Hostage Taking: Determinants of Terrorist Logistical and Negotiation Success*

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Abstract

This article investigates the determinants of logistical and negotiation success from the terrorists' viewpoint in hostage-taking missions. Logistical success indicates that the terrorists apparently completed the mission as planned, while negotiation success means that the terrorists received some of their initial demands. In the empirical analysis, the article utilizes a new data set on hostage incidents from 1978 through 2005 for the logit regressions. Empirical results broadly support our theoretical predictions. Logistical success depends positively on terrorist resources and target vulnerability, while negotiation success increases with the relative disagreement values and relative bargaining strengths of the terrorists. More specifically, terrorist success at the execution stage depends positively on kidnappings and large hostage grabs, and varies negatively with attack force diversity and terrorist casualties. Negotiation success depends on bargaining variables (i.e., the number of hostages, casualties, incident duration and other proxies). The article shows that the factors that determine terrorist negotiation success differ between kidnappings and nonkidnappings (i.e., skyjackings, the takeover of buildings, and the hijacking of nonaerial means of transport), owing to location and other considerations (e.g., types of demands). In particular, making multiple demands bolsters negotiated success in nonkidnappings, while demanding money fosters negotiated success in kidnappings. Lengthier incidents have a positive influence on the likelihood of terrorists gaining concessions in kidnappings and nonkidnappings.

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Terrorism is the premeditated use or threat to use violence by individuals or subnational groups in order to obtain a political or social objective through the intimidation of a large audience beyond that of the immediate victims. Of the many modes of terrorist attacks, hostage taking continues to contribute some of the most influential and newsworthy terrorist incidents.[1] For example, the 22 July 1968 Popular Front for the Liberation of Palestine (PFLP) hijacking of an El Al plane is credited by many experts as marking the start of the modern era of transnational terrorism, where terrorists stage events in other countries to capture the world's attention for their cause (Hoffman, 2006: 63-64). The kidnapping of Israeli athletes at the Munich Olympics by Black September on 5 September 1972 was viewed live on television by a global audience. On 21 December 1975, the PFLP succeeded in capturing 70 hostages including eleven Organization of Petroleum Exporting Countries (OPEC) ministers in Vienna. This audacious act involving such influential persons showed that virtually no one is immune and that the 'right' hostage(s) may result in large ransoms being paid. The abduction of American hostages at the US embassy in Tehran on 4 November 1979 by radical students lasted 444 days and effectively lost President Carter the election. The 14 June 1985 hijacking of TWA flight 847 with 153 people aboard gained intense media coverage until the release of the remaining hostages on 30 June 1985. Other noteworthy hostage incidents include the four hijackings on 9/11 and the Chechen terrorists' takeover of the Beslan middle school on 1 September 2004. Although the terrorists were logistically successful in securing hostages in these incidents, they did not always

gain concessions. None of their demands were met at Munich or Beslan. An analysis of the determinants of terrorist success at the logistical (abduction) and negotiation stages is the focus of this article.

Hostage-taking events – skyjackings, barricade and hostage missions (henceforth, barricade missions), nonaerial hijackings, and kidnappings – are newsworthy as lives hang in the balance. The first three types of hostage events differ from kidnappings in that the former events are in a *known* location while kidnappings are in an unknown location (Corsi, 1981; Wilson, 2000). As such, hostage takers are exposed to greater risks for nonkidnappings, since they are under surveillance by the authorities once the hostages are secured. Moreover, nonkidnapping dramas often unfold in the full view of the public, which affects the actions of the authorities. This constant scrutiny may cause negotiations to proceed differently between nonkidnappings and kidnappings. For example, negotiation strategies may differ between these types of hostage missions in terms of the kinds of demands made and terrorist actions to wait out the authorities (Elster, 2004). Thus, factors that influence negotiation outcomes may have different consequences for nonkidnappings and kidnappings.

Why do terrorists resort to hostage-taking operations if they involve high risks and great costs? Nonkidnapping hostage incidents are very risky as terrorists must, at times, circumvent barriers, while kidnappings are particularly costly as the hostage(s) may have to be maintained for lengthy periods. Terrorists are drawn to such events provided that the expected payoffs – accounting for risks – equal or exceed expected costs. A high expected payoff may result owing to publicity, recruitment benefits, concessions, or induced society-wide anxiety. To attract terrorists, the anticipated rewards must also be larger than those associated with other less-risky types of terrorist attacks. In terms of transnational terrorist events, hostage-taking incidents represent 14.2% of all such incidents: 9.44%, kidnappings; 2.88%, skyjackings; 1.42%, barricade

missions; and 0.46%, nonaerial hijackings (Enders & Sandler, 2006: 162-163). These relative frequencies underscore that terrorists choose among hostage operations by responding to risks, because the least risky kind of hostage mission represents two-thirds of all such operations. The larger percentage of skyjackings compared to barricade events can be explained by the greater difficulty that authorities have in ending a skyjacking compared to the takeover of a building. Rescue missions for authorities can be extremely onerous for skyjackings if the safety of the hostages is to be protected. Moreover, rescuers are frequently in plain view as they initiate their rescue of a hijacked plane.

