrorism prevention fail to detect the plot. Since liberty-reducing antiterrorism measures aimed at increasing the cost of terrorism transform the environment in which security agencies and terrorist groups interact, it is important to investigate how the expectation that free speech protections are curtailed after a terrorist attack affects the motivations of terrorist groups to plot and carry an attack as well as the incentives of security agencies to foil the threat.

To answer this question, I develop a two-period model of an interaction between a se-

curity agency and a terrorist organization in which the first-period outcome determines the second-period interaction: If no terrorist attack occurs in the first period, the level of free speech protections remains unchanged in the second period and thus the security agency and the terrorist organization play the same game as in the first period. However, the free speech protections are curtailed if a terrorist attack occurs in the first period, and, in this contingency, the security agency and the terrorist organization play a game with lower free speech protections in the second period. The fact that the level of free speech protections is lower in the second period if the outcome of the first period is a terrorist attack creates dynamic incentives: the prospect of changing the level of free speech protections should a terrorist attack happen changes the first-period stakes of terror prevention and terror success, which in turn alters the first-period incentives of the players.

The dynamic analysis shows that the prospect of reducing free speech protections in the event of a terrorist attack has a moral hazard effect: it either increases the level of terrorist activities or decreases the level of counterterrorism effort (or possibly both) in the first period, which can make a terrorist attack more likely in the first period. Moreover, restrictions on free speech can also make a terrorist attack more likely in the second period, even if such antiterrorism measures increase the cost of terrorism, which undermines the policy justification for adopting such policies on its own terms. The analysis suggests that a commitment to not curtailing fundamental rights and liberties in the wake of security crises can be security-beneficial: a norm that liberal societies remain faithful to their fundamental values even when bombs go off can reduce the likelihood of terrorism.

Restrictions on free speech and other liberty-reducing antiterrorism measures have ignited a longstanding scholarly and public debate about the tradeoffs between liberty and security (Ferejohn and Pasquino 2004). Legal and political theory scholars have argued extensively whether such antiterrorism policies are normatively undesirable because they depart from established liberal-democratic principles or whether they are essential to respond effectively to terrorist threats (Heymann 2003; Ignatieff 2004; Posner 2005; Waldron 2003). Scholars of terrorism have investigated empirically the effectiveness of various repressive counterterrorism tactics to show that such policies can be counterproductive (Siegel 2011; Daxecker and Hess 2013; Benmelech, Berrebi, and Klor 2015). Such findings have been documented in cross-sectional analyses (Daxecker and Hess 2013; Walsh and Piazza 2010; Daxecker 2014), in case studies of counterterrorism in France, Italy and India (Della Porta 1995; Shapiro 2007; Crenshaw 1995; Wallace 2007), and in quantitative assessments of counterterrorism policies in Israel, United Kingdom and Spain (LaFree, Dugan, and Korte 2009; Gil-Alana and Barros 2010; Dugan and Chenoweth 2012; Benmelech, Berrebi, and Klor 2015). However, the mechanisms by which restrictions on free speech and other liberty-reducing antiterror-

ism measures affect terrorism prevention are generally understudied. This paper develops a framework that allows us to scrutinize the micro-foundations of antiterrorism measures aimed at increasing the cost of terrorism and also to assess the consequences of such policies.

More importantly, researchers have yet to determine how the expectation of reducing free speech protections (and other liberty-reducing measures) in the aftermath of an attack affects the incentives of terrorism prevention/occurrence. This question is particularly important since restricting fundamental rights and liberties to make it harder for terrorist groups to operate has been the typical response of democratic governments to major terrorist attacks. The paper presents, to the best of my knowledge, the first dynamic model that tackles this question.[3] The paper uncovers novel results regarding the (dynamic) consequences of such antiterrorism measures, results that are missing from current scholarly and policy debates about terrorism prevention. The dynamic analysis underscores the importance of assessing this strategy of prevention in light of the incentives of security agencies responsible for terrorism prevention. It suggests that in a world where politicians respond to major terrorist attacks by restricting civil liberties security agencies try less hard because the pain of the attack is ameliorated somewhat by the future gains from having a better counterterrorism environment (i.e. one with less free speech), a finding that has several important institutional and policy implications which I will discuss in the concluding section.[4]

A Dynamic Model of Terrorism Prevention

To answer the question of how a policy of reacting to terrorist attacks with restrictions on free speech affects the likelihood of terrorism, I analyze a two-period interaction between a security agency and a terrorist organization. For simplicity of exposition, I suppress time superscripts from the presentation of the players' actions in the stage game below and use such notations only when necessary.

In each period, the structure of the interaction (i.e., the stage game) is as follows: the terrorist organization chooses a level of terrorist activities in preparation for a terrorist

[3]The paper also contributes to a political economy literature on terrorism (Sanchez-Cuena and de la Calle 2009; Moore 2011). The existing scholarship on terrorism has addressed several important questions about terrorism prevention, including the optimal (or suboptimal) counterterrorism policy (Rodendorff and Sandler 2004; Bueno de Mesquita 2007; Powell 2007; Bapat 2011; Dragu 2011; Langlois and Langlois 2011; Siegel 2011), terrorism recruitment and support (Siqueira and Sandler 2006, Bueno de Mesquita and Dickson 2007), the effect of terrorism on domestic politics and institutional design (Berrebi and Klor 2008; Indridason 2008; Shapiro and Siegel 2010), to name a few topics (the literature is much too extensive to attempt a comprehensive review here).

[4]The dynamic analysis can also help understanding the effectiveness of preventive measures in situations in which governments engage in preemptive actions to foil various social harms, and, as such it contributes to a small but growing political economy of prevention (Fox and van Welden 2014, Forand 2015).

attack, $e_t \in \mathcal{R}_+$. The agency chooses a level of counterterrorism effort aimed at detecting terrorist activity, $e_s \in \mathcal{R}_+$. The players make their decisions simultaneously.

The outcome of the stage game is binary and it is captured by a variable $A \in \{0, 1\}$, where $A = 1$ denotes a successful terrorist attack and $A = 0$ denotes failure or absence of a terrorist attack. The actions of the security agency and the terrorist organization translate into a probability of a successful terrorist attack, given by a twice continuously differentiable function $P(e_s, e_t) \equiv \text{Prob}(A = 1)$. This probability increases in the level of activities in preparation for a terrorist attack, e_t, and decreases in the level of counterterrorism effort to detect terrorist activity, e_s. Also, $P(e_s, e_t)$ is convex in e_s (i.e., there are decreasing marginal returns to terrorism prevention in e_s) and it is concave in e_t (i.e., there are decreasing marginal returns to terrorism occurrence in e_t).

The existing scholarship depicts terrorism as an asymmetric form of warfare: the weapon of the weak, the terrorist organization, against the strong, the government (Richardson 2007; Wilkinson 2006; Hoffman 2013). In other words, terrorists do not wear uniforms or openly confront the government, rather they want to be undetected by security agencies and have an advantage by remaining unknown and plotting in secrecy (Hoffman 2013; White 2003). That is, the effectiveness of the terrorists' effort to successfully execute a terror plot is higher when the government's surveillance to detect traces of terrorist activity is lower (Wilkinson 2006; White 2003). To formalize this, let the cross-partial derivative of the probability of a successful terrorist attack be negative, i.e., $\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t} < 0$.[5]

Let $O_s(A)$ the be security agency's payoff if the outcome is $A \in \{0, 1\}$. The objective of the security agency is to prevent a terrorist attack and thus $O_s(1) < O_s(0)$. Denote the difference by $\Delta_s \equiv O_s(0) - O_s(1)$, where Δ_s can be thought as the security agency's stake in terrorism prevention. The security agency also incurs a cost given by a twice continuously differentiable function $C_s(e_s)$; the cost increases in e_s and is convex in e_s.[6] The security agency's expected utility in the stage game is

$$\begin{aligned} U_s(e_s, e_t) &= [1 - P(e_s, e_t)]O_s(0) + P(e_s, e_t)O_s(1) - C_s(e_s) \\ &= O_s(0) - P(e_s, e_t)\Delta_s - C_s(e_s). \quad (1) \end{aligned}$$

Let $O_t(A)$ be the terrorist organization's payoff if the outcome is $A \in \{0, 1\}$. The objective of the terrorist organization is to successfully carry a terrorist attack and thus $O_t(1) > O_t(0)$. Denote the difference by $\Delta_t \equiv O_t(1) - O_t(0)$, where Δ_t can be thought as the terrorist organization's stake in terrorism occurrence. The terrorist organization also incurs

[5] Also, as shown in the next section, this specification leads to best-response functions that are intuitive and consistent with empirical evidence. For further discussion see the Appendix.

[6] I assume standard Inada conditions: $\lim_{e_s \to 0} C_s'(e_s) = 0$ and that $\lim_{e_s \to \infty} C_s'(e_s) = \infty$.

a cost given by a twice continuously differentiable function $C_t(e_t, f)$; the cost increases in e_t and it is convex in e_t.[7] The cost of terrorist activities is also affected by the level of free speech protections, f, as described below.

To formalize the policy justification for curtailing free speech protections and other rights and liberties (i.e., more restrictions on free speech increases the cost of terrorism), let the cost of terrorist activities be decreasing in the level of free speech protections, f (i.e. $\frac{\partial C_t(e_t,f)}{\partial f} < 0$), and also let the marginal cost be decreasing in f (i.e. $\frac{\partial^2 C_t(e_t,f)}{\partial e_t \partial f} < 0$). The terrorist organization's expected utility in the stage game is

$$\begin{aligned} U_t(e_s, e_t) = [1 - P(e_s, e_t)]O_t(0) + P(e_s, e_t)O_t(1) - C_t(e_t, f) \\ = O_t(0) + P(e_s, e_t)\Delta_t - C_t(e_t, f). \quad (2) \end{aligned}$$

As mentioned, I analyze a two-period interaction between the security agency and the terrorist organization. In each period, the structure of the interaction is the given by the stage game described above. The only difference is that the game in the second period depends on the outcome of the first period: If no terrorist attack occurs in the first period, the security agency and the terrorist organization play the same game as in the first period (i.e., the same level of f). However, the level of free speech protections is reduced if a terrorist attack occurs in the first period, and, in this contingency, the security agency and the terrorist organization play a game with lower free speech protections in the second period. To formalize this argument, let f denote the level of free speech protections in the first period and let f' denote the level of free speech protections in the second period in the contingency that a terrorist attack happens in the first period, where $f' < f$. The timing of the interaction is as follows:

- In the first period, the security agency chooses a level of effort e_s^1 and the terrorist organization chooses a level of effort e_t^1.
- The outcome of the interaction in the first period is a terrorist attack with probability $P(e_s^1, e_t^1)$ and no terrorist attack with probability $1 - P(e_s^1, e_t^1)$.
- In the second period, the level of free speech protection remains f if the outcome of the first period is no terrorist attack.
- In the second period, the level of free speech protections decreases from f to f' if the outcome of the first period is a terrorist attack.

