

MORAL HAZARD, DISCIPLINE, AND THE MANAGEMENT OF TERRORIST ORGANIZATIONS

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INTRODUCTION

FROM the mid-1990s through 2001 two of the West's most implacable terrorist foes, Abu Hafs al-Masri and Abu Khabab, carried on what appears to have been a long-running feud within al-Qaeda, a feud that came to an end only when Abu Hafs al-Masri was killed by the U.S. military. Abu Hafs joined al-Qaeda early on and served as the group's military commander from 1996 onward. Abu Khabab was a member of Egyptian Islamic Jihad who ran his own camps in Afghanistan and began working closely with al-Qaeda in the late 1990s as an explosives expert. That two such individuals competing for prominence in a global terrorist organization would not get along is hardly surprising. That their feud would entail lengthy arguments about reporting requirements, air travel reimbursements, and the proper accounting for organizational property does seem a bit odd. One does not usually think of terrorist masterminds writing notes like the one Abu Hafs sent to Abu Khabab in the late 1990s taking him to task for six specific errors including:

1. Regarding the tickets: I obtained 75,000 rupees for you and your family's trip to Egypt. I learned that you did not submit the voucher to the accountant, and that you made reservations for 40,000 rupees and kept the remainder claiming that you have the right to do so. We believe that you do not have the right to do

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that and a brother should take only what he needs for the trip. I would like you to know that we have never given such an amount to any one else at all.¹

The dispute is hardly unique. Substantial evidence indicates that members of terrorist groups are not uniformly motivated by the cause, are not equally willing to sacrifice for the cause, often disagree on what the cause is, and rarely see eye to eye on the best tactics to achieve their strategic ends. Scholars who have done extensive interview work with terrorists report that their organizations are torn by strife and disagreement.² Supporting this view, internal documents from al-Qaeda are full of sometimes vitriolic letters flying back and forth as members of the group debate ideology, strategy, and tactics, including how much violence is optimal.³ Even when there is no observed conflict within groups, leaders often engage in costly efforts to monitor their agents, suggesting that the potential for disagreement exists.⁴ Indeed, groups as diverse as the Polish Underground in Warsaw, Red Brigades, Euskadi Ta Askatasuna (ETA), Aum Shinrikyo, Fatah, al-Qaeda, and al-Qaeda in Iraq generated paperwork that, were it not for its violent subject matter, could have come from any traditional organization.

This is all a bit puzzling in that covert organizations are commonly thought to screen their operatives very carefully and pay a particularly heavy price for such record keeping.⁵ On November 5, 1986, for example, the French police captured a large cache of ETA documents at the Sokoia chair factory. These documents provided a rich picture of ETA's

¹ Harmony, AFGP-2002-001111. Throughout this article we refer to documents captured from al-Qaeda and other groups. These documents were originally in the United States Department of Defense's Harmony database, which contains more than one million documents captured during operations in Afghanistan, Iraq, and elsewhere. Roughly a quarter of these documents have been fully translated. The documents run the gamut from strategic policy studies, to accounting reports, to membership lists, to technical training manuals, to draft ideological screeds, to letters between family members. Originals and translations of the documents we refer to and many others are available at http://www.ctc.usma.edu/harmony_docs.asp. Documents from the Harmony database are referenced by their document number. The Conflict Records Research Center at the National Defense University has begun to make more of these records public and is tasked with assisting researchers in using these data.

² Bowyer 1989; Crawford 2003.

³ Hassan al-Tajiki's Third Letter to the Africa Corps is typical. Hassan writes: "Here once again I remind you of one of your fatal mistakes, which is the quick changing of strategic targets, whereby now every action is tactical and improvised"; AFGP-2002-600053, 25. See also Cullison 2004. The best analysis of leadership schisms in al-Qaeda is Brown 2007.

⁴ Some leaders in Jemaah Islamiyah (JI), for example, required members to report their travel expenses to determine whether there was any corruption. That they never had problems with corruption could mean agents did not have different preference from the leaders, or it could mean the monitoring deterred corruption. Author interview, Jakarta, February 20, 2007. Al-Qaeda units operating in Africa in the early 1990s also had to file detailed expense reports. AFGP-2002-800573.

⁵ Chai 1993; Bueno de Mesquita 2005b.

internal organization that proved extremely useful to both academics and Spanish and French police, who used them to conduct a series of damaging raids on the organization.⁶ One might have expected ETA to reduce its reliance on paperwork in light of such an incident but when one of ETA's top leaders was captured by the French police in 1987, he was carrying a chart that nicely laid out the group's structure.⁷ Although organizational charts serve many useful purposes, in covert groups they are a clear liability.

In this article we provide an explanation for the seemingly odd facts that terrorist groups repeatedly include operatives of varying commitment and often rely on a common set of security-reducing bureaucratic tools to manage these individuals. Our core argument is that in small, heterogeneous organizations, longer institutional memory can enhance organizational efficiency for a variety of reasons.⁸

First, operations are difficult to monitor and the link between what leaders can observe and what their operatives actually do is often tenuous. The outcome of any single attack, for example, depends on a large dose of chance.⁹ Simply put, terrorist leaders and their agents are not always of one mind, so the greater the ambiguity about what the agents have done and whether failure is attributable to their shirking or to circumstances beyond their control, the greater the need for memory to establish a track record. Thus the monitoring problems following from the illegal and dangerous nature of the activities create the need for procedures that necessarily reduce security.¹⁰

Second, the set of possible operatives is often small—even among populations that believe deeply in a cause, few are willing to become terrorists—and recruiting new members entails additional security risks. This means that motivating agents requires both the ability to punish and the ability to employ disciplinary strategies that fall short of firing wayward operatives. As we will see, record keeping helps “managers” do both.

Third, managers themselves are at high risk for being killed or cap-

⁶ Zirakzadeh 1991, 277–78.

⁷ Llera, Mata, and Irvin 1993, 124.

⁸ We thank two of our anonymous reviewers for helping us articulate the clear and succinct statement of our argument that follows. We have appropriated their language in several locations.

⁹ Had would-be LAX bomber Ahmed Ressaam not caught malaria in Afghanistan, for example, he may not have come to the attention of the United States Border Patrol agents who stopped him on December 14, 1999, because he was nervous, fumbling, and sweating profusely. Miletich and Carter 2001; Carter 2004.

¹⁰ Shapiro explores exactly this trade-off in greater detail using a set of models that abstract from many of the organizational processes we study here in order to concentrate on the different sources of divergent preferences between terrorist leaders and their operatives. Shapiro 2007; Shapiro 2008.

tured, meaning that unless records are kept, institutional memory of past behavior is transitory. When past bad acts can be forgotten, incentives for good behavior are weakened as are incentives for leaders to follow consistent disciplinary strategies. Record keeping allows for institutional memory in the absence of predictable personal relationships between principals and agents.

We illustrate these arguments using a game-theoretic model of moral hazard in a finitely sized organization. In this setting, the punishment strategies that allow leaders to extract greater effort from their agents are credible only when leaders can recall operatives' past actions and when operatives can identify and react to deviations from the leaders' equilibrium strategy.¹¹ The intuition is that if leaders had a finite group of operatives, they would always want to use their best operative(s) every period unless by doing so they would weaken the long-term incentives for the operative(s) to put forth maximum effort. That long-term trade-off exists only when both sides have some knowledge of the organizational history. Hence the incentives for record keeping. Moreover, the stochastic nature of terrorist operations means that small organizations may periodically use problematic agents in equilibrium as part of a strategy that optimally motivates their best operatives.

Our work contributes to the larger literature aimed at understanding the sources of variation in terrorist activity. Within this literature the microdynamics and structure of groups have received relatively little attention, at least as compared with the attention devoted to country-level variables such as democracy, GDP, or degree of globalization.¹² Yet organizational structure and internal constraints have an impact on both the efficacy of groups and the utility of counterterror strategies against them.¹³ Shapiro and Siegel, for example, illustrate how the moral hazard problem created when terrorist leaders delegate logistical tasks can lead to suboptimal funding of attacks, lower success rates, and a nonlinear response to counterterrorism.¹⁴ Though they cite the bureaucratization of al-Qaeda in the late-1990s as evidence that terror-

¹¹ The key difference between our model and the ones commonly used in the agency theory literature is that we relax the standard assumption that principals have an infinite population of potential agents drawn from a known distribution.

¹² Recent work that explores the microdynamics of terrorist organizations includes Abrahms 2008; Weinstein 2007; Bueno de Mesquita 2005a; Siqueira 2005; Bueno de Mesquita 2008; Berman and Laitin 2008. A small sample of recent work exploring the impact of country-level variables includes Li 2005; Burgoon 2006; Bapat 2007; Wade and Reiter 2007; Neumayer and Plumper 2008; Walsh and Piazza forthcoming.

¹³ Shapiro 2007; Helfstein 2009.

¹⁴ Shapiro and Siegel 2007.

ist organizations face problematic agents, the role of bureaucracy itself is left implicit. Other scholars likewise identify conditions that may affect how much hierarchy terrorist groups employ without explicitly modeling the internal conflicts that drive them to employ bureaucratic structures.¹⁵

Here we make those internal processes explicit, using a basic model in which a terrorist leader must employ an operative to accomplish some activities as a springboard. The main goal of the analysis is to illuminate a core reason why bureaucracy is used. We also derive some results about when it is likely to be used, although our ability to do so is limited by the inherent complexity of the strategic interaction. Importantly, while we use the term bureaucracy throughout, this is really as a shorthand for a range of mechanisms that can enhance institutional memory.¹⁶ Maintaining a thorough oral history of the organization, for example, would serve similarly in helping organizations to reduce agency problems. Such a history, however, would also be security reducing, as captured operatives carry information that intelligence services have historically been quite effective at eliciting.

The article proceeds as follows. Section I takes a macrolevel approach, analyzing the set of ninety terrorist autobiographies available in English, French, and Spanish to show that security-reducing bureaucracy has been prevalent in a wide range of terrorist organizations operating from 1880 through the present. Section II takes a microlevel approach, reviewing a broad set of captured documents from al-Qaeda in Iraq to demonstrate, first, that agency problems bedeviled one of the most prominent modern Islamist terrorist groups and, second, that the group responded by adopting substantial record keeping. Section III presents a game-theoretic model that can help explain the patterns observed in the data by analyzing the challenges of maintaining discipline in small groups. The problem terrorist leaders face when operating with a *finite* pool of agents subject to moral hazard turns out to be quite complex, especially under conditions of limited organizational memory. We demonstrate two key facts about such organizations. First, under a broad range of conditions terrorist leaders have incentives to use agents who are less than fully committed, *even when these agents are known to be strictly worse than other alternatives*, because doing so allows them to

¹⁵ Helfstein 2009 is primarily concerned with the costs of nonmarket governance for groups. Enders and Jindapon 2010 follow an approach similar to Fearon 2008 by focusing on the risks of compromise created by network ties.