The purpose of the current study is to investigate the determinants of logistical and negotiation success from the terrorists' viewpoint for hostage missions during the 1978-2005 period. This time period is chosen owing to the availability of a new data set on transnational terrorism that includes some key negotiation and other pertinent variables, not coded in other data sets – e.g., the outcome of negotiations. Terrorist abduction success hinges on the terrorist resources and the vulnerability of the intended hostages. In contrast, terrorist negotiation success depends on bargaining considerations – the relative disagreement values and the relative bargaining strengths of the terrorists and the government. The types of demands may also play a role with money being important in kidnappings and multiple demands being essential in nonkidnappings. Our logit estimations support our theoretical prediction that the determinants of success differ when abducting hostages and when negotiating concessions. This difference is not only in terms of the *set of independent variables*, but also in terms of the coefficients' magnitude of overlapping variables. For negotiation success, the estimations show that some coefficients of key factors differ between nonkidnapping and kidnapping missions. For example, money demand is a significant positive determinant of negotiation success in kidnappings but not in nonkidnappings.

There are notable methodological differences between the current study and an earlier study on this topic by Sandler and Scott (1987). First, the sample periods differ. Second, our study presents a formal theory of both stages of hostage taking. Third, the current study better distinguishes between variables at the two stages of a hostage event by not including all of the abduction-stage variables in the negotiation stage. Fourth, our study separately investigates the determinants of negotiation success for hostage events at known and unknown locations.

Theory and Hypotheses

A hostage-taking terrorist event involves at least three distinct stages. In the first stage, the terrorists must plan and assign resources to the incident. After the planning stage, the incident is executed. If the execution is logistically successful (i.e., the terrorists complete the mission and capture one or more hostages), then the third stage consists of bargaining between the terrorists and the government. The terrorists' likelihood of success at the negotiation stage is conditional on their success at the execution stage. For simplicity, we combine the planning and execution stages so that hostage taking is characterized as involving two stages: logistical and negotiation.

Logistical Stage

We adapt a model of terrorist resource allocation by Berrebi & Lakdawalla (2007) to investigate the logistical stage when hostages are abducted. This model allows for *self-protection* by the terrorists, since they allocate resources, r, to increase their logistical success probability, π (Ehrlich & Becker, 1972). Let N represent the number of alternative hostage targets.[2] The probability of terrorist logistical success for the i^{th} target equals:

$$\pi^i = \pi^i\left(r_i, v_i\right), \tag{1}$$

where r_i denotes terrorist resources (e.g., size of attack force and weaponry) devoted to capturing

this target and v_i is the vulnerability of the i^{th} target. As target vulnerability rises, so does the likelihood of logistical success. Thus, actions by the authorities to put metal detectors in airports, guards at buildings, or to protect officials reduce the associated vulnerability, thereby decreasing the likelihood of logistical success at potential hostage targets. Logistical success probability rises with r_i at a diminishing rate and increases with v_i at an increasing rate, so that $\pi_r^i > 0$, $\pi_{rr}^i < 0$, $\pi_v^i > 0$, and $\pi_{vv}^i > 0$. Moreover, the marginal gain in logistical success from self-protection, π_r^i, increases as vulnerability increases, so that $\pi_{rv}^i > 0$.

The terrorists are viewed as allocating their total resources, *R*, over the *N* potential hostage opportunities, where $\bar{r} = \{r_i\}_{i=1}^N$, to maximize their expected gain. Thus, terrorists address the following problem at the logistical stage:

$$\max_{\bar{r}} \left[\sum_{i=1}^{N} \pi^i (r_i, v_i) P_i \right]$$

$$\text{subject to: } \sum_{i=1}^{N} r_i = R, \tag{2}$$

where P_i is the payoff from capturing hostage opportunity *i*. The associated first-order conditions (FOCs) are:

$$\pi_r^i (r_i, v_i) P_i = \lambda, \text{ for } i = 1, \ldots, N, \tag{3}$$

for an interior solution,[3] where λ is the Lagrangian multiplier attached to the budget constraint. Thus, by equation (3), terrorists spread their resources among potential targets to equate their marginal expected payoffs. Targets with a low marginal likelihood of logistical success may still be pursued if P_i is sufficiently large. Terrorists can increase the logistical success probability by choosing the appropriate size for the attack force, the proper mix of operatives, the number of hostages, and engaging in kidnappings, while the authorities can limit success through efforts to

harden targets (e.g., protection for officials and metal detectors at airports and embassies). Private individuals can limit their vulnerability, and hence terrorist logistical success, through precautions or protection. By differentiating equation (3), we can show that terrorists will augment resources to the i^{th} hostage target as its payoffs or vulnerability increases.