[7] I assume standard Inada conditions: $\lim_{e_t \to 0} \frac{\partial C_t(e_t,f)}{\partial e_t} = 0$ and that $\lim_{e_t \to \infty} \frac{\partial C_t(e_t,f)}{\partial e_t} = \infty$.

- In the second period, the security agency chooses a level of effort e_s^2 and the terrorist organization chooses a level of effort e_t^2.
- The outcome of the interaction in the second period is a terrorist attack with probability $P(e_s^2, e_t^2)$ and no terrorist attack with probability $1 - P(e_s^2, e_t^2)$.

The security agency's and the terrorist organization's total utility in this two-period interaction is the sum of the first period and (discounted) second period utilities, where the security agency's and the terrorist organization's per-period utility is given by expressions (1) and (2).

The analysis proceeds in two steps. First, I present some equilibrium properties of the stage game. Second, I analyze how a policy of reducing free speech protections if the outcome in the first period is a terrorist attack affects the players' first-period actions and, consequently, the first-period equilibrium probability of a terrorist attack.

The Stage Game

I begin with presenting some properties of the stage game, which are necessary for the dynamic analysis. For simplicity of exposition, I state the key results of the formal analysis in text and provide a more detailed analysis in the Appendix.

The security agency's objective function (1) is concave in e_s, and thus the unique optimal e_s is the solution to the first-order condition:

$$-\frac{\partial P(e_s, e_t)}{\partial e_s}\Delta_s - C_s'(e_s) = 0. \tag{3}$$

Moreover, the security agency's best-response function $e_s(e_t)$ strictly increases in e_t. The result is intuitive: if the terrorist organization increases its level of terrorist activities in preparation for a terrorist attack, in response, the security agency increases its level of counterterrorism effort to detect terrorist activity.

The terrorist organization's objective function (2) is concave in e_t, and thus the unique optimal e_t is the solution to the first-order condition:

$$\frac{\partial P(e_s, e_t)}{\partial e_t}\Delta_t - \frac{\partial C_t(e_t, f)}{\partial e_t} = 0. \tag{4}$$

Moreover, the terrorist organization's best response function $e_t(e_s)$ strictly decreases in e_s. The result is intuitive as well: if the security agency increases its level of effort to detect terrorist activity, in response, the terrorist organization decreases its level of activities.

The (unique) equilibrium of the stage game is the solution to the system of equations given by (3) and (4).[8] As a result, we can study how reducing the level of free speech protections affects the players' equilibrium actions and, consequently, the players' equilibrium payoffs in the stage game, results that will be important for the dynamic analysis.

Reducing free speech protections has effects on the equilibrium actions of both players. First, it has a direct effect on the terrorist organization's equilibrium action because it increases its marginal cost. Second, it has a strategic effect on the security agency's equilibrium action, an effect that comes through how the security agency changes its equilibrium action in response to changes in the equilibrium level of terrorist activities. The mechanics of this strategic effect is as follows: reducing the level of free speech protections increases the cost of terrorist activities, which decreases the terrorist organization's equilibrium action, e_t. Since the security agency's counterterrorism effort increases in e_t, reducing free speech protections decreases the security agency's equilibrium action, e_s.

Proposition 1. *In the stage game, reducing free speech protections decreases the terrorist organization's equilibrium level of terrorist activities and decreases the security agency's equilibrium level of counterterrorism effort.*

Given the results regarding the effect of f on the players' equilibrium actions, I next investigate how changing the level of free speech protections affects the security agency's and the terrorist organization's equilibrium payoffs. In this context, the security agency's equilibrium payoff (as a function of f) in the stage game is the following:

$$U_s^*(f) = O_s(0) - P(e_s^*(f), e_t^*(f))\Delta_s - C_s(e_s^*(f)).$$

A simple inspection of the above expression suggests that the level of free speech protections affects the security agency's equilibrium payoff through two different channels: it changes the equilibrium level of counterterrorism effort, $e_s^*(f)$, and it also changes the equilibrium level of terrorist activities, $e_t^*(f)$. Changes in the level of free speech protections that work through changing the security agency's equilibrium action have a zero effect on its equilibrium payoff, a simple implication of the envelope theorem. Since reducing the level of free speech protections decreases the equilibrium level of terrorist activities and since a lower level of terrorist activities increases the agency's payoff, it implies that reducing the level of free speech protections increases the security agency's equilibrium payoff in the stage game.

The terrorist organization's equilibrium payoff (as a function of f) in the stage game is:

$$U_t^*(f) = O_t(0) + P(e_s^*(f), e_t^*(f))\Delta_t - C_t(e_t^*(f), f).$$

[8] For a detailed analysis, see the Appendix.

A simple inspection of the above expression suggests that the level of free speech protections affects the terrorist organization's equilibrium payoff through three different channels: it changes the equilibrium level of counterterrorism effort, $e_s^*(f)$, it changes the equilibrium level of terrorist activities, $e_t^*(f)$, and it also changes the cost of terrorist activities, $C_t(e_t^*(f), f)$. Changes in the level of free speech protections that work through changing the terrorist organization's equilibrium action have a zero effect on its equilibrium payoff, a simple implication of the envelope theorem. On the one hand, reducing the level of free speech protections decreases the security agency's equilibrium action, which, all else equal, increases the terrorist organization's equilibrium payoff. On the other hand, reducing the level of free speech protections increases the marginal cost of terrorist activities, which, all else equal, decreases the terrorist organization's equilibrium payoff. Depending on which effect dominates, the terrorist organization's equilibrium payoff in the stage game can decrease or increase when f is reduced.

Proposition 2. *In the stage game, reducing free speech protections increases the security agency's equilibrium payoff in the stage game. In the stage game, reducing free speech protections has an ambiguous effect on the terrorist organization's equilibrium payoff.*

The results of Proposition 2 are important in the context of the dynamic analysis since, as I shall show, the efforts of the security agency/terrorist organization to prevent/plan a terrorist attack are affected by how a reduction in f should a terrorist attack happen changes their subsequent equilibrium payoffs. Another set of results that will be important to analyze the dynamic effects of liberty-reducing antiterrorism measures on the incentives to prevent/plan a terrorist attack is how changes in the security agency's stake for terrorism prevention and changes in the terrorist organization's stake for a successful attack affect the players' equilibrium actions in the stage game. The next proposition summarizes these effects.

Proposition 3. *In the stage game, the security agency's equilibrium action increases in its stake from terrorism prevention, Δ_s, and also in the terrorist organization's stake for a successful terrorist attack, Δ_t. In the stage game, the terrorist organization's equilibrium action increases in its stake for a successful terrorist attack, Δ_t, and decreases in the security agency's stake for terrorism prevention, Δ_s.*

Proposition 3 indicates that a higher Δ_s increases the security's agency equilibrium action in the stage game. This is intuitive since a higher Δ_s means that the security agency has a higher benefit from stopping a terrorist attack, which augments the agency's incentives to put more effort to stop a terrorist attack. On the other hand, an increase in Δ_s decreases

the terrorist organization's equilibrium action since a higher Δ_s increases the agency's equilibrium action and since the terrorist organization decreases its action when the level of counterterrorism effort is higher. Proposition 3 also indicates that a higher Δ_t increases the terrorist organization's equilibrium action in the stage game. This is intuitive as well since a higher Δ_t means that the terrorist organization gets a bigger benefit from a successful attack, which increases the organization's incentives to put more effort into devising a terrorist attack. On the other hand, a higher Δ_t increases the security agency's equilibrium action in the stage game since a higher Δ_t increases the terrorist organization's equilibrium action and since the security agency's action increases when the level of terrorist activities is higher.

Given these equilibrium properties of the stage game, I present the dynamic analysis in the next section.

The Dynamic Game

Restricting free speech and other fundamental rights and liberties has been the typical response of democratic governments to major terrorist attacks (Alexander 2006; Jacobson 2006; Wilkinson 2006; Donohue 2008; Cronin 2009; Crenshaw 2010; Roach 2011). How does a policy of reacting to terrorist attacks with restrictions on free speech protections affect the likelihood of terrorism?

To answer this question, I compare the dynamic game previously described with a benchmark game in which the level of free speech protections doesn't change if the outcome in the first period is a terrorist attack. That is, I compare the dynamic game in which the level of free speech protections in the second period decreases from f to f' if the first-period outcome is a terrorist attack with a benchmark game in which the level of free speech protections in the second period remains f even if the first-period outcome is a terrorist attack. For simplicity of exposition, henceforth, I label the interaction in which the level of free speech protections remains unchanged after a terrorist attack as the benchmark game and the interaction in which the level of free speech protections changes in the event of a terrorist attack after the first period as the dynamic game.

Benchmark Game. Let us first analyze the benchmark scenario in which the level of free speech protections is the same in the first and the second period regardless of whether a terrorist attack happens after the first period. In other words, the level of free speech protections in the second period is f. Similar to the equilibrium analysis of the stage game, the interaction in the last period has a unique equilibrium, and let $u_s^2(f)$ and $u_t^2(f)$ denote the security agency's and the terrorist organization's second-period equilibrium payoffs.

When the security agency chooses its first-period level of counterterrorism effort its total utility (the sum of first and discounted second period utilities) is:

$$U_s = \underbrace{O_s(0) - P(e_s, e_t)\Delta_s - C_s(e_s)}_{\text{first period payoff}} + \underbrace{\delta_s[P(e_s, e_t)u_s^2(f) + [1 - P(e_s, e_t)]u_s^2(f)]}_{\text{second period payoff}}$$
$$= O_s(0) - P(e_s, e_t)\Delta_s - C_s(e_s) + \delta_s u_s^2(f), \quad (5)$$

where the term $P(e_s, e_t)u_s^2(f) + [1 - P(e_s, e_t)]u_s^2(f) \equiv u_s^2(f)$ represents the second-period utility from the perspective of the security agency when choosing its first-period effort and $\delta_s \in [0, 1]$ represents the agency's discount factor.

Similarly, when the terrorist organization chooses its first-period action its total utility (the sum of first and discounted second period utilities) is:

$$U_t = \underbrace{O_t(0) + P(e_s, e_t)\Delta_t - C_t(e_t, f)}_{\text{first period payoff}} + \underbrace{\delta_t[P(e_s, e_t)u_t^2(f) + [1 - P(e_s, e_t)]u_t^2(f)]}_{\text{second period payoff}}$$
$$= O_t(0) + P(e_s, e_t)\Delta_t - C_t(e_t, f^1) + \delta_t u_t^2(f), \quad (6)$$

where the term $P(e_s, e_t)u_t^2(f) + [1 - P(e_s, e_t)]u_t^2(f) = u_t^2(f)$ represents the second-period utility from the perspective of the terrorist organizations when choosing its first-period action and $\delta_t \in [0, 1]$ represents the terrorist organization's discount factor.