¹⁶ We thank our anonymous reviewers for asking us to be explicit on this point.

motivate their best operatives to higher levels of effort. Not only does this help explain why terrorist groups seem to have so many problematic members, but it is also a novel finding for the agency-theory literature, one driven by the finite pool of potential agents in our model. Second, there are conditions under which longer memory—and thus more bureaucracy—is favorable to the leaders. Section IV concludes by discussing the broader implications of this work.

An online appendix¹⁷ contains proofs to all results in the article and discusses applications of extant principal-agent models to terrorist organizations. These existing models provide a range of additional reasons why terrorist organizations would use bureaucracy and record keeping to solve their organizational challenges.

I. TERRORIST ORGANIZATIONS: AN INSIDE VIEW

One of the key challenges in studying the internal dynamics of terrorist organizations is the relative dearth of data on what actually goes on inside these inherently secretive institutions. Aside from a few highly salient examples (al-Qaeda, Fatah, al-Qaeda in Iraq), the internal correspondence of terrorist organizations has not been readily available to analysts and so it is hard to know how pervasive bureaucracy actually is in terrorist groups.¹⁸ We bring new evidence to bear on this question by analyzing all ninety memoirs we could find that were written by participants in terrorist organizations and that contained descriptions of individuals' activities in those organizations.¹⁹ We find that agency problems are pervasive in terrorist organizations and that security-reducing paperwork and bureaucracy were present in many of them.

For many terrorists, participation is a highly significant life event. Whatever their reasons for joining in the first place, terrorists by and large accept substantial risk in order to serve highly salient goals such as defending one's community, struggling for freedom from colonial rule, or transforming their country's economic system.²⁰ A proportion of those who survive the experience naturally want to write about it,

¹⁷ See the online appendix, Shapiro and Siegel 2012.

¹⁸ For analyses drawing on the United States government's extensive collection of internal documents from al-Qaeda and al-Qaeda in Iraq, see Brachman and McCants 2006; Felter 2006; Shapiro 2007; Bergen et al. 2008.

¹⁹ For purposes of this exercise we define terrorist organizations as any whose use of violence regularly violated the principles of distinction and proportionality under the law of armed conflict for at least one year of their existence.

²⁰ On reasons for joining, see the review of the psychological literature in Victoroff 2005. See also the explicit arguments about individual motivations in Pipes 2003; Reuter 2004; and Sageman 2008.

and thus many terrorists pen memoirs. As terrorism is a fascinating subject, especially to those viewing it from afar, many of these autobiographies have been published and a large number have been translated into English.

One may rightfully be concerned that the characteristics of terrorists who write memoirs could bias inferences about bureaucracy in terrorist groups. Two such biases deserve immediate attention. First, those who write memoirs have strong motivations to cast their actions in the most favorable light. We would therefore expect those who recall their participation favorably to minimize discussions of intraorganizational strife and discord and vice versa for those who were government agents. It is not clear, though, how this bias should affect the likelihood that they accurately recount the paperwork involved in participation. Second, bureaucracy is an inherently boring topic for the target audience of these memoirs (but, we hope, not for the readers of this article) and so we could expect these memoirs to underreport mundane organizational details and therefore underreport the extent of bureaucracy in their organizations. Since few memoir writers view their participation in a negative light (only eight in our sample), both of these selection effects should introduce a conservative bias into estimations of the prevalence of bureaucracy based on terrorists' autobiographies.²¹

Our data collection began with a survey of the secondary literature on terrorism and the historiography of specific groups to identify primary sources in English, French, and Spanish.²² We also consulted a number of prominent experts on terrorism and on specific terrorist conflicts. From this review we identified 122 potential autobiographies of individuals involved in terrorist groups, which we define as violent covert organizations that engaged in nontrivial levels of violence that violate the standards of distinction and proportionality under the customary law of armed conflict. Of these, ninety carried descriptions of individuals' activities in terrorist groups. The memoirs span the modern history

²¹ A related issue is that the sample is biased toward countries that have a tradition of autobiography or were colonies of countries that do. Few Islamist terrorists write memoirs, for example, while many Irish ones do. Any concerns that this would bias us toward finding high levels of record keeping should be allayed by the fact that the internal papers of at least two prominent Islamist organizations and one Arab organization have come to light (al-Qaeda, al-Qaeda in Iraq, and Fatah), and all show a keen affinity for paperwork during key moments in their histories. We elaborate further on al-Qaeda in Iraq in the next section.

²² We did not find any prominent Arabic sources that met our criteria; one prominent scholar attributed this to the absence of autobiography as a genre in jihadi writings. Private communication, Thomas Hegghammer, August 18, 2009. The documents closest to our criteria were written by members of al-Qaeda and are included in the Harmony database.

of terrorism, from Marxist groups in Russia in the late nineteenth century to West European leftist groups in the 1970s to Islamist groups today. For each memoir we collected a variety of types of information, including the organizations the individuals were in, factors that could bias their memoirs including whether they were repentant or government agents, and a vector of dichotomous variables indicating whether they mention each of the following:

- disagreement over political goals
- disagreement over tactics
- disagreement over target
- disagreement over money or logistics
- problems maintaining discipline
- multiple levels of hierarchy
- operatives being punished by leaders
- security-reducing monitoring²³

The autobiographies contain hundreds of interesting stories, and while we cannot discuss all in the space of a journal article, some specific ones are worth discussing. An excellent example of disagreements over money comes from the autobiography of Michael Baumann, a member of the Movement of the 2nd of June, a small leftist group operating in West Germany in the early-mid-1970s. In 1975 the group conducted a series of bank robberies and then split into two factions over disputes about how to spend the money.²⁴ Bill Ayers's memoir *Fugitive Days* describes the fraught history of Weatherman, a leftist group operating in the United States in the 1970s, offering up many examples of disagreements over tactics, most of them concerning how much energy to spend on military action relative to political organizing.²⁵ Operatives being violently punished for various transgressions feature prominently in a number of the memoirs. One of the most striking examples comes from Baya Gacemi's memoir of her time in the Algerian Islamic Group (GIA); she tells of the time a fund-raiser named "Djamel" was killed. While the killers claimed it was because they heard he was informing, Baya reports that other members of the group thought he was killed to cover up the fact that his killers had been stealing from him.²⁶

²³ Defined as keeping records on paper or electronic media that could help government authorities kill or capture group members or significantly disrupt their activities.

²⁴ Baumann 1979, 104–5.

²⁵ See, for example, Ayers 2003, 197–98.

²⁶ Gacemi 2006, 67.

Four important facts became clear through this analysis. First, the majority of groups experience problems due to the heterogeneous preferences of their members—fifty-seven of the ninety memoirs report nontrivial agency problems. Second, most groups are decidedly hierarchical—sixty-five of the memoirs discuss three or more levels of authority in the organization. Third, security-reducing monitoring of group members is common—twenty-five memoirs mention it. This monitoring ranged from the Warsaw Underground’s audit department,²⁷ to the Irgun’s detailed tracking of weapons given to it by Jewish soldiers in the British Army,²⁸ to the Mau Mau requirement that commanders provide village leaders with receipts for food expropriated during the Kenyan Emergency.²⁹ Fourth, rates of record keeping are a bit higher in nationalist groups (seventeen of forty-four) than in social revolutionary groups (ten of thirty-two). This last finding makes intuitive sense: because nationalist groups tend to be larger and more diverse, both adverse selection and moral hazard problems will be more challenging.

If we define bureaucracy as the combination of hierarchy and security-reducing paperwork, then 28 percent (twenty-five of ninety) of the terrorists in our sample observed enough bureaucracy to report it in their memoirs. Interestingly, these memoirs were not unduly concentrated in specific groups. Of the thirty-two groups represented in these memoirs, participants in twelve (37.5 percent) reported bureaucracy, participants in twenty-four (75 percent) reported multiple levels of hierarchy, and the same number discussed specific agency problems. Overall the evidence is quite strong that bureaucracy has been present in a wide range of terrorist groups over a long period of time.

Despite these patterns, one might still be concerned that the organizational problems terrorist groups have typically faced do not apply to the current threat from jihadi terrorist organizations. After all, our sample has only eight autobiographies from participants in such groups. Two points should allay these concerns. First, the Harmony documents consist largely of the internal correspondence of jihadi groups and they display plenty of conflict and record keeping. Second, a closer examination of internal documents from one of the most deadly jihadi organizations, al-Qaeda in Iraq, reveals organizational phenomena that look strikingly familiar once we set aside the group’s sanguinary purpose.

²⁷ Korbonski 2004, 334–35.

²⁸ Heller 1999, 254.

²⁹ Itote 1971, 285–91.

II. INSIDE AL-QAEDA IN IRAQ: THE “SINJAR ORGANIZATION”

This section draws on a sample of 109 captured documents that provide a striking insider’s view of the management challenges facing al-Qaeda in Iraq’s (AQI) successor organization, the Islamic State of Iraq (ISI).³⁰ If Section I provided the equivalent of a cross-national evaluation of the level of conflict and record keeping in terrorist organizations, this section provides the equivalent of microlevel data. Overall these documents portray an organization that required a great deal of reporting by its agents despite the fact that it faced an extremely competent counterterrorism force with massive resources for document exploitation.³¹

The documents from what we call the “Sinjar organization” were captured by coalition forces in October 2007 in a raid near Sinjar, along Iraq’s border with Syria.³² The majority of the documents (seventy) are typed or were found on computer files, and just over half of the documents (sixty-one) are standardized forms or handwritten according to a common format. A number of the documents are actually blank standardized forms for everything from tracking weapons,³³ to receiving group funds,³⁴ to swearing allegiance to the ISI.³⁵

The combined documents cover a wide variety of institutional minutiae including: 44 signed pledges by fighters agreeing to conditions for different activities; 43 managerial reports covering personnel, equipment, and finances; 10 internal receipts for funds disbursed to group members; 9 internal policy memos; and 4 press releases. While some of the documents are undated and the exact dates on many others remain obscure, the production dates for 37 can be identified with relative certainty. These documents were produced during the eleven-month period from September 2006 through August 2007 and contain information about the Sinjar organization’s finances going back to March 2006.³⁶

³⁰ For an analysis drawing on a much larger collection of captured documents from al-Qaeda in Iraq including the ones we use, see Bahney et al. 2010.

³¹ Record keeping and financial management practices in AQI receive extensive discussion in Bahney et al. 2010.