Notice that the security agency's and the terrorist organization's first-period maximization problems are identical to the second-period maximization problems since the second-period utilities $u_i^2(f)$ for $i \in \{t, s\}$ do not affect the first-period equilibrium incentives. As a result, the equilibrium actions and payoffs in the first and the second period are the same. Let $\bar{e}_s$, $\bar{e}_t$, and $\bar{P}$ denote the first-period equilibrium actions and the equilibrium probability of a terrorist attack in the first period of the benchmark game.

Dynamic Game. Similar to the equilibrium analysis of the stage game, in the second period, the game has a unique pure strategy equilibrium. The second-period equilibrium payoffs depend on whether the level of free speech protections is f or f', where $f' < f$. Let us denote the second-period equilibrium payoffs by $u_s^2(f)$ and $u_t^2(f)$ if the level of free speech protections is f and by $u_s^2(f')$ and $u_t^2(f')$ if the level of free speech protections is f'. Proposition 2 shows that the security agency's equilibrium payoff increases when the level of free speech protections decreases, which implies that the security agency's second-period equilibrium payoff is higher if the level of free speech protections is reduced from f to f' (i.e., $u_s^2(f') > u_s^2(f)$). On the other hand, Proposition 2 shows that the terrorist organization's

equilibrium payoff can decrease or increase when the level of free speech protections decreases, which implies that the terrorist organization's second-period equilibrium payoff can be higher or lower if the level of free speech protections is reduced from f to f'.

Let $d_s = u_s^2(f) - u_s^2(f') < 0$ denote the security agency's equilibrium payoff difference between the game in which the level of free speech protection is f and the game in which the level of free speech protection is f'. Likewise, let $d_t = u_t^2(f) - u_t^2(f')$ denote the terrorist organization's utility difference between the game in which the level of free speech protections is f and the game in which the level of free speech protections is f'. Table 2 summarizes the relevant parameters in this dynamic analysis and their substantive interpretations.

Parameter	Substantive Interpretation
$u_i^2(f)$ for $i \in \{t, s\}$	a player's second-period equilibrium payoff in the f game
$u_i^2(f')$ for $i \in \{t, s\}$	a player's second-period equilibrium payoff in the f' game
$d_s = u_s^2(f) - u_s^2(f')$	the security agency's second-period utility difference between the f and f' games
$d_t = u_t^2(f) - u_t^2(f')$	the terrorist organization's second-period utility difference between the f and f' games
δ_i for $i \in \{t, s\}$	a player's discount factor

Table 1: Parameters in the Dynamic Model

When the security agency chooses its first-period action, its total utility (the sum of first and discounted second period utilities) is:

$$U_s = \underbrace{O_s(0) - P(e_s, e_t)\Delta_s - C_s(e_s)}_{\text{first-period payoff}} + \underbrace{\delta_s[P(e_s, e_t)u_s^2(f') + [1 - P(e_s, e_t)]u_s^2(f)]}_{\text{second-period payoff}}$$
$$= O_s(0) - P(e_s, e_t)B_s - C_s(e_s) + \delta_s u_s^2(f), \quad (7)$$

where $B_s = \Delta_s + \delta_s d_s$ can be understood as the security agency's stake of preventing a terrorist attack in the first period of the dynamic game. If we compare the security agency's first-period maximization problem in the benchmark game and the dynamic game (i.e. expressions (5) and (7)), we can see that the security agency's stake in terrorism prevention

decreases from Δ_s to B_s.[9] The agency's stake of preventing a terrorist attack is lower in the dynamic game since the agency's second-period equilibrium payoff is higher in the game in which the level of free speech protections is lower. Since the first-period equilibrium actions determine which game is played in the second period and since the agency prefers the f' game in the second period, the agency's stake of preventing a terrorist attack in the first period is lower in the dynamic game.

Similarly, when the terrorist organization chooses its first-period action, its total utility (the sum of first and discounted second period utilities) is:

$$U_t = \underbrace{O_t(0) + P(e_s, e_t)\Delta_t - C_t(e_t, f)}_{\text{first-period payoff}} + \underbrace{\delta_t[P(e_s, e_t)u_t^2(f') + [1 - P(e_s, e_t)]u_t^2(f)]}_{\text{second-period payoff}}$$
$$= O_t(0) + P(e_s, e_t)B_t - C_t(e_t, f) + \delta_t u_t^2(f). \quad (8)$$

where $B_t = \Delta_t - \delta_t d_t$ can be understood as the terrorist organization's stake in a successful terrorist attack in the first period of the dynamic game. If we compare the terrorist organization's first-period maximization problem in the benchmark and the dynamic game (i.e. expressions (6) and (8)), we can see that the terrorist organization's stake in a successful terrorist attack changes from Δ_t to B_t, where B_t can be higher or lower than Δ_t, depending on whether the terrorist organization's second-period equilibrium payoff decreases or increases when the level of free speech protections decreases from f to f'.

By a similar analysis as in the equilibrium analysis of the stage game, the first-period interaction has a unique equilibrium. As mentioned, let us denote the equilibrium actions in the first period of the dynamic game by e_s^1 and e_t^1, and the equilibrium probability of a terrorist attack in the first period of the dynamic game by P^1.

Equilibrium Comparison. The key difference between the strategic interaction in the benchmark scenario and the dynamic game is that the prospect of changing the level of free speech protections if the first-period outcome is a terrorist attack alters the incentives of the players by changing the stakes of terror prevention and terror success in the first period. Proposition 4 below indicates that the prospect of reducing the level of free speech protections after a terrorist attack has a moral hazard effect on the first-period incentives, either by increasing the level of terrorist activity or by decreasing the level of counterterrorism effort.

Proposition 4. *The security agency's first-period equilibrium action is lower in the dynamic game than in the benchmark game if $d_t > 0$. The terrorist organization's first period*

[9] $B_s < \Delta_s$ since $\delta_s \in [0, 1]$ and $d_s < 0$.

equilibrium action is higher in the dynamic game than in the benchmark game if $d_t < 0$.

Recall that the terrorist organization's second-period equilibrium payoff can decrease or increase when the level of free speech protections decreases from f to f'. Therefore we need to consider two (exhaustive) cases: 1) the terrorist organization's stake in a successful terrorist attack in the first period of the dynamic game is higher than the benchmark game (i.e., $d_t < 0$) and 2) the terrorist organization's stake in a successful terrorist attack in the first period of the dynamic game is lower than the benchmark game (i.e., $d_t > 0$).

Consider first the situation in which the terrorist organization's second-period equilibrium payoff decreases when f decreases (i.e., $d_t > 0$). In this scenario, both B_s and B_t are lower than Δ_s and Δ_t, respectively. Proposition 3 shows that the security agency's equilibrium action increases when Δ_s and Δ_t are higher, which implies that the security agency's equilibrium action is lower in the dynamic game than in the benchmark game. The intuition is as follows: decreasing the agency's stake for terrorism prevention from Δ_s to B_s has a direct effect of reducing the security agency's incentive to prevent a terrorist attack. At the same time, decreasing the terrorist organization's stake for a successful terrorist attack from Δ_t to B_t reduces the terrorist organization's incentives for terrorist activities. Since the level of counterterrorism effort decreases when the level of terrorist activities is lower, a decrease in the terrorist organization's stake for a successful terrorist attack reduces the security agency's level of counterterrorism effort. Both the direct and the strategic effect work in the same direction to decrease the level of counterterrorism effort in the first period of the dynamic game as compared to the benchmark scenario.

Consider next the situation in which the terrorist organization's second-period equilibrium utility increases when f decreases (i.e., $d_t < 0$). In this scenario, B_s is lower than Δ_s but B_t is higher than Δ_t. Proposition 3 indicates that the terrorist organization's equilibrium action decreases in Δ_s and increases in Δ_t, which implies that the terrorist organization's equilibrium action is higher in the dynamic game than in the benchmark game. The intuition is as follows: increasing the terrorist organization's stake for a successful terrorist attack from Δ_t to B_t has a direct effect of increasing its incentives for terrorist activities. At the same time, decreasing the security agency's stake for terrorism prevention from Δ_s to B_s has a strategic effect of increasing the terrorist organization's incentives for terrorist activities since the terrorist organization's equilibrium action is higher when the level of counterterrorism effort is lower. Both the direct and the strategic effect work in the same direction to increase the level of terrorist activities in the first period of the dynamic as compared to the benchmark scenario.

Proposition 4 indicates that a policy of reducing free speech protections in the aftermath of a terrorist attack either decreases the level of counterterrorism effort or increases the level

of terrorist activities in the first period (or both as shown in Example 1 below). In other words, the prospect of such policy intervention has a moral hazard effect since either $e_s^1 < \bar{e}_s$ or $e_t^1 > \bar{e}_t$ (or both).

Example 1 illustrates the moral hazard effect of curtailing free speech protections in the aftermath of a terrorist attack. To this end, let the parameters of the stage game be as follows: $P(e_s, e_t) = e_t(1 - e_s)$, $C_s(e_s, k_s) = \frac{1}{2}k_s e_s^2$, $C_t(e_t, f) = M(f)\frac{1}{2}k_t e_t^2$, $\delta_s = \delta_t = 1$, $k_s = k_t = 1$, $M(f) = 1 - f$, $f < 1$, and $O_s(0) = O_t(1) = 1$, $O_s(1) = O_t(0) = 0$ (which implies that $\Delta_s = \Delta_t = 1$).

Example 1: Suppose that the level of free speech protections is $f = 0$ in the first period and that it decreases from $f = 0$ to $f' = -2$ if a terrorist attack happens in the first period. The second-period probability of a terrorist attack is $P^2(f) = \frac{1}{2}$ in the f game and $P^2(f') = \frac{3}{4}$ in the f' game. Also, in the second period, the security agency's equilibrium payoff is $u_s^2(f) = -\frac{3}{8}$ in the f game and $u_s^2(f') = -\frac{7}{32}$ in the f' game, which implies that $d_s = -\frac{5}{32}$ and $B_s = \frac{27}{32}$. Likewise, in the second period, the terrorist organization's equilibrium payoff is $u_t^2(f) = \frac{1}{8}$ in the f game and $u_s^2(f') = \frac{3}{32}$ in the f' game, which implies that $d_t = \frac{1}{32}$ and $B_t = \frac{31}{32}$.

In the dynamic game, the security agency's first-period equilibrium action is $e_s^1 \approx 0.45$, the terrorist organization's first-period equilibrium action is $e_t^1 \approx 0.53$, and the first-period equilibrium probability of a terrorist attack is $P^1 \approx 0.29$. In the benchmark game, the security agency's first-period equilibrium action is $\bar{e}_s = 0.5$, the terrorist organization's first-period equilibrium action is $\bar{e}_t = 0.5$, and the first-period equilibrium probability of a terrorist attack is $\bar{P} = 0.25$. Therefore we have $e_s^1 < \bar{e}_s$, $e_t^1 > \bar{e}_t$, and $P^1 = 0.29 > \bar{P} = 0.25$.

Thus the first-period level of counterterrorism effort is lower in the dynamic game, the first-period level of terrorist activities is higher in the dynamic game, and the first-period equilibrium probability of a terrorist attack is higher in the dynamic game as compared to the benchmark game. Notice also that the second-period equilibrium probability of a terrorist attack increases when the level of free speech protections is reduced from f to f' if the first-period outcome is a terrorist attack (i.e., $P^2(f') = \frac{3}{4} > P^2(f) = \frac{1}{2}$).

We have the following result:

Proposition 5. *The first-period equilibrium probability of a terrorist attack can be higher if the level of free speech protections is reduced when the first-period outcome is a terrorist attack.*

Proposition 5 implies that a commitment to not reducing the level of free speech protections in the aftermath of a terrorist attack can make a terrorist attack less likely. In other

words, an expectation that liberal societies remain faithful to their fundamental values even in times of duress can in fact reduce the likelihood of terror.

Another well-documented empirical fact is that budgetary resources devoted to fighting terrorism increase the aftermath of terrorist attack (Alexander 2006; Donohue 2008; Priest and Arkin 2011). The rationale of such policies is to reduce the likelihood of a terrorist attack by decreasing the cost of counterterrorism. But how does a policy of reacting to terrorist attack with measures aimed at decreasing the cost of counterterrorism affect the likelihood of a terrorist attack? In the Appendix, I analyze a version of the dynamic model in which the cost of counterterrorism effort decreases if the outcome in the first period is a terrorist attack.[10] This analysis shows that such a policy intervention also has a moral hazard effect: it reduces the level of counterterrorism effort in the first period, which in turn can make a terrorist attack more likely in the first period.

In sum, the previous analysis shows that a policy of reducing the level of free speech protections in the aftermath of a terrorist attack has a moral hazard effect and can make a terrorist attack more likely. The mechanism is as follows: When choosing their first-period actions, the security agency and the terrorist organization take into account how reducing the level of free speech protections (if the outcome of the first period is a terrorist attack) affects their payoffs in the second period. A reduction from f to f' increases the security agency's second-period utility whereas the effect of such a policy on the terrorist organization's second-period utility is ambiguous. This implies that a reduction from f to f' (if the outcome of the first period is a terrorist attack) decreases the security agency's first-period stake for terrorism prevention and can decrease or increase the terrorist organization's first-period stake for a successful terrorist attack. Regardless of how the terrorist organization's first-period stake for a successful terrorist attack is affected, reducing free speech protections in the aftermath of a terrorist attack either decreases the first-period level of counterterrorism effort or increases the first-period level of terrorist activity (or both), with the overall effect of making a terrorist attack more likely in first period.

The dynamic analysis shows a potential deleterious consequence of a policy of restricting free speech protections in the aftermath of a terrorist attack. The policy justification for passing such antiterrorism measures is that, by increasing the cost of terrorism, such policies decrease the incidence of terrorism. The U.S. Supreme Court expounded this very rationale in *Holder v. Humanitarian Law Project,* the landmark case that upheld the constitutionality of material support provisions against free speech considerations in the United States. Without denying that Patriot Act provisions limit the scope of freedom of expression, the court

[10]This analysis is related to a larger literature on how altering the budgets of bureaucratic agencies affects policy-making (for example, see Ting 2001).

intoned that the law is a legitimate preventive measure because "material support," even if intended to foster non-violent, non-terrorist activities, "helps lend legitimacy to foreign terrorist groups - legitimacy that makes it easier for those groups to persist, to recruit members, and to raise funds - all of which facilitate more terrorist attacks."[11]

In the context of our model, this security rationale would imply that a reduction from f to f' if the outcome in the first period is a terrorist attack should decrease the probability of a terrorist attack in the second period. Notice that the moral hazard effect documented above does not depend on whether a reduction in f decreases or not the probability of a terrorist attack in the second period. In other words, Proposition 4 holds regardless of whether liberty-reducing measures aimed at increasing the cost of terrorism have their intended policy benefits or not. Moreover, the equilibrium analysis of the stage game suggests that the policy justification for such antiterrorism measures might not be valid even on its own terms. That is, Proposition 1 shows that a reduction in f decreases both equilibrium actions in the stage game. Since the probability of a terrorist attack in the second period decreases in security agency's action and since the equilibrium level of counterterrorism effort decreases when the level of free speech protections is reduced, Proposition 1 implies that there can be situations when reducing free speech protections increases the equilibrium probability of a terrorist attack in the second period (as shown in Example 1).

The previous discussion therefore suggests that a policy of restricting free speech protections should a terrorist attack happen not only has a moral hazard effect on the first-period incentives but might also make a terrorist attack more likely in the second period.

The Security Rationale for Reducing Free Speech

Since the policy justification for curtailing free speech and other rights and liberties in the aftermath of a terrorist attack is that such measures are necessary to fight terrorism, it is perhaps also relevant from a policy perspective to further assess this policy justification. As such, in this section, I characterize the conditions under which reducing the level of free speech protections increases or decreases the probability of a terrorist attack in the second period. To this end, I analyze a parametric model that allows us to derive closed-form solutions for the equilibrium actions which is necessary to investigate how a reduction in f affects the equilibrium probability of a terrorist attack in the second period.[12] In this

[11] Holder v. Humanitarian Law Project, 561 U.S. 1 (2010), p. 25.

[12] We can derive an expression for how changing f affects the equilibrium probability of a terrorist attack in terms of the relationship between the partials of $P(\cdot,\cdot)$ and the cost functions (such a derivation is provided in the Appendix). However, to say more about the conditions under which P^2 increases or decreases in f, we need to solve for the equilibrium actions in the second period as the partials in the respective expression

context, let the probability of a terrorist attack in the stage game be given by $P(e_s, e_t) = e_t(1 - e_s)$,[13] the cost of counterterrorism effort be given by $C_s(e_s) = \frac{1}{2}k_s(e_s)^2$, and the cost of terrorist activities be given by $C_t(e_t, f) = M(f)\frac{1}{2}k_t(e_t)^2$.[14] We can think of k_s to parametrize the (marginal) cost for counterterrorism effort; similarly, we can think of k_t to parametrize the (marginal) cost for terrorist activities due to factors other than the level of free speech protections. Also, the function $M(f)$ captures the (marginal) effect of free speech protections on the cost of terrorism, where $M'(f) < 0$ (i.e., a higher level of free speech protections decreases the marginal cost of terrorist activities). Table 1 summarizes the exogenous parameters of the model and their substantive interpretations.

Parameter	Substantive Interpretation
$M(f)$	the effect of free speech protections on the cost of terrorism
Δ_s	the security agency's stake in preventing a terrorist attack
Δ_t	the terrorist organization's stake in a successful terrorist attack
k_s	the marginal cost of counterterrorism effort
k_t	the marginal cost of terrorist activities

Table 2: Exogenous Parameters in the Model

Given these specifications, the equilibrium actions in the second-period are $e_s^2 = \frac{\Delta_t\Delta_s}{\Delta_t\Delta_s + M(f)k_tk_s}$ and $e_t^2 = \frac{\Delta_t k_s}{\Delta_t\Delta_s + M(f)k_tk_s}$, and, as a result, the equilibrium probability of a terrorist attack in the second period is

$$P^2 = \frac{M(f)\Delta_t k_t k_s^2}{[\Delta_t\Delta_s + M(f)k_tk_s]^2}.$$[15]

Proposition 6 states the conditions under which a decrease in the level of free speech protections increases the equilibrium probability of a terrorist attack in the second period:

need to be evaluated at the equilibrium levels of e_s^2 and e_t^2.

[13] We need $e_s \leq 1$ but such a restriction is not necessary because it will be the case that $e_s^* < 1$.

[14] Notice that the cost functions are quadratic in effort. To avoid any confusion with the time superscripts denoting the second-period action, I use parentheses to denote effort squared.

[15] A sufficient (but not necessary condition) for P^2 to (always) be less than 1 is $\Delta_s > k_s$.

Proposition 6. *Reducing the level of free speech protections increases the equilibrium probability of a terrorist attack in the second period if*

$$\frac{\Delta_t}{k_t}\frac{\Delta_s}{k_s} - M(f) > 0, \tag{9}$$

and decreases the equilibrium probability of a terrorist attack in the second period otherwise.

Proposition 6 shows that the probability of a terrorist attack in the second period increases when the level of free speech protections is reduced if condition (9) holds. Notice that expression (9) is a function of the exogenous parameters of the model, and thus we can characterize the conditions under which a reduction in f leads to an increase in the equilibrium probability of a terrorist attack in the second period.

A simple inspection of expression (9) shows that the inequality is more likely to be satisfied when Δ_s and Δ_t are higher and when k_s and k_t are lower. In other words, reducing the level of free speech protections is more likely to be counterproductive when the security agency's stake for preventing a terrorist attack is higher, when the terrorist organization's stake in a successful terrorist attack is higher, when the security agency's marginal cost is lower, and when the terrorist organization's marginal cost is lower. These parameters can have various substantive interpretations; therefore scholars could derive policy and empirical implications regarding the conditions under which reducing the level of free speech protections is likely to be ineffective.

The game-theoretic analysis shows that the policy justification for restraints on free speech is questionable on its own terms. The decrease in privacy and the concomitant increase in the government's surveillance powers are another important preventive policies adopted in the wake of 9/11 by various liberal societies (Epifanio 2011). The analysis here is related to existing theoretic accounts of how reducing privacy affects terrorism prevention (Dragu 2001). From a modeling perspective, the key difference between reductions in privacy and restraints on free speech is the fact that changing privacy protections affects both the cost of terrorist activities and the government's cost of detecting terrorist activity. As a result, changes in privacy protections have both a strategic and a direct effect on each players' equilibrium actions (Dragu 2011). This implies that, in contrast with the previous analysis, the equilibrium level of counterterrorism effort can decrease or increase when privacy is reduced, depending on whether the strategic effect (working through changes in the level of counterterrorism effort in response to changes in the level of terrorist activities) dominates the direct effect (working through changes in the cost of counterterrorism effort).[16]

[16]That is, if we consider reductions in privacy protections, p (where a reduction in p decreases the marginal

Conclusion

In the wake of Charlie Hebdo, the French authorities began what has become almost a rite of passage for Western nations since 9/11 attacks in the United States: curbing freedom of expression and restricting other fundamental rights and liberties in order to increase the cost of terrorism. When terrorists strike home there is an overwhelming political urge to fix things so that the events will not be repeated (Heymann 2003; Ignatieff 2004; Richardson 2007; Crenshaw 2010). The "what if something awful happens again" factor creates a political climate in which it is easier for liberty-reducing antiterrorism measures to pass since no politician wants to be blamed for another terrorist strike and since no politician want to be perceived as not doing whatever it takes to safeguard security (Donohue 2008; Fox and Stephenson 2011; Dragu and Polborn 2014). Exacerbating the problem, situations of crisis, such as the aftermath of a terrorist attack, afford security agencies opportunities to push for antiterrorism measures that were not attainable in normal times (Dragu 2011; Glennon 2015).[17]

While the symbolic and political rationales of restricting rights and liberties in the aftermath of a terrorist attack are clear, perhaps less understood are the potential deleterious effects of such measures. The analysis shows that the prospect of curtailing free speech protections in the wake of a terrorist attack has a moral hazard effect, which can make a terrorist attack more likely in the first period. Moreover, such antiterrorism measures can also make a terrorist attack more likely in the second period, which undermines the policy justification for adopting such policies on its own terms.