³² Fourteen of the documents explicitly refer to the “Border Emirate” (Imarat al-Hudud) of the ISI. It is not clear when this organizational distinction became official within the group, nor whether what would become the Border Emirate was recognized as a distinct geographical command within AQI. What is clear is that these documents were produced by a cohesive organization with shared personnel across “official” names, institutional memory, embedded management practices, and permanent salaried employees. We therefore refer to it as the Sinjar organization. For a more wide ranging analysis of these documents, see Fishman 2008.

³³ NMEC-2007-657916.

³⁴ NMEC-2007-657782.

³⁵ NMEC-2007-637854.

³⁶ The vast majority of the documents are from the “Border Emirate” of the Islamic State of Iraq

Understanding the situation in Iraq at this time period is critical for putting the documents into context. By many accounts AQI's relationship with the local population in Western Iraq began to sour in the summer of 2006.³⁷ For the ISI, carefully targeted violence and the appearance of financial efficiency became critical elements in a struggle for legitimacy in the eyes of the locals.³⁸ This meant the ISI had a double task: to control operations and to convince the locals it was doing so. In this light, seemingly obscure bureaucratic actions—having the group's financial administrator, Shahin, sign as a witness on the outgoing leader's summary of the group's activities in September 2006, for example—contributed to the ISI's ability to present itself as a disciplined, well-run, financially circumspect organization.³⁹

Several patterns in these data are useful for thinking about why terrorist groups seem to have a fair amount of internal conflict and use bureaucracy to deal with it. First, we see ISI leaders discussing the political value of exercising control over their operatives and acknowledging that the communications required to do so create security risks. Second, we see a nontrivial level of bureaucracy in the Sinjar organization because (1) controlling violence is critical to its political mission and (2) it operates with a very diverse membership. Third, there is evidence of a steady trend toward greater bureaucratization in the ISI, suggesting its leaders found it worth the inherent security cost. We will consider each pattern in turn.

The first pattern is highlighted by the fact that ISI leaders repeatedly note that they must control their subordinates because engaging in too much violence and in inappropriate fund-raising efforts can damage their cause.⁴⁰ It is instructive that the ISI's midlevel managers, as well as those of AQI in earlier years, had repeated problems with personnel engaging in politically problematic fund-raising that hurt their relationship with the locals.⁴¹ A December 2004 "Threat Announcement" from AQI highlights the political impact of such actions when it lists the names of those who took part in "mugging and looting" and disavows them in the following harsh terms:

(ISI), though the earliest documents were completed shortly before AQI and its allies publicly declared the independent ISI across a swath of western Iraq on October 15, 2006.

³⁷ Kagan 2007; Roggio 2007.

³⁸ For an analysis of the ISI's "pitch" to Iraqis and the wider Arab world, see Fishman 2007. For a discussion of the divisions and competition between Sunni insurgent groups, see Kohlmann 2008.

³⁹ NMEC-2007-658016.

⁴⁰ IZ-060316-02, NMEC-2007-637813.

⁴¹ Press reporting on coercive fund-raising by foreign fighters include Loyn 2008; Gordon 2007; Arrington 2006; and Hendawi 2006.

Due to the increase of illegal activities from theft and looting from those who claim to be part of Jihadi organizations and have committed such act in the name of their organization, let it be known [that] we at Al Qaeda organization in the land of two rivers are free from all their wrong doing and their acts we have sworn to expel those who allow themselves to exploit the blood or the money of the Muslims.⁴²

The discussion of “expelling those who exploit” suggests that the appearance of financial impropriety hurt AQI politically. Indeed, concerns with public perceptions are implicit in a series of later ISI memos that lay down administrative rules with which leaders could monitor how their operatives spent money.⁴³ Two requirements from these memos stand out:

1. “For every amount paid out of the Muslim people funds, the recipient is required to provide two signatures, in his own handwriting, one for receiving the money and another one to show how the money was spent.”
2. “All properties, small and large, will be inventoried, a report will be kept. We will keep a copy of the report, and all changes will be annotated from the previous report.”

These are sensible requirements for almost any organization, but not for one that is ostensibly covert. For such an organization, record keeping of the type described presents dramatic security risks and makes sense only if the group’s leaders were either (1) deeply concerned with the costs of operatives engaging in unauthorized behavior or (2) willing to give up a measure of security in order to be able to demonstrate financial propriety to a skeptical public. Both possibilities reflect a deep concern with the political impact of inappropriate behavior.

The leaders of the Sinjar organization are also keenly aware that they operate in an environment where becoming known to Iraqi or American government forces leads to operational failure.⁴⁴ One Sinjar memo detailing standard reporting procedures specifically admonishes local leaders that

⁴² NMEC-2007-637813.

⁴³ The list of rules appears in a series of three slightly amended memos, two of which have standardized expense forms tacked on at the end, presumably to ensure that ISI operatives do their paperwork correctly. NMEC-2007-657945, NMEC-2007-657926, and NMEC-2007-657877.

⁴⁴ This trade-off is especially stark for organizations such as the ISI whose enemy, the Coalition Forces, can strike anywhere without the constraints security forces face in traditional counterterrorism operations. The British, for example, could not use indirect fire weapons against Provisional Irish Republican Army (P-IRA) meetings in Belfast in the 1990s.

[a]ll information is to be uploaded on a [flash USB], and sent every week to the administrator of the Emirate of Borders. Due to the security risk involved, do not keep any information.⁴⁵

Despite such concerns, the Sinjar organization persists in using standardized forms,⁴⁶ keeping lists of operatives and equipment,⁴⁷ demanding regular reports from lower-level units,⁴⁸ and sending intraorganizational memos on everything from recommendations for a movie memorializing Abu Musab al-Zarqawi to a meeting agenda with a proposed organizational chart to be discussed.⁴⁹ Put simply, these documents show that for at least a one-year period, the Sinjar organization repeatedly sacrificed operational security for managerial control. In doing so, the group's leaders appear to have been motivated by a deep concern with managing public perceptions of their organization.

With respect to the second pattern, the Sinjar organization's use of bureaucratic tools is especially prominent in the group's "Fighter Registry Report[s]." These reports clearly provided a useful leadership tool.⁵⁰ Each details the group's personnel in three categories: "incoming fighters," "permanent Emirate fighters," and "exiting brothers." For incoming fighters, the reports provide names, dates of arrival, the work they will do (martyr or fighter), and the assets they brought with them. For permanent fighters, the reports list individuals' names and gives information on "salary" and "work" for a number of them. For "exiting brothers," the report gives the individuals' "reason for leaving," who gave permission for them to leave, and their dates of departure. Any human resources manager would want to capture such information. For an organization whose members depend on anonymity for survival, however, such record keeping is a disaster waiting to happen.⁵¹

In many ways this kind of bureaucracy is exactly what we should expect to see in the ISI. People who are good at violence—those who make ideal recruits as far as their eagerness and ability to conduct opera-

⁴⁵ NMEC-2007-657926.

⁴⁶ NMEC-2007-657694, NMEC-2007-658008, NMEC-2007-657694, NMEC-2007-658008.

⁴⁷ NMEC-2007-658070, NMEC-2007-657674, NMEC-2007-657911, NMEC-2007-657921.

⁴⁸ NMEC-2006-657777, NMEC-2007-657926, NMEC-2007-657945.

⁴⁹ NMEC-2007-637123 and NMEC-2007-657738, respectively.

⁵⁰ Chronologically these are NMEC-2007-657921, NMEC-2007-657680, NMEC-2007-657775, and NMEC-2007-657927.

⁵¹ Other Islamist terrorist organizations use personnel tracking spreadsheets. At least one manager in al-Qaeda (Abu Huthayfa) in the late-1990s called for the establishment of a database on al-Qaeda members and programs, the goal being to guide the organization and the broader jihadi movement by the study of its people; AFGP-2002-003251.

tions—could be expected to have an underlying preference for violence that leads them to engage in more violence than is politically desirable. The ISI surely faced this dynamic. Most of the ISI's fighters were foreigners who had traveled long distances to kill and die for a cause they deeply believed in. These fighters came from many different countries and a range of socioeconomic backgrounds.⁵² They were exactly the kind of diverse, highly motivated group of operatives that should be expected to seek out violence and combat for its own sake. Outside of any other considerations, ISI leaders likely had a great need to exercise control simply due to the nature of their operatives.

The third pattern is evident in that documents serving similar functions become much more formal and detailed over time. There is an illustrative contrast between two documents that report monetary income, expenses, personnel entering and departing, and equipment status for defined periods. The first document covers the two-month period from October 29 to December 21, 2006.⁵³ The second covers the fifteen-day period from January 27 to February 10, 2007.⁵⁴ The first difference between these two documents is the time period they cover. The later document is one of two bimonthly reports in the sample, suggesting the reporting frequency required in the Sinjar organization increased over time.⁵⁵ The second difference of note is that the while the first document breaks expenses down into large categories—"Guest houses," "Returnable debts," and "The brother's salaries," for example—the second document records each disbursement individually, noting the amount in dinars, recipient, and purpose for each, while summarizing the total amount disbursed to each individual in dollars.

A similar increase in bureaucratization can be seen in how the organization tracks its personnel. In October and November 2006 the Sinjar organization reports its personnel activities in relatively informal notes.⁵⁶ In December the personnel memos are typed but still appear ad hoc.⁵⁷ In January the first "Foreign Fighter Registry Report" appears with a standard format.⁵⁸ These reports appear with the same format in February and March.⁵⁹ Finally in May 2007 the "Islamic State of Iraq Salah al Deen Province Media Office" issues a memo that nicely

⁵² Felter and Fishman 2007.

⁵³ NMEC-2007-657676.

⁵⁴ NMEC-2007-657731.

⁵⁵ The other such report is NMEC-2007-657680.

⁵⁶ NMEC-2007-657696, NMEC-2007-657973.

⁵⁷ NMEC-2007-657941.

⁵⁸ NMEC-2007-657921.

⁵⁹ NMEC-2007-657850, NMEC-2007-657775, and NMEC-2007-657927, respectively.

illustrates the peak of the Sinjar organization's bureaucratization by directing all "sections and media personnel" to

Requesting [sic] an application for everyone of your soldiers in your district, if they have not done that before, please send them via postal service, in order for us to have all those who pledge of allegiance. If you did not have enough applications and if you don't have the capabilities for copying please inform our office to secure your needs.⁶⁰

While it is certainly considerate of the "media office" to handle local cells' photocopying needs, the solicitousness seems a bit strange given the security implications. It makes sense only if the organization found some level of standardizing personnel records to be of great value.