The analysis has implications for contemporary debates regarding how to balance antiterrorism protections with individual freedoms (Waldron 2005; Posner and Vermeule 2007). It shows that even if one accepts that restrictions on freedom of expression and other liberty-reducing policies are effective at increasing the costs of terrorism, reducing free speech protections does not necessarily have the intended security consequences. At minimum, this analysis suggests that the burden of empirical proof should be on the proponents of liberty-reducing measures who must show that such policies are effective in preventing terrorist attacks.

The result that the efficacy of free speech restrictions is questionable on efficiency grounds is especially important since laws restricting free speech might pose fundamental challenges

cost of counterterrorism and increases the marginal cost of terrorist activities), $e_s^*(p)$ can increase or decrease in p. Notice that the moral hazard result (i.e., Proposition 4) generalizes to this set-up since Proposition 3 and the result of Propositions 2 that the agency's equilibrium payoff in the stage game increases when p is reduced hold even when $e_s^*(p)$ decreases in p.

[17] As Proposition 3 indicates, security agencies have incentives to push for liberty-reducing antiterrorism policies in the aftermath of a terrorist attack, regardless of their effectiveness.

to the institutional and social fabric of liberal societies beyond their questionable effect on security. The language of anti-incitement statutes invariably contains indefinite terms such as "incitement," "glorification," "encouragement of terrorism," vagueness that gives government officials the ability to censor political viewpoints or to sanction speech that has little chance of inciting violence, should they elect to do so. Most fundamentally, efforts to target speech that may lead to incitement place at risk values that citizens in liberal societies deem essential, such as freedom of speech, freedom to dissent, and the like, especially when anti-terrorism incitement provisions do not require a direct link between speech and incitement or intentionality to induce violence.

Moreover, the paper suggests that the effectiveness of liberty-reducing antiterrorism measures should be considered in light of the incentives of bureaucratic agencies responsible for terrorism prevention. In this context, scholars and governmental reports have documented various agency problems such as a bureaucratic culture rewarding quantity over quality, a focus on short-term at the expense of long-term strategic analysis, inability to connect the dots, among other problems (Garicano and Posner 2005; Posner 2006b; Treverton 2008). Scholars have also pointed out numerous bureaucratic inefficiencies in collecting, analyzing, and sharing intelligence (Zegart 2007; Hewitt 2008).

That curtailing free speech protections and other liberty-reducing antiterrorism measures changes the environment in which the security agencies and the terrorist groups interact is particularly important in light of such dysfunctional incentives. This is especially problematic because to head off a terrorist attack it is necessary to look for "the needle in a haystack," so to speak –an activity that is particularly prone to "false positives" and that requires spending most of the time and resources on null results (Garicano and Posner 2005).[18] Preventive policies that reduce rights and liberties to presumably make it harder for terrorist groups to operate inside liberal societies might instead make terrorist activity more difficult to spot, which can exacerbate the bureaucratic inefficiencies scholars have widely documented.

Generalized a bit, the dynamic analysis suggests that security agencies would prefer to magnify the threat of terrorism so as to justify and augment their counterterrorism powers. This finding, for example, is consistent with empirical observations regarding the use of informants and agents provocateurs to instigate terrorist acts, a tactic that has been documented, at least, since the nineteenth century struggle against anarchist terror.

Scholars have widely documented the fact that the security agencies themselves contributed in part to the phenomenon of anarchist terrorism at the end of the nineteenth

[18] As a Federal Bureau of Investigation (FBI) agent puts it "a lot of time we are chasing shadows." For example, *The New York Times* reports that the FBI 21-member threat squad, known as Counterterrorism 6, followed 5,500 leads between 2004 and 2009, none of which foiled a specific terrorist plot (Eric Schmitt. F.B.I. Agents Role Is Transformed by Terror Fight. New York Times. August 18, 2009).

century, through their use of agents provocateurs (Laqueur 1987; Butterworth 2010; Jensen 2013). For example, agents provocateurs urged the adoption of violent tactics at the 1881 London anarchist congress (Butterworth 2010); Louis Andrieux, the Paris police prefect, secretly financed the creation of La Revolution Sociale, the first anarchist periodical published in France, which, among other provocations to violence, published detailed instructions for fabricating dynamite (Laqueur 1987; Butterworth 2010); in 1894, a bomb went off outside the Greenwich Observatory in London, killing the man who was carrying it who had been recruited for the attack and supplied with explosives by an undercover police officer (Butterworth 2010).[19] From his archival and documentary record of the nineteenth century anarchist milieu, Alex Butterworth concludes that provocateurs were close to the planning and/or financing of many headline-making anarchist bomb plots (Butterworth 2010). Inspired by the environment that Butterworth chronicles, in his 1908 novel "The Man Who Was Thursday," G.K. Chesterton describes a convocation of anarchist conspirators in which all of the plotters turn out to be cops sent to infiltrate the group.

The notion that policing terror sometimes means encouraging it is not a thing of the past. The FBI, of course, has a long history of infiltrating dissident organizations and in many instances acting as agents provocateurs to instigate violence. From the 1950s until the early 1970s, the bureau ran the Counter Intelligence Program, which, among other tactics, infiltrated various organizations and spurred their members to commit violent acts (Marx 1974). In the context of the current fight against Al-Qaeda terrorism, the FBI has routinely used paid informants not to capture existing terrorists, but often to cultivate them by offering ideas and incentives that encourage individuals to engage in terrorist activity (Aaronson 2013). For instance, Human Rights Watch and the press reports have documented that FBI-involved agents orchestrated several well-known terror plots of the last decade, including the the Miami Seven, the Washington DC Metro bombing plot, the New York City subway plot, and the attempt to blow up Chicagos Sears Tower, among others.[20] In the case of the "Newburgh Four," for example, who were accused of planning to blow up synagogues and attack a U.S. military base, a U.S. District Judge said, "I believe beyond a shadow of a doubt that there would have been no crime here except the government instigated it, planned it and brought it to fruition."[21] Unsurprisingly perhaps, government officials have cited such

[19]These events form the basis of Joseph Conrad's 1907 novel, "The Secret Agent."

[20]For example, see Human Rights Watch, "Illusion of Justice: Human Rights Abuses in US Terrorism Prosecutions," July 2014; Spencer Ackerman, "Government agents 'directly involved' in most high-profile US terror plots," The Guardian, July 14, 2014; Petra Bartosiewicz, "Deploying Informants, the FBI Stings Muslims," The Nation, June 14, 2012.

[21]Peter Finn, "Documents provide rare insight into FBIs terrorism stings," Washington Post, April 13, 2012.

foiled terrorist plots as evidence that liberty-reducing antiterrorism measures are effective.[22]

This bias of security agencies to magnify the threat of terrorism in order to justify or augment their counterterrorism powers has important policy and institutional implications. From a policy perspective, the presence of this bias makes it difficult to assess empirically the effectiveness of liberty-reducing antiterrorism policies. At the minimum, reliable data on the number of foiled terrorist plots would be needed in order to accurately determine whether such measures are working or not. However, because security agencies have an interest in exaggerating their success and worse still in cultivating terror plots to foil them, accurate statistic on the number of prevented plots is not necessarily reliable. From an institutional perspective, the result regarding the agency bias suggests that it may not be desirable to allow those governmental officials responsible for terrorism prevention to craft antiterrorism measure. It also indicates that it is not necessarily desirable to rely on information from security agencies when deciding on the scope of liberty-reducing antiterrorism measures. Indeed, as the press has documented, senior counterterrorism officials have given an inaccurate impression of the effectiveness of liberty-reducing antiterrorism measures whenever the wisdom of such policies became a matter of public debate.[23]

Democratic governments have a hard time fighting terrorism by resorting to repressive measures since a free and vibrant civil society is a necessary condition for the existence and proper functioning of a liberal polity. Indeed terrorist groups will find it very difficult, if not impossible, to grow and operate inside a totalitarian regime that is willing to use maximal force and disregard any considerations for freedom of expression, association, privacy and other fundamental rights. A democratic government, on the other hand, cannot use maximal force and repression in its antiterrorism campaign for the government would endanger the very foundation of a liberal society if it were to set aside all rights and liberties to tackle the threat of terrorism. Since restricting rights and liberties has been a typical response of democratic governments to major terrorist attacks, we need to understand the security consequences of antiterrorism measures which, although might increase the cost of terrorism, cannot completely suppress terrorist activity. This paper provides a necessary first step analysis of the dynamic effects of such policies. It suggests that in a world in which democratic governments respond to major terrorist attacks with restrictions on rights and liberties, such policy interventions have a moral hazard effect, which can make a terrorist

[22]Glenn Greenwald and Andrew Fishman, "Latest FBI Claim of Disrupted Terror Plot Deserves Much Scrutiny and Skepticism," The Intercept, January 16, 2015.

[23]For example, NSA chief Gen. Keith Alexander has testified that the governments sweeping surveillance programs have disrupted more than 50 terrorist plots in the United States and abroad, however, subsequent inquires have shown that such claims were not accurate (see, Justin Elliott and Theodoric Meyer, "The NSA's Big Terrorism Claim Doesn't Hold Up," ProPublica, October 23, 2013).

attack more likely. The analysis implies that a commitment to respecting fundamental rights and liberties in times of duress can be security-beneficial: if liberal societies were to remain faithful to their fundamental values in the aftermath of terrorist attacks, such a strategy possibly decreases the probability of a terrorist attack.

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Appendix

The Appendix contains three section. First, I provide a detailed formal analysis of the stage game. Second, I provide the proofs for results of the dynamic game stated in the text. Third, I also analyze a variant of the dynamic game in which the cost of counterterrorism in the second period decreases if the outcome in the first period is a terrorist attack.

The Stage Game

In this section, I develop in more detail the analysis of the stage game discussed in the main text and also provide the proofs for the propositions stated in the text.