Two notes of caution must be sounded when deciding how much weight to give these documents. First, they do not represent a random sample of all ISI documents captured in Western Iraq from September 2006 on, much less a random sample of all ISI correspondence produced during this time period. Thus we cannot be certain they are representative of the group's internal correspondence. It may be that those ISI operatives whose documents were captured have a particular taste for bureaucracy. Second, some of the staid managerial tone in the translated documents may be due more to the translators' experiences in highly bureaucratic government organizations than to the original authors' affinities for Western business jargon. These problems aside, the Sinjar documents examined above provide the best public evidence on the financing and management of one important terrorist organization.

III. MANAGING MORAL HAZARD IN SMALL ORGANIZATIONS

A common assumption in the larger principal-agent literature is that the pool of theoretically available agents is effectively infinite. In such settings, a principal need not update his beliefs on the characteristics of the pool itself, just on the agents he draws from it. Further, it is often fair to assume that discarded agents are not used again. After all, if a new draw from the pool were better at the time the agent was discarded, surely this continues to be the case at any later time.⁶¹ Consequently, other than lack of knowledge about an agent's quality, there is never any reason to suffer the use of a poor agent and certainly not more than once regardless.⁶²

⁶⁰ NMEC-2007-637927.

⁶¹ Banks and Sundaram 1993.

⁶² We discuss applications of extant agency theory to the problem of terrorist organizations in the online appendix, Shapiro and Siegel 2012.

Yet it is clear that principals do not choose from an effectively infinite unknown pool in all cases. Often they are constrained for various reasons (for example, security, relevant knowledge) to use only a finite, potentially small number of people, and over time these people become quite well known. As we show in this section, a setting with finite choices of agents introduces significant new problems for a principal. Addressing these problems entails two induced incentives for principals that are relevant for understanding terrorist organizations. First, terrorist bosses—the principals of our story—have a strong incentive to increase the level of bureaucracy in their organizations, in order to condition their agents to take more favorable actions. Specifically, bureaucracy makes punishment of agents feasible, and multiperiod punishments sustainable in equilibrium. In settings where principals receive imperfect signals of agent effort, as they surely do in covert organizations, having the ability to be lenient when good agents fail due to bad luck can improve long-term performance. Second, counter-intuitively, bosses have an incentive to deliberately and repeatedly use agents *known* to be bad. Even agents *guaranteed* to perform poorly can be used in equilibrium, despite the immediate cost to the boss, in order to ensure better outcomes when the better agent is used.

In this section we illustrate both of these incentives via a game-theoretic model. The model accommodates the substantial complexity arising from limiting agents to a finite pool by keeping everything else comparatively simple. Specifically, we limit the pool to two agents, one better and one worse, and build on prior work analyzing moral hazard problems in terrorist organizations. In that work, we analyze a model in which a terrorist leader, B, has the opportunity to engage his organization in a series of attacks. Because he cannot carry out the attacks on his own, he delegates to one or more terrorist middlemen, each denoted M. Each attempted attack requires one M and the attack is always attempted, though its likelihood of success can vary greatly.⁶³ Due to security concerns and abundant outside options for the middlemen (for example, defecting in exchange for immunity), B has only two ways to condition an M's behavior: he can alter the level of funding for M's attack, or he can choose a different M. An M has even fewer options: he chooses how much of B's funding goes to the attack and how much he skims off of the top. The likelihood of a successful attack increases

⁶³ This setup effectively represents any set of actions with noisy observables. The choice of a binary signal for the model simplifies the analysis a bit, allowing us to focus in on the importance of organizational memory.

with the amount M delivers to the attack. Middlemen are assumed to vary in the degree to which they prefer skimmed money relative to successful attacks.

Due to the infinite pool of identical M , the optimal (stationary) strategy for B in this case is to retain the same M if an attack succeeds and choose a new M if an attack fails, never again using the failed middleman. If the pool of middlemen were not identical but still infinite, then this same strategy would remain optimal for B . Only the best agents would ever be used, and no agent would be rehired after a failure. If the pool of agents were additionally finite, however, things would change substantially. And that is our jumping-off point.

Consider the following model of the interaction between one terrorist boss, B , and two different middlemen, whom we'll call M_1 and M_2 .⁶⁴ Assume without loss of generality that M_1 is the "good" middleman, and M_2 the "bad" one; we will explain the meaning of these adjectives shortly. These middlemen may represent operatives tasked with managing operations, or they may represent those directly tasked with operations.⁶⁵

In each period, t , of an infinitely repeated game, the actors play a stage game that has two subperiods. In the first subperiod, B chooses an $M = \{M_1, M_2\}$ of known type according to a decision rule q_t and delivers to that M funds w .⁶⁶

In the second subperiod, M chooses an action $a_t \in [0, w]$, which is the amount of delivered funds put toward the attack.⁶⁷ This action in part determines the likelihood of a successful attack, $p(a_t; \theta)$; θ is some array of parameters relating to the difficulty of the environment for the attack, dictated by contextual factors including but not limited to government counterterror. Higher values of θ indicate a more permissive

⁶⁴ In addition to the finite pool of heterogeneous agents, this model differs from Shapiro and Siegel 2007 in its use of a constant wage, rather than a wage that is chosen by B . This is to keep the focus on the rehiring rule of the boss, rather than on his choice of funding level.

⁶⁵ We retain the "middleman" label for comparability with earlier work and ease of exposition.

⁶⁶ Note that we assume the choice of an M is costless regardless of M 's quality. Should there be a cost to choosing a particular type of M due to government action, that M will be used weakly less often in equilibrium. A cost to the use of any M is weakly deleterious to B in equilibrium; however, whether such a cost renders the bureaucracy-inducing trigger equilibria we propose in this article less beneficial depends on which type of agents are more costly to use. If, as discussed in Shapiro and Siegel 2007, worse agents are potentially more costly to use as they are more easily bought off by government, then it becomes more costly for B to switch to them and trigger strategies are less beneficial. If, however, superior agents are more costly to employ, then things are more complex. Some trigger strategies may very well be more beneficial, as they enable B to pay the cost for the superior agent less often than in a simpler equilibrium, while still inducing M to take more favorable actions.

⁶⁷ Shapiro and Siegel 2007 considered the variable x , the amount M skimmed from w . Here $a = w - x$.

environment, and so more terrorist success for the same a_t . We assume that $p(a_t; \theta)$ is strictly increasing in a_t and θ and, like all functions we will employ here, is twice-continuously-differentiable.⁶⁸ We also assume that $p(a_t; \theta)$ has increasing differences in a_t and θ . In other words, a higher θ , corresponding to a more permissive environment, not only directly increases the chance of success but also increases the efficiency of the agent's action in producing success.⁶⁹

Importantly, we are agnostic as to the exact interpretation of $p(a_t; \theta)$. Instead of the probability of "success" being the probability a bomb goes off or a rifle is fired, it can be understood as the probability the attack goes off without causing excessive, politically counterproductive violence. On November 25, 1993, for example, Egyptian Islamic Jihad (EIJ) set off a bomb in an attempt to assassinate then-Egyptian prime minister Atef Sidqi. The bomb missed its target but injured twenty-one bystanders and killed a schoolgirl named Shayma Abdel-Halim, causing a major shift in public opinion against EIJ. In this case, the principal would have been uncertain about whether the agent shirked by being careless in setting up the attack or was just unlucky, but the attack was most certainly not a success.

Between periods the attack is realized. Define a reward r_t as a random variable that yields 1 if the attack at time t is a success and 0 if a failure; then $p(a_t; \theta)$ implicitly defines the Bernoulli density function $F(r_t | a_t; \theta)$. We assume that F is common knowledge and constant through time; prior assumptions imply trivially that $F(r_t | a_t; \theta)$ satisfies the monotone likelihood ratio property (MLRP) for both a_t and θ , and therefore first-order stochastic dominance (FOSD) as well: $\forall r \in \{0, 1\}$ and $a > a'$, $F(r | a; \theta) \leq F(r | a'; \theta)$, and similarly for θ and θ' .

M_i 's utility is

$$E[V(a_{i,t}, q_{i,t}; \omega, \gamma_i)] = \sum \delta_M^t q_{i,t} \left(\frac{(1 - \gamma_i)}{\gamma_i} v(\omega - a_{i,t}) + p(a_{i,t}; \theta) \right), \quad (1)$$

⁶⁸ This last is not necessary but makes the presentation simpler.

⁶⁹ We assume as well that $p(a_t; \theta)$ is independent of the strategy B employs. That is, the chance of success does not decrease in the complexity of B's strategy, given by the decision rule q_t . This is a typical modeling assumption that is fair as long as the bureaucracy B's strategy entails does not appreciably worsen the operational security of the group going forward. Such will be the case when bureaucratic record keeping focuses more on the degree to which each M has heeded to B's preferences, and less on the operational details of past or future attacks. However, when such details are prevalent, we would expect a greater decrease in security the more complex is B's strategy and, accordingly, that complex strategies would be employed less than seen in our model. Similarly, if control via bureaucracy decreases innovation in agents' behavior, in turn decreasing the probability of successful attacks, then complex strategies entailing bureaucracy would also be employed less. We thank an anonymous reviewer for pointing this out.

where $q_{i,t}$ is the probability M_i is employed in any given period.⁷⁰ This form captures M 's dual interests in material gain and in the success of the attack. We index agent type by the parameter $\gamma_i \in (0, 1]$; higher values correspond to less greedy agents. The types of all agents are common knowledge, so that there is no adverse selection problem.⁷¹ Thus the assumption that M_1 is "good" and M_2 "bad" means that $\gamma_1 > \gamma_2$. We assume that $v(\cdot)$ is increasing so this portion of M 's utility is increasing in the amount skimmed, and that $v(0) = 0$ so that being hired is at least as good as not being hired (with its utility of 0) in all periods.⁷² Note that for all $\gamma < 1$, M 's preferences are not perfectly aligned with B 's, leading to a potential moral hazard problem.

B 's utility is

$$E[U(q_t; w)] = \sum \delta_B^t (p(a_{i,t}; \theta) - H(w)), \tag{2}$$

capturing B 's valuation of the attack and his opportunity cost for using money for the attack relative to other options. We assume that $H(w)$ is increasing and convex.

Let $H_t^k = (s_{t-1}, \dots, s_{t-k})$ be the k -period history of the game where each $s_t \in \{\{1, 2\} \times \{0, 1\}\}$ indicates which agent was chosen (hired) and the outcome of the attack in period t . B 's strategy is a rule for hiring based on the past history of the game, $q_t : H_t^k \rightarrow [0, 1]$. q_t is in general stochastic.⁷³ Note that its domain is a k -period history, where $k < t$, and thus not all previous periods' actions may affect it.⁷⁴ M_i 's strategy consists of an effort level, $a_{i,t} : H_t^k \times q_t \rightarrow [0, w]$. Again, M is limited to condition his actions only on the previous k periods. A full strategy profile over all time is $\sigma(q, a)$.⁷⁵ Best-response correspondences will be given by a^* .

⁷⁰ This differs from that in Shapiro and Siegel 2007 in the change in the definition of γ_i ($(1 - \gamma)$ there is γ in this article, and vice versa) and in an affine transformation. All logic below also generalizes trivially to the case of a general utility function as long as $v(w - a_i \gamma_i)$ has increasing differences in a_i and γ_i .

⁷¹ We briefly discuss the role of bureaucracy in the presence of incomplete information in the on-line appendix, Shapiro and Siegel 2012.

⁷² This ensures that individual rationality is always satisfied.

⁷³ Strictly speaking, q_t defines a mixed strategy in response to all possible histories of the game at time t . The pure strategy this mixed strategy extends assigns a 1 (rehire) or a 0 (do not rehire) to each possible history; q_t is a randomization over these pure strategies. To conserve notation, however, we do not introduce the pure strategies directly in the text.

⁷⁴ We will use this to solve for best response functions that treat the continuation value of the game as fixed conditional on the outcome of a finite number of periods.

⁷⁵ Notice that we have assumed B and all M have the same k . As a practical matter this may not be true, and a relatively straightforward extension of the model would relax this assumption.

We consider only strategies that are anonymous and time consistent. Anonymity implies that all *ex ante* identical agents are treated identically by B, and all agents with identical type pursue the same strategy. Time consistency implies that all strategies are optimal looking forward at every t , assuming the other player uses his equilibrium best response function.

Each value of k defines a different level of organizational memory, and increasing k requires increasing the level of bureaucracy necessary for the upkeep of this memory.⁷⁶ If increasing k increases the utility of the boss, the boss may be willing to take on increased record keeping and oversight despite the inherent security risk. To illustrate the impact of organizational memory, we consider $k = 0$, $k = 1$, and $k = 2$ in turn and show that increased memory, and hence bureaucracy, can be beneficial. Of course, there are costs to bureaucracy as well, meaning there is surely an optimum level of bureaucracy for each group, which may very well be none. This optimum will decrease in costs and increase in benefits; thus, our illustration of when and under what conditions bureaucracy will prove positive for the organization speaks directly to the degree of bureaucratization a group acting optimally should undertake.⁷⁷

NO MEMORY

We begin with the trivial case in which no actor evinces any degree of memory and is therefore unable to condition actions on even the previous period's outcome. With no memory all middlemen act myopically in each period, solving

$$\arg \max_{a_i} \frac{1 - \gamma_i}{\gamma_i} v(w - a_i) + p(a_i; \theta). \quad (3)$$

Since the equilibrium in each period reduces to a one-shot game, B simply hires the agent providing the greatest utility in every period. $v'(\cdot) > 0$ provides the immediate monotone comparative static that a^*

⁷⁶ Note that even though the boss needs only k -period memory here, time may pass between periods, implying the need for security-decreasing record keeping.

⁷⁷ Though we could view the restriction to a specific level of memory, or equivalently, a specific degree of history dependence, as an equilibrium selection criterion, we choose to frame the argument instead in terms of a property of the actors: the level of memory they may employ. We do this to highlight more clearly the choice that B is making over bureaucracy in the larger, though not modeled, game in which B would first choose an optimal level of bureaucratization, and hence k , and then play the game we have described.

is weakly increasing in γ .⁷⁸ B thus chooses M_1 every period in equilibrium.

So under very general conditions the basic intuition applies that in myopic organizations better agents devote more of w to action and so B hires the best agent in every period.

FINITE MEMORY

Finite memory expands the range of possible equilibria. We focus on subgame perfect Nash equilibria to show that greater memory allows B to achieve two important organizational goals: (1) more effectively condition the better agent and (2) find equilibria in which conditioning is time consistent given a greater quality spread between the two agents.

Covert organizations face substantial costs for developing the bureaucracy to maintain organizational memory. Whether any particular group finds it worthwhile to create the memory required to sustain more complicated equilibria will depend on the nature of its operation environment, here represented by the probability of success given effort, parameterized by θ , and the characteristics of the agents; δ_M , $v'(\cdot)$, and γ_i . This section simply shows that memory helps solve the problems which arise in organizations relying on a finite population of heterogeneous agents and identifies conditions under which this use of memory is more likely to be feasible.

We start by examining the game with 1-period memory to lock in the key intuition. We then extend the results to 2-period memory, provide an example of one set of conditions under which B can do better with 2-period memory, and construct an equilibrium that further utilizes the extended memory.

1-PERIOD MEMORY

Given all actors' inability to recall more than the k -period history of the game, actors can condition their behavior only on the *visible* outcomes of the previous k periods and on their expectations about future actions. Visible actions include only which agent was used and whether the action succeeded. For 1-period memory, this implies in particular that all that matters at the start of time t are (1) who was in use in the previous

⁷⁸ Applying reasonable conditions guarantees an interior solution so that a^* is strictly increasing in γ . Sufficient conditions for a unique interior solution are that,

$$p'(w) < \frac{1-\gamma}{\gamma} v'(w), p'(0) > \frac{1-\gamma}{\gamma} v'(0) \text{ and } \frac{1-\gamma}{\gamma} v''(w-a) + p''(a) < 0 \quad \forall a \in [0, w].$$

period and (2) what happened with the attack undertaken with that agent.⁷⁹

B's rehiring rule q_t thus takes a particularly simple form: $q_t = (q_t^{1,1}, q_t^{1,0}, q_t^{2,1}, q_t^{2,0})$, where the first element of each superscript corresponds to the agent in use in period $t - 1$, who may or may not be rehired, and the second element corresponds to the success (1) or failure (0) of that agent's earlier attack. An equilibrium of the game defines all four elements of this vector. We restrict attention to equilibria where B's hiring rule satisfies the following reasonable criterion: B is weakly more likely to rehire all agents after a success, that is, $q_t^{i,1} \geq q_t^{i,0}$, $\forall i, t$.

Though q_t has four elements, from B's perspective only one of them is relevant at the beginning of each period t —the one corresponding to the appropriate outcome of the previous period. In order for B's actions to be time consistent, this element must maximize B's utility looking forward, conditional on both M_i 's action that period, $a_{i,t}$, and the expected outcome of the game looking forward. Under 1-period memory there are only four unique ways to begin a period and so four different continuation values of the game. In analogy to the notation introduced for the rehiring rule q_p , we denote these for B: $U_{t+1} = (U_{t+1}^{1,1}, U_{t+1}^{1,0}, U_{t+1}^{2,1}, U_{t+1}^{2,0})$. Define V_{t+1} similarly for M. Only some of these elements may come into play, depending on the outcome of the previous period. Also note that these continuation values do not depend on actions in the previous periods, though they do depend on expectations about future periods and the parameters of the model.

Any M_i in use faces a similar problem to B. The major difference is that, while B chooses a q_t to affect which a_t will be used in the present period, a_t is chosen with an eye to maximizing a linear combination of present rewards and M_i 's rehiring in the *next* period. M_i 's action, a_p , therefore depends on the likelihood that it will result in an additional use of M_i in the future, which is a function both of $p(a_i; \theta)$ and q_{t+1} . The former is common knowledge given a_p , while the latter is a function of the equilibrium strategy B plays and M's expectations thereof.

Unlike B, with 1-period memory no M cares what happened last period. By the time he is hired in period t , B has already used that information. 1-period memory thus affects M only indirectly, through its impact on B's ability to remember one past action and rehire or not

⁷⁹ Extending memory by M to include memory of his own actions would enable M to play more damaging trigger strategies against B (for example, resort to myopic play forever if B ever fails to punish). Since this would make it easier to sustain punishment by B in equilibrium, we analyze the hard case in which M remembers only the *outcome* of his past actions.

accordingly. If the equilibrium q_t were stationary—a reasonable class of equilibria to explore under 1-period memory, due to the sameness of each period—then any hired M_i would take the same action in every period as well.

These insights allow us to derive a few useful properties of the best response functions of all actors in the model. We begin with the agents. In general, each M_i chooses a level of action, a_t , to maximize his expected utility looking forward:

$$E[V_t^{i,1}] = \frac{1 - \gamma_i}{\gamma_i} v(w - a_t) + p(a_t; \theta) + \delta_M (\text{Prob}(\text{Hired}_{t+1} \mid a_t) V_{t+1}^{i,1} + (1 - \text{Prob}(\text{Hired}_{t+1} \mid a_t)) V_{t+1}^{i,0}). \tag{4}$$

We can expand the probability of being rehired according to the logic above and rewrite M_i 's problem in the particularly simple form shown in the following equation, which leads directly to lemma 1:⁸⁰

$$\begin{aligned} \arg \max_a E[V_t^{i,1}] = \arg \max_a & \frac{1 - \gamma_i}{\gamma_i} v(w - a_t) + p(a_t; \theta) \\ & + \delta_M ([q_{t+1}^{i,1} - q_{t+1}^{i,0}] p(a_t; \theta) (V_{t+1}^{i,1} - V_{t+1}^{i,0}) \\ & + q_{t+1}^{i,0} (V_{t+1}^{i,1} - V_{t+1}^{i,0}) + V_{t+1}^{i,0}). \end{aligned} \tag{5}$$

LEMMA 1. M_i 's best response, $a_t^*(\cdot)$ is weakly increasing in $q_{t+1}^{i,1}$ and $V_{t+1}^{i,1}$, and weakly decreasing in $q_{t+1}^{i,0}$ and $V_{t+1}^{i,0}$. Consequently, M 's best response is also weakly increasing in the difference between the continuation value if rehired or not, $V_{t+1}^{i,1} - V_{t+1}^{i,0}$, and the difference in his rehiring probabilities after a success and a failure, $q_{t+1}^{i,1} - q_{t+1}^{i,0}$.