As mentioned, I solve for the Nash equilibrium of the game. The security agency's unique optimal action is the solution of the following first-order condition:

$$-\frac{\partial P(e_s, e_t)}{\partial e_s}\Delta_s - C_s'(e_s) = 0. \tag{10}$$

The second order condition is satisfied since the agency's optimization problem is strictly concave in e_s, as the second derivative is $-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s) < 0$. Since there is a unique optimal level of counterterrorism effort for any given level of terrorist activities, we can investigate how changes in the level of terrorist activities affect the level of counterterrorism effort. Since expression (10) is continuous in e_t, the security agency has a well-defined best-response function. As such, the agency's best response function is continuous and we can apply the implicit function theorem to (10) to find the slope of $e_s(e_t)$, which is given by the sign of the following expression:

$$\frac{de_s}{de_t} = -\frac{-\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_s}{-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)}.$$

The above expression is strictly positive which implies that security agency's best-response function $e_s(e_t)$ strictly increases in e_t. The terrorist organization's unique optimal action is the solution of the following first-order condition:

$$\frac{\partial P(e_s, e_t)}{\partial e_t}\Delta_t - \frac{\partial C_t(e_t, f)}{\partial e_t} = 0. \tag{11}$$

The second order condition is satisfied since the terrorist organization's optimization problem is strictly concave in e_t, as the second derivative is $\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2} < 0$. Since there is a unique optimal level of terrorist activities for any given level of counterterrorism effort, we can investigate how changes in the level of counterterrorism effort affect the level

of terrorist activities. Since expression (11) is continuous in e_s, the terrorist organization has a well-defined best response function. As such, its best response function is continuous in e_s and we can apply the implicit function theorem to (11) to find the slope of $e_t(e_s)$, which is given by the sign of the following expression:

$$\frac{de_t}{de_s} = -\frac{\frac{\partial^2 P(e_s,e_t)}{\partial e_t \partial e_s}\Delta_t}{\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}}.$$

The above expression is negative which implies that the terrorist organization's best response function $e_t(e_s)$ strictly decreases in e_s.[24]

The equilibrium of the game is the solution to the system of equations given by (10) and (11). The Inada conditions ensure that both the security agency and the terrorist organization's have a non-zero finite optimal level of effort.[25] Because the security agency's reaction function $e_s(e_t)$ is strictly increasing in e_t and the terrorist organization's reaction function $e_t(e_s)$ is strictly decreasing in e_s, the reaction functions can only intersect once. Making the (empirically intuitive) assumptions that if 1) $P(e_s, 0) = 0\ \forall e_s$ and $lim_{e_s \to \infty} P(e_s, e_t) = 0\ \forall e_t$,[26] and 2) $P(0, e_t) > 0$ for $e_t > 0$ and $lim_{e_t \to 0} \frac{\delta P(0,e_t)}{\delta e_t} > 0$,[27] guarantees that the best response functions intersect. As such, the stage game has a unique pure strategy Nash equilibrium.

As a result, we can do comparative statics on how reducing the level of free speech protections affects the players' equilibrium actions, the equilibrium probability of a terrorist attack, and the players' equilibrium payoffs in the stage game. Proposition 1 summarizes the effect of changing f on the equilibrium actions in the stage game.

[24]The intuitive results that $e_s(e_t)$ is strictly increasing in e_t and $e_t(e_s)$ is strictly decreasing in e_s are an implication of the fact that the cross-partial of $P(e_s, e_t)$ is negative. For if the cross-partial would be positive, this would not only imply that the effectiveness of the terrorists' effort to successfully execute a terror plot is higher when the government's surveillance to detect traces of terrorist activity is higher but would also lead to empirically implausible best-response functions: $e_s(e_t)$ would be strictly decreasing in e_t and $e_t(e_s)$ would be strictly increasing in e_s. This for instance would suggest that when the terrorists increase the magnitude of their activities to carry a terrorist attack, in response, the security agency would decrease its level of effort to foil the attack. Furthermore, a positive cross-partial would also imply, from a substantive perspective, that the terrorist organization would increase the magnitude of its activities to carry an attack when the government does more to detect terrorist activity and foil the attack; this result would be inconsistent with empirical evidence depicting terrorism as the weapon of the weak in which the modus operandi of terrorists is secrecy and stealth rather than direct confrontation with military superior opponents (Wilkinson 2006; Richardson 2007; Hoffman 2013; White 2003).

[25]Alternatively, we could assume that both actors make their choices from a compact interval: $e_s \in [0, \bar{e}_s]$ and $e_t \in [0, \bar{e}_t]$.

[26]The condition says that if the level of terrorist activities is zero, then the probability of terrorist attack is zero since there is no terrorist plot to be stopped.

[27]This condition says that if the level of counterterrorism effort is zero, the probability of a terrorist attack is positive if the terrorists put some effort to carry a terrorist attack.

Proposition 1. *In the stage game, reducing free speech protections decreases the terrorist organization's equilibrium level of terrorist activities and decreases the security agency's equilibrium level of counterterrorism effort.*

Proof. The unique pure strategy equilibrium (e_s^*, e_t^*) is the solution to the system of equations given by (10) and (11).

The Inada conditions on the cost functions ensure that the equilibrium actions are interior. Since both (10) and (11) are continuous in f, the security agency's and the terrorist organization's best response functions are continuous in f and we can apply the implicit function theorem to see how the equilibrium actions vary with an increase in f. The dependence of $(e_s^*(f), e_t^*(f))$ on f is found by totally differentiating (10) and (11) with respect to f, which yields the system of equations

$$-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s\frac{de_s}{df} - \frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_s\frac{de_t}{df} - C_s''(e_s)\frac{de_s}{df} = 0$$

$$\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t\frac{de_t}{df} + \frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_t\frac{de_s}{df} - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}\frac{de_t}{df} - \frac{\partial^2 C_t(e_t,f)}{\partial e_t \partial f} = 0.$$

Solving the system of equations, we get

$$\frac{de_s}{df} = \frac{\frac{\partial^2 C_t(e_t,f)}{\partial e_t \partial f}\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_s}{[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}][-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator and the numerator are positive and, as a result, $e_s^*(f)$ increases in f, as claimed.

Also we have

$$\frac{de_t}{df} = \frac{\frac{\partial^2 C_t(e_t,f)}{\partial e_t \partial f}[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)]}{[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)][\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator and numerator are both positive and, as a result, the equilibrium level of $e_t^*(f)$ increases in f, as claimed. □

I next investigate how changing the level of free speech protections affect the security agency's and the terrorist organization's equilibrium payoffs in the stage game. Proposition 2 summarizes the effect of changes in f in the security agency's and the terrorist organization's equilibrium payoff in the stage game.

Proposition 2. *In the stage game, reducing free speech protections increases the security agency's equilibrium payoff in the stage game. Reducing free speech protections has an ambiguous effect on the terrorist organization's equilibrium payoff.*

Proof. Using the envelope theorem, the effect of a change in f on the security agency's equilibrium expected payoff in the stage game is given by the sign of the following expression

$$\frac{\partial U_s^*(f)}{\partial f} = -\frac{\partial P(e_s^*(f), e_t^*(f))}{\partial e_t}\frac{\partial e_t^*(f)}{\partial f}\Delta_s. \tag{12}$$

The sign of right-hand side of (12) is negative because $-\frac{\partial P(e_s^*(f),e_t^*(f))}{\partial e_t}\frac{\partial e_t^*(f)}{\partial f}\Delta_s < 0$. As a result, the security agency's equilibrium expected payoff strictly increases with a decrease in f.

Using the envelope theorem, the effect of a change in f on the terrorist organization's equilibrium expected payoff in the stage game is given by the sign of the following expression

$$\frac{\partial U_t^*(f)}{\partial f} = \frac{\partial P(e_s^*(f), e_t^*(f))}{\partial e_t}\frac{\partial e_s^*(f)}{\partial f}\Delta_t - \frac{\partial C_t(e_t^*(f), f)}{\partial f}. \tag{13}$$

The sign of right-hand side of (13) is ambiguous because $\frac{\partial P(e_s^*(f),e_t^*(f))}{\partial e_t}\frac{\partial e_s^*(f)}{\partial f}\Delta_t < 0$ and $-\frac{\partial C_t(e_t^*(f),f)}{\partial f} > 0$. □

The next proposition summarizes the effect of changes in Δ_s and Δ_t on the equilibrium actions in the stage game.

Proposition 3. *In the stage game, the security agency's equilibrium action increases in its stake from terrorism prevention, Δ_s, and also in the terrorist organization's stake for a successful terrorist attack, Δ_t. In the stage game, the terrorist organization's equilibrium action increases in its stake for a successful terrorist attack, Δ_t, and decreases in the security agency's stake for terrorism prevention, Δ_s.*

Proof. The dependence of $\{e_s^*(\Delta_s), e_t^*(\Delta_s)\}$ on Δ_s is found by totally differentiating (10) and (11) with respect to Δ_s, which yields the system of equations

$$-\frac{\partial P(e_s, e_t)}{\partial e_s} - \frac{\partial^2 P(e_s, e_t)}{\partial e_s^2}\Delta_s\frac{de_s}{d\Delta_s} - \frac{\partial^2 P(e_s, e_t)}{\partial e_s \partial e_t}\Delta_s\frac{de_t}{d\Delta_s} - C_s''(e_s)\frac{de_s}{d\Delta_s} = 0$$

$$\frac{\partial^2 P(e_s, e_t)}{\partial e_t^2}\Delta_t\frac{de_t}{d\Delta_s} + \frac{\partial^2 P(e_s, e_t)}{\partial e_s \partial e_t}\Delta_t\frac{de_s}{d\Delta_s} - \frac{\partial^2 C_t(e_t, f)}{\partial e_t^2}\frac{de_t}{d\Delta_s} = 0.$$

Solving the system of equations, we get

$$\frac{de_s}{d\Delta_s} = \frac{\frac{\partial P(e_s,e_t)}{\partial e_s}[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}]}{[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}][-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator and the numerator are positive and, as a result, $e_s^*(\Delta_s)$ increases in Δ_s, as claimed.

Also we have

$$\frac{de_t}{d\Delta_s} = \frac{-\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\frac{\partial P(e_s,e_t)}{\partial e_s}\Delta_t}{[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)][\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator is positive while the numerator is negative and, as a result, the equilibrium level of $e_t^*(\Delta_s)$ decreases in Δ_s, as claimed.