Lemma 1 is intuitive; increased rewards for success and decreased rewards for failure can induce a middleman to take (weakly) higher actions. We might think that other intuitive results should fall easily from the form of M_i 's utility, for example, that better agents always take higher actions or that a more permissive environment might always lead to higher actions. However, these statements do not follow from the agent's utility because M 's optimal actions depend on B 's choices. For example, it is entirely possible that a worse agent, maximally conditioned by B 's hiring rules, will perform better for B than a better

⁸⁰ All proofs are in the online appendix, Shapiro and Siegel 2012.

agent who is not conditioned at all and so plays the myopically optimal strategy of the no memory case.⁸¹

To see when B will use strict hiring rules, we need to consider B's problem in more detail. Assume that player i was used in the last period, with attack outcome r_{t-1} , and player $-i$ was not used. Let i 's equilibrium action given expectations on future rehiring rules be $a_{i,t}^*(\gamma_t, \delta_M, \theta, q_{t+1}, V_{t+1})$. We will leave off the functional dependence of the equilibrium action for readability. Note however that M's equilibrium action at time t does not depend at all on the rehiring rule at time t . B's best response correspondence is then

$$q_t^*(\cdot) \equiv \arg \max_{q_t(\cdot)} q_t^{i,r_{t-1}}(p(a_{i,t}^*; \theta) + \delta_B [p(a_{i,t}^*; \theta) U_{t+1}^{i,1} + (1 - p(a_{i,t}^*; \theta)) U_{t+1}^{i,0}]) \\ + (1 - q_t^{i,r_{t-1}})(p(a_{-i,t}^*; \theta) \\ + \delta_B [p(a_{-i,t}^*; \theta) U_{t+1}^{-i,1} + (1 - p(a_{-i,t}^*; \theta)) U_{t+1}^{-i,0}])). \quad (6)$$

B's continuation value clearly depends both on whom he hires in the present period and whether or not that agent succeeds, because both influence the probability of getting a given middleman in the next period. With B's expected utility in hand we can directly examine the power of conditioning via hiring rules by constructing an equilibrium of the repeated game.

Consider the intuitive strategy profile in which B rehires the good M when he succeeds but fires him when he fails, and only ever uses the bad M for one period regardless of the outcome of that period of use. In this equilibrium M_2 receives no conditioning; he cannot reearn his job via his actions and thus has no incentive to do anything other than take his myopically optimal action in every period he is used. We denote this action \tilde{a}_2 and, for shorthand, the probability of success this induces as \tilde{p}_2 .

The use of M_2 in this 1-period trigger strategy is as a pure punishment to M_1 for his failure in the previous period. With only 1-period memory, all such triggers must be of a harsh form—B cannot give M_1 the benefit of the doubt for a period after a failure, because the failure will have been forgotten by B by the next rehiring decision. Only when multiperiod memory is in use will such “gentle” triggers become pos-

⁸¹ Rules that always rehire after a success and always fire after failure achieve maximum conditioning according to lemma 1. Rules that rehire and fire at the same rates after success or failure achieve no conditioning by lemma 1.

sible. Note that in this equilibrium, unlike in our previous work or in any other model utilizing an infinite pool of agents, our trigger strategy keeps the better agent out of service for only one period. This is due not only to the 1-period memory structure but also to the finiteness of the pool.

We postulate a stationary equilibrium hiring strategy $q^* = (q^{1,1} = 1, q^{1,0} = 0, q^{2,1} = 0, q^{2,0} = 0)$. This implies (under 1-period memory) stationary actions by each M as well. We have already defined \hat{a}_2 as the equilibrium action for the bad M. The good M, by contrast, does condition its behavior on B's actions. We postulate that M_1 optimizes his expected utility $E[V^{1,1}]$ as per normal whenever B plays his equilibrium hiring strategy but reverts to myopic behavior (which is better for it) in any period that B fails to punish when he should.

Formally, M_1 maximizes equation 3 when B goes off the equilibrium path. This is a strictly beneficial deviation in the short term. It is also a sensible one, as M_1 now has evidence that B's threat to fire is not credible.⁸² We denote this myopic best response \hat{a}_1 , and its associated success probability \hat{p}_1 . Note that, because of the strictures of 1-period memory, M cannot revert to this strategy for all time. M_1 acts myopically in one period because he remembers he was in use and failed last period and yet is rehired this period. This is strictly better for M_1 in the current period than playing as if B were on the path. However, if he is treated appropriately (that is, according to equilibrium play) by B following his punishment period, he no longer remembers why it was necessary to punish.⁸³

On the equilibrium path, M_1 maximizes $E[V^{1,1}]$. To determine this, start with equation 6 and equate $E[V_t^{1,1}]$ with $E[V_{t+1}^{1,1}]$ due to stationarity. Then write an equivalent equation for $E[V^{1,0}]$, which is equal to $\delta_M E[V_{t+1}^{1,1}]$ because the better agent is always rehired after one period out of use. After some algebra, these equations yield:

$$E[V^{1,1}] = \left(\frac{1 - \gamma_i}{\gamma_i} v(\omega - \hat{a}_1) + \hat{p}_1 \right) (1 - \delta_M^2 - \delta_M(1 - \delta_M)\hat{p}_1)^{-1}, \quad (7)$$

⁸² A straightforward extension of the game would introduce uncertainty for M over whether B is a "tough" type or a "wimpy" type. Since M remembers only one period back, Bayesian updating would take a very simple form.

⁸³ While he may remember being fired, he does not remember if this was deserved or not. This may be a poor assumption for participation in spectacular attacks, but there are many observable actions that generate noisy signals of effort but are less memorable. An alternative specification would allow M to condition current actions on the previous k-periods' actions, which would make a permanent deviation to myopic play possible; that is, M_1 knows it played myopically in the previous period and so B must have failed to follow through with his firing threat at some point in that past. In that alternative

where \hat{a}_1 is the conditioned action of the better agent and \hat{p}_1 is its associated probability of success.

Lemma 1 guarantees that $\hat{a}_1 \geq \tilde{a}_1$. In periods while the better agent is in use, this equilibrium makes B weakly better off than the case without memory. We just need to ensure that all actors want to play this equilibrium. We have already seen that both types of M have no benefit from a deviation. On the equilibrium path both are maximizing the appropriate utilities given the rehiring rules. Off the equilibrium path the better agent forms the belief that his actions are now uncorrelated with the rehiring rule and so maximizes the appropriate utility in this case.

That leaves B's incentives. For B's threat to be credible and thereby serve to condition M_1 , it must be the case that the value of the game going forward from punishing the better agent exceeds the value of the game going forward from simply rehiring the better agent after a failure given his off-the-path beliefs. Solving for the difference in expected utilities arising from each of these actions allows us to generate conditions on how much the threat of punishment has to condition M_1 in order for the threat to be credible.

Proposition 1. If M_1 's myopic strategy is sufficiently bad for B relative to his conditioned strategy, then B can sustain a 1-period trigger strategy in equilibrium regardless of the bad agent's type. The greater the value of the future to B (δ_B), the stronger the conditioning effect (the greater \hat{p}_1); and the better the worse agent performs (\tilde{p}_2), the more likely it is that a 1-period trigger strategy can be sustained.

Proposition 1 encapsulates the value of organizational memory in this setting. Without memory, the boss must rely upon his agents' myopic best interests, which may be very bad. With this simple 1-period memory the boss is able to motivate his agents to do better than they would if unconditioned. Though B cannot make credible claims about hiring rules *ex ante*—because of a lack of enforceable contracts for terrorists and the necessity of time consistency—past history provides a guide to B's future actions. M can determine if B has left the path and punish him if he has. Importantly, M's punishment is time consistent: the agent *wants* to punish whenever he can get away with it.

The conditioning made possible by this can lead to significantly better outcomes for the boss. The following simple numerical¹ example makes the point clearly. Consider a fairly good agent, $\gamma_1 = \frac{1}{2}$, and let

memory structure B does worse after a deviation and so an equilibrium is easier to obtain. We are thus dealing with the hard case in justifying bureaucracy.

the bad agent be horrible, $\gamma_2 = 0$. Using reasonable functional forms and parameters it turns out that no matter how much money B pumps into attacks, even the good M skims it all in the case of no memory.⁸⁴ But if B plays the 1-period trigger strategy of proposition 1, then M_1 's best response yields an equilibrium success rate of 87.8 percent, which is almost, though not quite, as good as that obtained with an infinite population of identical agents who have $\gamma = \frac{1}{2}$.

Conditioning therefore clearly works on the better agent, even when only small levels of organizational memory are in effect, but is it useful to the boss? The answer to this question depends on the frequency with which the better agent is used, since in this example using the worse agent is just a wasted period. To get at this, we note that the combination of equilibrium success probabilities and hiring rates produces a Markov chain in equilibrium, with a well-defined transition matrix. For our 1-period trigger equilibrium, this matrix T , where T_{ij} is the probability of transitioning from M_i to M_j , is

$$\begin{pmatrix} \hat{p}_1 & 1 - \hat{p}_1 \\ 1 & 0 \end{pmatrix}. \tag{8}$$

In the steady-state, M_1 is thus used a fraction of the time equal to $\frac{1}{2 - \hat{p}_1}$. For the parameter values used in our previous numerical example this implies that M_1 gets used about 88.5 percent of the time in equilibrium, so that B effectively wastes a period on average once every ten periods by using agent 2 to condition agent 1. Despite this, the expected overall success rate is 78 percent given this frequency of use, clearly superior to the 0 percent B gets in the absence of conditioning.⁸⁵

Thus we see that the boss does substantially better in this example by constructing a level of organizational memory, supported in practice by a certain level of security-decreasing bureaucracy, as compared with the no-memory case. Organizational memory (that is, record keeping) supports equilibrium punishment strategies that are time-consistent given a finite pool of known agents.

⁸⁴ We use $v = b(w - a)$, $H = cw$, $p = \frac{e^{\beta(a-a)}}{1 + e^{\beta(a-a)}}$, $\delta_M = .83$, $\alpha = 600$, $\beta = .005$, $b = .00088675$, and $c = .0004167$. These parameter values were used and justified in Shapiro and Siegel 2007.

⁸⁵ If B can set wages, then no money is wasted here either: the better agent does not skim, taking the highest action possible, and the worse one does not get funded. If B cannot do so, as in our analytic simplification, money will be wasted, as the worse agent will take no action and abscond with the funding.

1-PERIOD MEMORY VERSUS NO MEMORY

What about in general? Can we determine *when* the boss will do better with the 1-period trigger equilibrium and so choose more bureaucracy? Without using specific functional forms as in the previous example, this is difficult, as the decision involves numerous trade-offs that are likely to be situation specific. However, we can make some progress toward a general welfare result by considering the steady state behavior of the actors.

As noted above, in the steady state of the 1-period trigger equilibrium, M_1 has a success rate of \hat{p}_1 and is used a fraction of the time equal to $\frac{1}{2 - \hat{p}_1}$, while M_2 has a success rate of \tilde{p}_2 and is used $1 - \frac{1}{2 - \hat{p}_1}$ fraction of the time.⁸⁶ In the no-memory case, M_1 is always used, with a success rate of \tilde{p}_1 . Bureaucracy is beneficial whenever the expected value of the 1-period trigger to B exceeds that of the no-memory equilibrium, or when

$$\tilde{p}_1 < \frac{1}{2 - \hat{p}_1} [\hat{p}_1^2 + (1 - \hat{p}_1)\tilde{p}_2].$$

After some algebra, this reduces to:

$$\hat{p}_1 > \frac{2\tilde{p}_1 - \tilde{p}_2}{1 + \tilde{p}_1 - \tilde{p}_2}.$$

On one level, this condition is fairly clear. The bigger is the conditioned probability of success for M_1 , \hat{p}_1 , the better B does with 1-period memory, as B does better from each period that M_1 is in use. Similarly, the greater is the myopic probability of success for M_2 , \tilde{p}_2 , the better B does with the 1-period trigger, as B does better during the punishment periods when M_2 is in use. By contrast, the larger is \tilde{p}_1 , the better B does in the myopic equilibrium, leaving less reason to add on costly bureaucratic layers to B's organization.

Ideally, though, we would like to know how the likelihood of this inequality's holding varies with the parameters of the model. For its dependence on most parameters, however, even the functional forms used in our numerical example do not provide insight. There are simply too many trade-offs involved to derive a result not dependent on the

⁸⁶ We use the steady state to avoid the combinatorics arising from B's always choosing M_1 first in equilibrium.

specifics of the situation. Despite this, there is one comparative static we can state.

As noted in the discussion in the no-memory subsection, the myopic equilibrium action is increasing in γ_i so that the probability of success is also increasing in γ_i . Consequently, \tilde{p}_2 is increasing in γ_2 , and the 1-trigger equilibrium becomes more beneficial the less greedy the worse agent is. Substantively, this implies that the bureaucracy a 1-trigger equilibrium entails is likely to be more worthwhile the better the second-best agent is. In other words, a reduction in the quality of alternative agents by government, even though these agents may not be presently in use, should result in less incentive for B to bureaucratize and necessarily a worse outcome for B, since the better agent in use stays the same. Conversely, if, as suggested by Shapiro and Siegel,⁸⁷ government action often first removes the worse agents, potentially driving up the quality of the next best agent due to search processes, B becomes more likely to bureaucratize and achieves a better outcome.

Of course, some organizations may benefit from a wider range of possible equilibria and so may value longer memory. We examine the case of 2-period memory to show that the results extend quite naturally.

2-PERIOD MEMORY

The existence and potential benefit to the boss of the 1-period trigger equilibrium tells us that memory, and so bureaucracy, can be useful to an organization employing a finite group of agents. It does not, however, indicate *how much* memory might be useful or exactly why more memory is useful. Constructing an equilibrium that takes advantage of 2-period memory gets at these complementary questions. The boss's motivation for doing so is simple: in some settings B can gain strictly better outcomes by employing strategies not available with 1-period memory. The intuition is that even good agents will sometimes have a bad outcome due to chance. Organizations can do better if they can be lenient as well as strict. Being lenient with good agents, however, requires that organizations record behavior over multiple periods for both the obvious reason and to make it possible for principals to play time-consistent strategies that permit forgiving occasional failure and still incentivize good agents. When it is beneficial to have longer organizational memory, terrorists have an incentive for more bureaucracy.

With 2-period memory the players' maximization problems become more complicated because B can condition his hiring choice in period

⁸⁷ Shapiro and Siegel 2007.

$t + 1$ on the outcomes both in the current period and in period $t - 1$. Moreover, while an M who is fired obviously receives nothing in period $t + 1$, the probability that M is hired in period $t + 2$ can depend on the outcome in period t and so the continuation value of being fired depends on the current period's outcome. In other words, M's decision affects not only whether or not he is rehired but also the value he gets for being rehired or for being fired. Formally, we must keep track of four continuation values, rather than the two in the 1-period memory case.

The same increase in complexity is true for B as well, and B's problem is harder than M's because of the fundamental asymmetry of the problem—B must always keep track of events one period further back than M does because of the order of actions in the game. So whereas in the 1-period memory case, B's rehiring strategy had four elements, now a minimal strategy has eight. We define this new strategy as $q_t = (q_t^{1,1,1}, q_t^{1,1,0}, q_t^{1,0,1}, q_t^{1,0,0}, q_t^{2,1,1}, q_t^{2,1,0}, q_t^{2,0,1}, q_t^{2,0,0})$, where the first element of each superscript corresponds to the agent in use in period $t - 1$ who may or may not be rehired, the second element corresponds to the success (1) or failure (0) of that agent's attack in period $t - 2$, and the third element corresponds to that agent's results in period $t - 1$. We define 2-period memory analogues to U_t and V_t in the same way.

In the 1-period case, we postulated a stationary 1-period trigger strategy. While not the only equilibrium possible for all parameter values, this had the nice properties that it (1) strongly conditioned the better agent, (2) used the better agent often, and perhaps most importantly (3) was extremely easy for a boss to use. We want to keep these properties under 2-period memory, while making use of the expanded set of strategies afforded by extra memory. In particular, we can easily imagine a situation in which the operational environment is so hard that even highly motivated Ms fail fairly often. In such settings B can still benefit from conditioning the M but would want to have the option of employing a less drastic strategy to do so, especially if the worse agent had a very low γ .

An intuitive strategy profile to consider in a setting where a bit of leniency can help is a "gentle trigger" strategy in which B fires the good agent only if he suffers two failures in a row and never uses the bad agent for more than one period. This strategy has the nice qualities of the 1-period trigger equilibrium but makes use of the extra memory. Formally, $q^* = (1, 1, 1, 0, 0, 0, 0, 0)$. To help keep down notational complexity, we define M's stage game payoff as $v_i(a_i) \equiv \frac{1 - \gamma_i}{\gamma_i} v(\omega - a_i) + p(a_i; \theta)$.

The gentle trigger strategy reduces the complexity of the problem somewhat, leaving three relevant states of the world. The first state occurs when the good M is newly hired or when the good M succeeded in the previous period. In equilibrium the good M will not be fired in the next period in either case regardless of the outcome of his attack. Because memory is limited to two periods the game looks the same going forward to the good M (and B) in both cases. To keep notation simple, we call the expected utility of the game to M_1 in this state V_S , to B U_S , and the equilibrium action M_1 takes is a_S , which we define below. The second state occurs when M_1 failed in his previous attack but succeeded in the one before that. Now he may be fired in the next period, which may produce different incentives to him. We define analogous notation: V_F , U_F , and a_F . Finally, the third state occurs when M_2 is in use because M_1 has been fired. Because the bad M's incentives remain the same as in the 1-period trigger equilibrium, M_2 takes the same myopic action as before, \tilde{a}_2 . The corresponding expected utilities for M and B are V_2 and U_2 respectively. (V_2 defines M_1 's utility when not in use, not M_2 's utility.) We define $p_S = p(a_S; \theta)$, $v_S = v(a_S)$, and so on for convenience.

This specifies the equilibrium path of play. Off the path, we assume that M_1 plays his myopic strategy, \tilde{a}_1 , for as long as he realizes that B has deviated from equilibrium play. There are several ways in which B could deviate. He could (1) fail to fire M_1 after two failures; (2) fire M_1 after one failure; (3) fire M_1 after a success; (4) fire M_1 after two successes; or (5) rehire M_2 at any time. Given the equilibrium strategies of both Ms, it clearly cannot pay for B to deviate in the last three ways. We will see by lemma 2 below that the second never pays either and, in proposition 2, that while the first deviation pays sometimes, it does so under well-defined conditions that produce results similar to proposition 1.

Transitions based on B's hiring rule and M_1 's actions define the following three linked expected utilities for M_1 :

$$V_S = v_S + \delta_M(p_S V_S + (1 - p_S)V_F) \tag{9}$$

$$V_F = v_F + \delta_M(p_F V_S + (1 - p_F)V_2) \tag{10}$$

$$V_2 = 0 + \delta_M V_S. \tag{11}$$

Some algebra produces the following decision problem, which implicitly defines both a_S and a_F on the equilibrium path:

$$a_S, a_F \equiv \arg \max_{a_S, a_F} \begin{cases} V_S = \frac{v_S + \delta_M v_F (1 - p_S)}{1 - \delta_M [p_S - \delta_M (1 - p_S)(\delta_M - (1 - \delta_M)p_F)]} \\ V_F = \frac{v_F + \delta_M v_S (\delta_M + p_F - \delta_M p_S) - \delta_M v_F p_S}{1 - \delta_M [p_S - \delta_M (1 - p_S)(\delta_M - (1 - \delta_M)p_F)]} \end{cases} \quad (12)$$

Informally we would think that the equilibrium would be sustainable only if B's threat conditions M. This turns out to be true. Lemma 2 formalizes this "boss pleasing" condition that follows from equations 9–12 and is an analogue to lemma 1.

Lemma 2. In a gentle trigger equilibrium M_1 tries weakly harder after both failure and success than in the myopic equilibrium. Further, M_1 tries weakly harder after failure than after success. That is, M_1 's actions are ordered in equilibrium: $a_F \geq a_S \geq \tilde{a}_1$.

Lemma 2 basically states that in the 2-period memory case some conditioning is never worse for B than none in terms of the good agent's actions. It also indicates that no 1-period deviation can be profitable for B after one failure, since by rehiring M_1 he would be trading weakly greater effort in the next period (a_F) for the weakly lower myopic effort (\tilde{a}_1). Lemma 2 thus reduces the qualifications necessary for the gentle trigger equilibrium to hold. As long as B has no incentive to rehire M_1 after two consecutive failures, B's hiring strategy will be credible to the agents. Proposition 2 provides the condition for this to be the case and illustrates how this condition varies.

Proposition 2. If M_1 's myopic strategy is sufficiently bad for B relative to his conditioned strategies, then B can sustain the gentle trigger strategy in equilibrium regardless of the bad agent's type. The greater the value of the future to B (δ_B), the stronger the conditioning effect (the greater p_S and p_F), and the better the worse agent performs (\tilde{p}_2), the more likely it is that the gentle trigger strategy can be sustained.