The dependence of $\{e_s^*(\Delta_t), e_t^*(\Delta_t)\}$ on Δ_t is found by totally differentiating (10) and (11) with respect to Δ_t, which yields the system of equations

$$-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s\frac{de_s}{d\Delta_t} - \frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_s\frac{de_t}{d\Delta_t} - C_s''(e_s)\frac{de_s}{d\Delta_t} = 0$$

$$\frac{\partial P(e_s,e_t)}{\partial e_t} + \frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t\frac{de_t}{d\Delta_t} + \frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_t\frac{de_s}{d\Delta_t} - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}\frac{de_t}{d\Delta_t} = 0.$$

Solving the system of equations, we get

$$\frac{de_s}{d\Delta_t} = \frac{-\frac{\partial P(e_s,e_t)}{\partial e_t}\Delta_s\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}}{[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}][-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator and the numerator are positive and, as a result, $e_s^*(\Delta_t)$ increases in Δ_t, as claimed. Also we have

$$\frac{de_t}{d\Delta_t} = \frac{-\frac{\partial P(e_s,e_t)}{\partial e_t}[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)]}{[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)][\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t - \frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}] + [\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator and the numerator are positive and, as a result, the equilibrium level of $e_t^*(\Delta_t)$ increases in Δ_t, as claimed.

□

The Dynamic Game

In this section, I provide the proofs for the results of the "Dynamic Game" section in the text.

Proof of Proposition 4. We need to consider two cases: $d_t < 0$ and $d_t > 0$.

- Let $d_t > 0$. This implies that both $B_s < \Delta_s$ and $B_t < \Delta_t$. Proposition 3 shows that $e_s^*(\Delta_s, \Delta_t)$ increases in Δ_s and Δ_t, which implies that $\bar{e}_s < e_s^1$, as claimed.
- Let $d_t < 0$. This implies that both $B_s < \Delta_s$ and $B_t > \Delta_t$. Proposition 3 shows that $e_t^*(\Delta_s, \Delta_t)$ decreases in Δ_s and increases in Δ_t, which implies that $\bar{e}_t < e_t^1$, as claimed.

□

Proof of Proposition 5. Example 2 proves the statement of the proposition. □

Next, I analyze the effect of a reduction in f on the equilibrium probability of a terrorist attack in the second period. Proposition 1 shows that a reduction in f decreases both equilibrium actions in the stage game. Because the probability of a terrorist attack increases when e_s decreases, Proposition 1 implies that there can be situations in which reducing free speech protections increases the equilibrium probability of a terrorist attack in the second period. In this context, how a decrease in f affects the probability of a terrorist attack in the second period is given by the sign of the following expression

$$\frac{\partial P(e_s^2(f), e_t^2(f))}{\partial e_t} \frac{\partial e_t^2(f)}{\partial f} + \frac{\partial P(e_s^2(f), e_t^2(f))}{\partial e_s} \frac{\partial e_s^2(f)}{\partial f}, \tag{14}$$

where $e_s^2(f)$ and $e_t^2(f)$ are the equilibrium levels of effort in the second period. The first term of (14) is positive while the second term is negative because $e_s^2(f)$ increases in f. As a result, when the latter effect dominates the former, $P^2(f)$ increases when f decreases. Rearranging the terms of expression (14), the second-period equilibrium probability of a terrorist attack increases when f is reduced in the aftermath of a terrorist attack if

$$\frac{\frac{\partial P(e_s, e_t)}{\partial e_t}}{\frac{\partial P(e_s, e_t)}{\partial e_s}} + \frac{\frac{\partial e_s(f)}{\partial f}}{\frac{\partial e_t(f)}{\partial f}} > 0 \Bigg|_{e_t^2, e_s^2} \tag{15}$$

Recall that Proposition 1 make usage of the implicit function theorem to investigate the effect of a change in f on the equilibrium level of e_s and e_t in the stage game. Using the expressions for the partial effect of f on the equilibrium actions derived in the proof

of Proposition 1, the condition for the second-period equilibrium probability of a terrorist attack to increase when f is reduced becomes

$$\frac{\frac{\partial P(e_s,e_t)}{\partial e_t}}{\frac{\partial P(e_s,e_t)}{\partial e_s}} + \frac{\frac{\partial^2 P(e_s,e_t)}{\partial e_s \partial e_t}\Delta_s}{-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s - C_s''(e_s)} > 0 \Bigg|_{e_t^2, e_s^2} \tag{16}$$

Notice that expression (16) is evaluated at the equilibrium values of e_s^2 and e_t^2. As such, to further characterize the conditions under which reducing f increases or decreases the second-period equilibrium probability of a terrorist attack, we need to derive closed-form solutions for equilibrium actions in the second period. To this end, below I provide the proof for Proposition 6 which states the conditions under which the second-period equilibrium probability of a terrorist attack increases when the level of free speech protections is reduced in the context of a parametric model in which the probability of a terrorist attack is given by $P(e_s, e_t) = e_t(1 - e_s)$, the cost of counterterrorism effort by $C_s(e_s) = \frac{1}{2}k_s(e_s)^2$, and the cost of terrorist activities by $C_t(e_t, f) = M(f)\frac{1}{2}k_t(e_t)^2$.[28]

Given these specifications, the security agency's maximization problem is

$$\max_{e_s}\{-e_t(1 - e_s)\Delta_s - \frac{1}{2}k_s(e_s)^2\},$$

and the terrorist organization's maximization problem is

$$\max_{e_t}\{e_t(1 - e_s)\Delta_t - M(f)\frac{1}{2}k_t(e_t)^2\}.$$

Solving for the system of equations given by the first-order conditions, the equilibrium actions in the second period are $e_s^2 = \frac{\Delta_t\Delta_s}{\Delta_t\Delta_s + M(f)k_tk_s}$ and $e_t^2 = \frac{\Delta_t k_s}{\Delta_t\Delta_s + M(f)k_tk_s}$, and, as a result, the second-period equilibrium probability of a terrorist attack is

$$P^2(f) = \frac{M(f)\Delta_t k_t k_s^2}{[\Delta_t\Delta_s + M(f)k_tk_s]^2}.$$

Proposition 6 states the conditions under which a decrease in the level of free speech protections increases the equilibrium probability of a terrorist attack in the second period.

Proposition 6. *Reducing the level of free speech protections increases the equilibrium prob-*

[28]Notice that the cost functions are quadratic in effort. To avoid any confusion with the time superscripts denoting the second-period action, I use parentheses to denote effort squared.

ability of a terrorist attack in the second period if

$$\frac{\Delta_t}{k_t}\frac{\Delta_s}{k_s} - M(f) > 0,$$

and decreases the equilibrium probability of a terrorist attack in the second period otherwise.

Proof. Differentiating $P^2(f)$ with respect to f gives

$$\frac{M'(f)\Delta_t k_t k_s^2[\Delta_t\Delta_s - M(f)k_t k_s]}{[\Delta_t\Delta_s + k_t k_s M(f)]^3}.$$

Since $M'(f)\Delta_t k_t k_s^2 < 0$, the above expression is negative if

$$\frac{\Delta_t}{k_t}\frac{\Delta_s}{k_s} - M(f) > 0,$$

and positive otherwise, as claimed. □

The Cost of Counterterrorism

In this section, I analyze a version the dynamic model in which the cost of counterterrorism in the second period decreases if the outcome in the first period is a terrorist attack.[29] To investigate this question, let the cost of counterterrorism be given by $C_s(k_s, e_s) = k_s c(e_s)$, where $c(e_s)$ is increasing and convex in e_s and where the parameter k_s affects the marginal cost of counterterrorism effort. As such, we want to analyze how a policy of reducing k_s if the first-period outcome is a terrorist attack affects the players' incentives and the equilibrium probability of a terrorist attack in the first period.

Before proceeding with this dynamic analysis, I state some results on how changes in k_s affect the players' equilibrium actions and payoffs in the associated stage game, results which will prove useful in the subsequent dynamic analysis.

Lemma 1. *In the stage game, a decrease in the marginal cost of counterterrorism effort increases the security agency's equilibrium action and decreases the terrorist organization's*

[29] As mentioned, the rationale of such policies is to reduce the likelihood of a terrorist attack by decreasing the cost of counterterrorism effort. However, some scholars and pundits argue that such policies do not necessarily achieve their intended goals as increasing budgetary resources or the staff of security agencies responsible for terrorism prevention can lead to empire building, duplication of efforts, lack of coordination, turf wars, among other problems (Priest and Arkin 2011).

equilibrium action in the stage game.

Lemma 1 indicates that reducing the marginal cost of counterterrorism effort decreases the level of terrorist activities and increases the level of counterterrorism effort in the stage game. The intuition is as follows: reducing k_s has a direct effect on the incentives of the security agency in that it decreases its marginal cost, which in turn induces the agency to increase its level of counterterrorism effort. At the same time, reducing k_s has a strategic effect on the incentives of the terrorist organization: since the level of terrorist activities decreases in the level of counterterrorism effort, reducing k_s induces the terrorist organization to decrease its equilibrium action in the stage game.

Next I describe how changes in the marginal cost of counterterrorism effort affect the security agency's and the terrorist organization's equilibrium payoff in the stage game.

Lemma 2. *In the stage game, a decrease in marginal cost of counterterrorism effort increases the security agency's equilibrium payoff and decreases the terrorist organization's equilibrium payoff in the stage game.*

The intuition is of Lemma 2 is similar to that of Proposition 3. For one, the effect of changes in k_s that works through the security agency's equilibrium action has a negligible effect on its equilibrium payoff. As a result, the effect of a reduction in the marginal cost on the agency's equilibrium payoff is determined by how such a change affects the terrorist organization's equilibrium action in the stage game. Since the terrorist organization's equilibrium action decreases in k_s and since the equilibrium probability of a terrorist attack increases in e_t, reducing the marginal cost of counterterrorism increases the security agency's equilibrium payoff in the stage game. A similar reasoning applies to why reducing the marginal cost of counterterrorism decreases the terrorist agency's equilibrium payoff: since the security agency's equilibrium action is higher when k_s is reduced and since the equilibrium probability of a terrorist attack decreases when the level of counterterrorism effort is higher, reducing the marginal cost of counterterrorism decreases the terrorist organization's equilibrium payoff in the stage game.

Given these results, we can provide an equilibrium analysis of the dynamic model in which k_s decreases in the second period if a terrorist attack in the first period. In other words, suppose that the marginal cost of counterterrorism decreases from k_s to k_s' in the second period if the first-period outcome is a terrorist attack.

Similar to the previous analysis, we want to compare two scenarios: a situation in which the cost of counterterrorism does not change in the second period even if the first-period outcome is a terrorist attack and a situation in which the cost of counterterrorism in the

second period decreases if the first-period outcome is a terrorist attack. Table 3 summarizes the relevant parameters in this dynamic analysis and their substantive interpretations.

Parameter	Substantive Interpretation
$u_i^2(k_s)$ for $i \in \{t, s\}$	a player's second-period equilibrium payoff in the k_s game
$u_i^2(k'_s)$ for $i \in \{t, s\}$	a player's second-period equilibrium payoff in the k'_s game
$d_s = u_s^2(k_s) - u_s^2(k'_s)$	the security agency's second-period utility difference between the k_s and k'_s games
$d_t = u_t^2(k_s) - u_t^2(k'_s)$	the terrorist organization's second-period utility difference between the k_s and k'_s games
δ_i for $i \in \{t, s\}$	a player's discount factor

Table 3: Exogenous Parameters in the Dynamic Model

Benchmark game. By a similar logic to the previous dynamic analysis, the security agency's and the terrorist organization's first-period maximization problems are similar to the second-period maximization problems since the second-period equilibrium payoffs do not affect the first-period equilibrium incentives. As a result, the equilibrium actions and payoffs in the first and the second period are the same.