Proposition 2 defines when a gentle trigger equilibrium can be sustained; whether that is better for B than a 1-period trigger depends on the parameters of the model. Consider the following simple numerical example where the good agent puts forth little effort off the path, so \tilde{a}_1 is very small. Suppose the model's parameters are such that $\tilde{p}_1 = .3$, $p_S = .5$, $\hat{p}_1 = .65$, and $p_F = .7$. Under these conditions both the 2-pe-

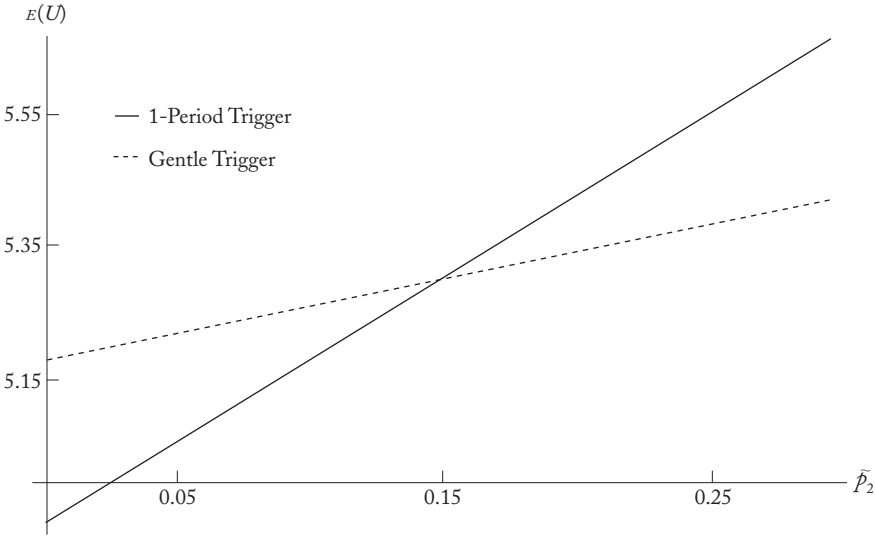


FIGURE 1
1-PERIOD TRIGGER VERSUS GENTLE TRIGGER

riod gentle trigger and the 1-period trigger strategies can be sustained in equilibrium for $\delta_B > .86$. Figure 1 shows B's expected utility at the start of the game fixing $\delta_B > .9$ and varying \tilde{p}_2 from 0 to .3. This encompasses the range of possibilities from the worst possible bad agent to the situation where both agents are identical: $\gamma_2 = 0$ to $\gamma_2 = \gamma_1$.

Figure 1 illustrates the fact that the loss of conditioning in the gentle trigger is more than offset by the loss of utility from using the worse agent more often in the 1-period trigger when M_2 is sufficiently bad. However, as M_2 gets closer in performance to the myopic good agent, the lost conditioning value outweighs the value of avoiding the bad agent and B does better with a 1-period trigger strategy. One can easily imagine the situation in which B would do better by switching to 2-period memory if bureaucracy were free but would not do better if the security costs of greater memory outweighed the expected value from employing more nuanced disciplinary strategies. This, of course, is exactly as it should be. Not all terrorist groups employ extensive bureaucracy.

EXTENSIONS

Before concluding, it is worth noting that we have assumed that the history of the game contains only the outcome of attacks and the agent in use for each attack; thus B can base rehiring decisions only on these two factors. We view this as the starkest setting to provide the key intu-

ition about this strategic interaction, but it is a departure from much of the agency literature in which conditioning is done on signals of effort. Indeed, some of the bureaucracy we use to motivate the article looks more like an attempt to elicit signals of effort than to draw repeated observations of success or failure. Fortunately, it is not necessary in general to assume that B wants only to prevent agents from skimming; nor is it necessary to assume that rehiring rules must depend only on the weak signal of success.

We could, for example, replace effort with level of violence and have B's utility depend on the difference between this level and B's ideal. While we view this as beyond the scope of this article, we can say something more about using alternative rehiring rules. Several examples above deal with bosses discovering noisy signals of agents' shirking, for example, the auditing in al-Qaeda in Iraq. There are numerous ways of modeling how such signals would enter into B's rehiring rule, but two reasonable ones reproduce results similar to ours. First, assume B receives a noisy signal of effort (or shirking), and the chance of receiving the positive signal is increasing in M's effort.⁸⁸ If B cares directly about effort, not success, then since effort is only observable via the signal it sends (the only actual function of effort is success, and we are assuming B does not care about both), B's utility is a function of the signal, which probabilistically depends on effort, and the problem is identical to what we have. Thus all results go through exactly.

If B cares about success but conditions rehiring on the signal of effort, the model gets more complex. However, the core proposition 1 holds with two exceptions. First, in this model we cannot determine the effect of increasing δ_B . Second, while the ability to sustain a 1-period trigger is increasing in the conditioning effect on the signal of effort (as was \hat{p}_1 in proposition 1), \hat{p}_1 itself now has the reverse effect. This is because it now serves only to provide benefits to the boss, which B finds harder to give up in order to condition M properly and which is also why δ_B is ambiguously signed. The intuition is that if B can observe effort but cares about success, he will have a harder time conditioning the good M in regimes where he gets a noisy signal of effort but sees frequent successes.⁸⁹

⁸⁸ We explicitly use this setup in a slightly different model in section 2.1 of the online appendix, Shapiro and Siegel 2012.

⁸⁹ Of course, B might use both signals in this case. To start to get at this, in section 2.1 of the online appendix, we compute equilibria for a model with an infinite agent pool in which B cares about both effort and success; Shapiro and Siegel 2012. Describing the full interaction with a finite pool, however, entails substantial complication for little gain in intuition and so we do not take that route.

IV. CONCLUSION

Prodigious levels of disagreements and bureaucracy in conventional, licit organizations are hardly surprising. Almost all organizations need to control agents with diverse preferences who operate in environments in which observable outcomes provide only noisy signals about actions. Bureaucracy eases this challenge by structuring interactions within the organization, defining standard operating procedures, delivering organizational goals, and reinforcing organizational culture. Though bureaucracy carries inefficiency costs, it is necessary. Illicit organizations, including terrorist groups and insurgent armies, face many of the same institutional requirements as their legal counterparts—agents must be directed, individuals must communicate, and so on—but pay particularly high costs for bureaucracy in the form of reduced security and the concomitant risk of incarceration or death. Despite these potent costs, some terrorist organizations demonstrate substantial levels of bureaucracy.

Formally analyzing the specific managerial challenges inside terrorist organizations helps explain this variation by identifying motivations for bureaucracy and record keeping in terrorist organizations. In addition to the typical role assigned to bureaucracies of providing leaders with better signals of their agents' efforts and quality, and so ameliorating moral hazard and adverse selection problems, we identify a novel use for bureaucratic record keeping: in small organizations facing moral hazard problems, longer institutional memory enables leaders to employ equilibrium disciplinary strategies that are forgiving (that is, they allow for the inevitable failures that come with a hard operational environment) and credible (that is, time consistent) given a finite pool of known agents. Counterintuitively, creating organizational structures that help operatives know when leaders are not following disciplinary rules can make it possible for leaders to employ a wider range of punishment strategies to condition agents. Such strategies can enhance organizational efficiency for terrorist groups, despite the gains to counterterrorism from enhanced record keeping. Further, employing these disciplinary strategies in difficult operational environments where occasional failures are inevitable entails the repeated use of agents known by terrorist leaders to be suboptimal, improving our understanding of seemingly questionable personnel choices by these groups.

From this perspective the fact that al-Qaeda in Iraq's successor organization, the Islamic State of Iraq (ISI), used standardized forms to track spending should not be surprising.⁹⁰ Illicit organizations will em-

⁹⁰ ISI administrative memos written in 2006 lay down administrative rules and provide standard-

ploy bureaucracy when they find the cost in decreased security outweighed by the benefits in organizational efficiency.

As our analysis of ninety terrorist memoirs in Section I demonstrated, while internal conflict and bureaucracy are not uniform in all terrorist organizations, they are quite common across a wide range of groups over many years. Section II provided a more refined view of the internal workings of one of the most prominent modern groups, al-Qaeda in Iraq, showing that dealing with internal conflict continues to be a challenge for even the most deadly terrorist organizations. Section III presented a new approach to modeling small organizations facing moral hazard problems with limited institutional memory. In this setting, longer institutional memory serves an important role by enabling leaders to employ more refined equilibrium disciplinary strategies given a finite pool of well-known agents. Additionally, one stylized fact about terrorist organizations is that they become flatter and less bureaucratic as they come under greater pressure. Our model is consistent with this finding, in that it becomes less likely that equilibria which make use of organizational memory can be sustained when (1) the value of the future to terrorist leaders declines (perhaps because counterterrorism efforts increase and so the leaders' chances of surviving drop) and (2) the quality of the worst agent in a terrorist group declines (perhaps because counterterrorists target better agents first).

While the model in Section III could be extended in several directions, we are confident it taps into a basic challenge for terrorist organizations. In our model the punishment strategies that allowed leaders to extract greater effort were credible only because operatives were able to identify and react to deviations from the leaders' equilibrium strategy. As a practical matter, such a reaction requires clearly established disciplinary standards that are understood throughout the organization, something not unlike corporate culture.⁹¹ Given this requirement, we should not be surprised to see the urban branch of the Kenyan Mau Mau insurgency (the Land and Freedom Army) keeping minutes of the meeting at which it laid out punishments for a variety of rules violations.⁹² Two rules from the minutes stand out. First, the Land and Freedom Army (LFA) implemented a very clever rule that

ized expense forms, presumably to ensure that ISI operatives do their paperwork correctly; NMEC-2007-657945; NMEC-2007-657926; and NMEC-2007-657877.

⁹¹ Kreps 1990.

⁹² The Land and Freedom Army operated a combination of an urban terrorist group and logistical support organization for the Mau Mau forest fighters during the Kenyan emergency, 1952–54. Mohamad 1974, 21.

created incentives for operatives to exert maximum effort: “3. If any fighter was arrested while he still had ammunition in his gun, he would not be given legal assistance by the Committee.” Second, the LFA used a type of gentle trigger strategy: “The punishment for violating these rules was simple. For the first offense, a man would be warned. Second offenders would be killed.”

These rules highlight two important facts. First, terrorist organizations take seriously the incentives created by their internal disciplinary rules. Second, terrorist organizations sometimes see value in being able to employ the kinds of more forgiving rules made possible with institutional memory. This is not always the case. The Greek Cypriot organization EOKA, for example, had remarkably strict rules which mandated death for failures that many organizations forgive, such as breaking under torture.⁹³ Our analysis, however, does not predict that we should always see one kind of rule or another. Rather, we argue that while terrorist organizations almost always face agency problems, whether or not bureaucracy will emerge as the solution depends in clearly identifiable ways on the organizations’ operational environments.

Specifically, we expect to see more bureaucracy in terrorist groups when three conditions obtain. First, a group’s chosen uses of violence entail substantial risk of operational failure, meaning even the best operatives supported by hard-working middlemen will still fail quite often. Second, a group has a reasonably secure location from which organizational tasks can be conducted, meaning the security costs of record keeping are relatively low. Third, a group has a fair number of high-quality operatives but those operatives are not fanatically committed, meaning the value of conditioning them is substantial but the costs of punishing the best are not so severe as to make their myopic behavior preferable.

Testing this prediction is a goal for future research. This will require case studies that make nuanced assessments of groups’ internal organizational characteristics. For now, the critical point is that terrorist organizations face strong incentives to keep security-reducing records. This is a good thing: it provides grist for the government counterterrorism mill and should dispel any notion that these groups present a uniquely deadly threat. They face the same challenges and constraints as other organizations and should be treated as such in both the political science literature and in policy debates.

⁹³ Grivas 1964, 49, 157–59.

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