Dynamic Game. In the dynamic game, when the security agency chooses its first-period action, its total utility (the sum of first and discounted second period utilities) is:

$$U_s = \underbrace{O_s(0) - P(e_s, e_t)\Delta_s - k_s c(e_s)}_{\text{first-period payoff}} + \underbrace{\delta_s[P(e_s, e_t)u_s^2(k'_s) + [1 - P(e_s, e_t)]u_s^2(k_s)]}_{\text{second-period payoff}}$$
$$= O_s(0) - P(e_s, e_t)B_s - k_s c(e_s) + \delta_s u_s^2(k_s),$$

where $B_s = \Delta_s + \delta_s d_s$. Since the security agency's second-period equilibrium payoff is higher in the k'_s game than in the k_s game, the security agency's stake for terrorist prevention is lower in the dynamic than in the benchmark scenario (i.e., $B_s < \Delta_s$).

Also, when the terrorist organization chooses its first-period action, its total utility (the

sum of first and discounted second period utilities) is:

$$U_t = \underbrace{O_t(0) + P(e_s, e_t)\Delta_t - C_t(e_t)}_{\text{first period payoff}} + \underbrace{\delta_t[P(e_s, e_t)u_t^2(k'_s) + [1 - P(e_s, e_t)]u_t^2(k_s)]}_{\text{second period payoff}}$$
$$= O_t(0) + P(e_s, e_t)B_t - C_t(e_t) + \delta_t u_t^2(k_s),$$

where $B_t = \Delta_t - \delta_t d_t$. Since the terrorist organization's second-period equilibrium payoff is lower in the k'_s game than in the k_s game, the terrorist organization's stake for a successful terrorist attack is lower in the first period of the dynamic game than in the benchmark game (i.e., $B_t < \Delta_t$).

Equilibrium Comparison. The key difference between the strategic interaction in the dynamic and the benchmark scenario is that the prospect of reducing the cost of counterterrorism if the first-period outcome is a terrorist attack decreases the security agency's stake for terrorism prevention and also decreases the terrorist organization's stake for a successful terrorist attack in the first period of the dynamic game.

Proposition 7 indicates that the prospect of reducing the cost of counterterrorism in the aftermath of a terrorist attack induces moral hazard by decreasing the first-period level of counterterrorism effort.

Proposition 7. *The first-period equilibrium level of counterterrorism effort is lower in the dynamic than in the benchmark game.*

In the dynamic game, we have $B_s < \Delta_s$ and $B_t < \Delta_t$. Lemma 1 shows that the security agency's equilibrium action increases in Δ_s and Δ_t, which implies the security agency's equilibrium action is lower in the dynamic game than in the benchmark scenario. The intuition is as follows: a lower stake for terrorism prevention decreases the agency's incentives relative to the benchmark game. At the same time, a lower stake for a successful terrorist attack decreases the terrorist organization's level of terrorist activities. Since the counterterrorism effort decreases when the level of terrorist activities is lower, a reduction in the terrorist organization's stake for a successful terrorist attack decreases the security agency's level of counterterrorism effort. Both the direct and the strategic effect work in the same direction to decrease the equilibrium level of counterterrorism effort in the first period of the dynamic game.

To illustrate the moral hazard effect of reducing the cost of counterterrorism in the aftermath a terrorist attack, I analyze a variant of the parametric model previously introduced:

$P(e_s, e_t) = e_t(1 - e_s)$, $C_s(e_s, k_s) = \frac{1}{2}k_s e_s^2$, $C_t(e_t, f) = M(f)\frac{1}{2}k_t e_t^2$, $\delta_s = \delta_t = 1$, $k_t = 1$, $k_s > 0$, $M(f) = 1 - f$, $f = 0$, and $O_s(0) = O_t(1) = 1$, $O_s(1) = O_t(0) = 0$ (which implies that $\Delta_s = \Delta_t = 1$).

Example 2. Suppose that in the first period $k_s = 2$ and that the marginal cost of counterterrorism decreases from $k_s = 2$ to $k_s' = 1$ if the first-period outcome is a terrorist attack. In the second period, the security agency's equilibrium payoff is $u_s^2(2) = -\frac{1}{2}$ in the k_s game and $u_s^2(1) = -\frac{3}{8}$ in the k_s' game, which implies that $d_s = -\frac{9}{72}$ and $B_s = \frac{63}{72}$. Also, in the second period, the terrorist organization's equilibrium payoff is $u_t^2(2) = \frac{2}{9}$ in the k_s game and $u_t^2(1) = \frac{1}{8}$ in the k_s' game, which implies that $d_t = \frac{7}{72}$ and $B_t = \frac{65}{72}$. In the dynamic game, the security agency's first-period equilibrium action is $e_s^1 \approx 0.28$, the terrorist organization's first-period equilibrium action is $e_t^1 \approx 0.65$, and the first-period equilibrium probability of a terrorist attack is $P^1 \approx 0.47$. In the benchmark game, the security agency's first-period equilibrium action is $\bar{e}_s = \frac{1}{3}$, the terrorist organization's first-period equilibrium action is $\bar{e}_t = \frac{2}{3}$, and the first-period equilibrium probability of a terrorist attack is $\bar{P} \approx 0.44$. Thus, we have $e_s^1 < \bar{e}_s$ and $P^1 > \bar{P}$.

We have the following result:

Proposition 8. *The first-period equilibrium probability of a terrorist attack can be higher in the game in which the cost of counterterrorism decreases in the aftermath of a terrorist attack.*

Proposition 8 implies that it can be better from a security standpoint to not increase the counterterrorism budget should a terrorist attack happen as the prospect of such policy intervention can make a terrorist attack more likely.

Proofs for the "The Cost of Counterterrorism"

Proof of Lemma 1. The unique pure strategy equilibrium (e_s^*, e_t^*) in the stage game is the solution to the following system of equations

$$-\frac{\partial P(e_s, e_t)}{\partial e_s}\Delta_s - k_s c'(e_s) = 0 \tag{17}$$

$$\frac{\partial P(e_s, e_t)}{\partial e_t}\Delta_t - \frac{\partial C_t(e_t, f)}{\partial e_t} = 0. \tag{18}$$

The dependence of $(e_s^*(k_s), e_t^*(k_s))$ on k_s is found by totally differentiating (17) and (18) with respect to k_s, which yields the system of equations

$$-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s\frac{de_s}{dk_s}-\frac{\partial^2 P(e_s,e_t)}{\partial e_s\partial e_t}\Delta_s\frac{de_t}{dk_s}-k_s c''(e_s)\frac{de_s}{dk_s}-c'(e_s)=0$$

$$\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t\frac{de_t}{dk_s}+\frac{\partial^2 P(e_s,e_t)}{\partial e_s\partial e_t}\Delta_t\frac{de_s}{dk_s}-\frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}\frac{de_t}{dk_s}=0.$$

$$\frac{de_s}{dk_s}=\frac{c'(e_s)[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t-\frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}]}{[\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t-\frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}][-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s-k_s c''(e_t)]+[\frac{\partial^2 P(e_s,e_t)}{\partial e_s\partial e_t}]^2\Delta_s\Delta_t}.$$

The denominator is positive and the numerator is negative and, as a result, $e_s^*(k_s)$ increases when k_s decreases, as claimed.

Also we have

$$\frac{de_t}{dk_s}=\frac{-\frac{\partial^2 P(e_s,e_t)}{\partial e_s\partial e_t}c'(e_s)\Delta_t}{[-\frac{\partial^2 P(e_s,e_t)}{\partial e_s^2}\Delta_s-k_s c''(e_s)][\frac{\partial^2 P(e_s,e_t)}{\partial e_t^2}\Delta_t-\frac{\partial^2 C_t(e_t,f)}{\partial e_t^2}]+[\frac{\partial^2 P(e_s,e_t)}{\partial e_s\partial e_t}]^2\Delta_s\Delta_t}.$$

The numerator and denominator are positive, as a result, the equilibrium level of $e_t^*(k_s)$ decreases when k_s decreases, as claimed. □

Proof of Lemma 2. The security agency's equilibrium payoff (as a function of k_s) in the stage game is the following:

$$U_s^*(k_s)=O_s(0)-P(e_s^*(k_s),e_t^*(k_s))\Delta_s-k_s c(e_s^*(k_s)).$$

Using the envelope theorem, the effect of a change in k_s on the security agency's equilibrium expected payoff in the stage game is given by the sign of the following expression

$$\frac{\partial U_s^*(k_s)}{\partial k_s}=-\frac{\partial P(e_s^*(k_s),e_t^*(k_s))}{\partial e_t}\frac{\partial e_t^*(k_s)}{\partial k_s}\Delta_s-c_s(e_s^*(k_s)). \tag{19}$$

The sign of right-hand side of (19) is negative because both $-\frac{\partial P(e_s^*(k_s),e_t^*(k_s))}{\partial e_t}\frac{\partial e_t^*(k_s)}{\partial k_s}\Delta_s<0$ and $-c_s(e_s^*(k_s))<0$. As a result, the security agency's equilibrium expected payoff in the stage game strictly increases with a decrease in k_s.

The terrorist organization's equilibrium payoff (as a function of k_s) in the stage game is:

$$U_t^*(k_s)=O_t(0)+P(e_s^*(k_s),e_t^*(k_s))\Delta_t-C_t(e_t^*(k_s),f).$$

Using the envelope theorem, the effect of a change in k_s on the terrorist organization's

equilibrium expected payoff in the stage game is given by the sign of the following expression

$$\frac{\partial U_t^*(k_s)}{\partial k_s} = \frac{\partial P(e_s^*(k_s), e_t^*(k_s))}{\partial e_s} \frac{\partial e_s^*(k_s)}{\partial k_s} \Delta_t \tag{20}$$

The sign of right-hand side of (20) is positive because $\frac{\partial P(e_s^*(k_s), e_t^*(k_s))}{\partial e_s} \frac{\partial e_s^*(k_s)}{\partial k_s} \Delta_t > 0$. As a result, the terrorist organization's equilibrium expected payoff in the stage game decreases when k_s decreases.

□

Proof of Proposition 7. In the dynamic game, we have $B_s < \Delta_s$ and $B_t < \Delta_t$. Lemma 1 shows that $e_s^*(\Delta_s, \Delta_t)$ increases in Δ_s and Δ_t, which implies that $e_s^1 < \bar{e}_s$, as claimed. □

Proof of Proposition 8. Example 2 proves the statement of the proposition. □