Based on this self-protection representation of logistical success, we make some theoretical predictions about how actions of the terrorists and the authorities influence the likelihood of logistical success. The size of the terrorist attack force is anticipated to increase the probability of logistical success as operatives secure the hostage(s) and keep would-be intervenors at bay. A larger attack force provides more operatives to overcome defenses. The number of terrorist nationalities in the attack force may limit the group's interoperability owing to goal, language, and cultural differences. Multiple nationalities may also imply that the terrorists have had less time to train as a team, thereby limiting the effectiveness of the terrorist resources in achieving a logistical success. The hijacking of Air France flight 139 on 27 June 1976 was perpetrated by German, Palestinian, and Japanese terrorists, some of whom met at the Athens airport just prior to the incident (Mickolus, 1980: 621-625). This famous incident ended with the Israeli commandos storming the Entebbe airport in Uganda to free the hostages. The presence of a high-powered weapon (rifle, shotgun, machine gun, explosives, or incendiaries) may or may not assist terrorist in achieving logistical success in hostage missions. Such weapons are helpful in kidnappings and the takeover of unprotected building or means of transport; these weapons are more difficult to get past metal detectors and screening devices at airports and other secure venues (e.g., embassies). Even screening devices may be circumvented if airport employees plant the weapons on the plane or the weapons are sufficiently disguised. We include an interactive variable (Atkf_highpw) involving the size of the terrorist attack force (Atkf) and the presence of high-powered weapons (highpw). These variables are interacted

because an increase in the attack force may be more conducive to logistical success when combined with the means to keep would-be intervenors at bay. This interactive variable captures the complementarity of these resources.

Thus, we have hypothesis 1 (*H1*):

H1: Terrorist logistical success increases with terrorist resources (i.e., the size of the attack force, group interoperability, high-powered weapons, and the attack force conditioned on high-powered weapons).

We next turn to the influences of hostage vulnerability on terrorist logistical prospects. The likelihood of logistical success is predicted to be higher for kidnappings relative to other hostage missions, since the terrorists are able to choose the safest venue to nab the hostage(s), which increases target vulnerability. A larger number of intended hostages may augment the vulnerability of a hostage target and, thus, increase the terrorist logistical success prospects. When the terrorists attempt to abduct a large number of hostages, logistical success (i.e., the capture of some hostages) may be achieved even though some intended hostages escape. In the Munich Olympics abduction of the Israeli athletes, six of the intended hostages escaped at the onset (Mickolus, 1980: 338); in the takeover of the US embassy in Tehran, six Americans escaped capture during the initial attack (Mickolus, 1980: 883). Moreover, the authorities may be more inhibited from using lethal force when many hostages are at risk, thereby making such targets more vulnerable at the abduction stage. Security can be more easily provided by the authorities or bodyguards to one or a few potential hostages than to a group of intended hostages – e.g., tourists at a resort or the occupants of a building.

Target fortification limits vulnerability and makes initial seizure more difficult. Protected persons (i.e., diplomats, military officials, and government personnel) are apt to have bodyguards, armor-plated cars, and other protections that make them less vulnerable. Guarded

venues are also less vulnerable and may result in terrorists sustaining casualties at the outset of the abduction. Because we do not have a direct measure of venue fortification, we use terrorist casualties as a proxy for this fortification. This poses a problem because we do not know when terrorists sustain casualties in an incident. If casualties occur often enough at the abduction stage, then terrorist casualties may be a significant negative determinant of logistical success.

In summary, we have the following hypothesis:

H2: Terrorist logistical success increases with target vulnerability (i.e., large hostage targets and kidnappings), or decreases with target fortification (i.e., protected persons and guarded venues).

Negotiation Success

The possibility of a terrorist negotiation success only becomes relevant once the terrorists have secured one or more hostages. We view the terrorists as being successful in their negotiations if they get away with *some* of their demands. Since terrorists may overstate their demands during the negotiations, basing negotiation success on terrorists receiving all of their demands is much too stringent. Terrorists may negotiate over several dimensions (demands) – e.g., prisoners released, ransom, issuing political statement, and safe passage. Some of the factors that determine negotiation success are likely to be different from those that influence logistical success. For example, the size of the attack force or the terrorist nationalities is not relevant once hostages are secured. The same is true of high-powered weapons. Other variables – nonterrorist casualties, demands, and bargaining strategies – are only germane to the negotiation stage. Those variables that overlap between stages may have different impacts on the two probabilities.

For the negotiation stage, our hypotheses derive from the Nash bargaining model where two parties – e.g., the government (G) and the terrorists (T) – negotiate over an amount M. If the negotiations fail, then each party walks away with their disagreement value d_G and d_T,

respectively (Dixit & Skeath, 2004; Gardner, 1995). The bargaining gains u_G and u_T must not exceed *M*. In this standard theory, the players

$$\max_{u_T, u_G} \left[(u_T - d_T)^h (u_G - d_G)^k \right] \tag{4}$$

subject to: $u_G + u_T \leq M$. In equation (4), *h* represents the terrorists' bargaining strength, while *k* denotes the government's bargaining strength. Both the disagreement points *and* the relative bargaining strength in a hostage incident depend, in part, on the outcome of stage 1. The bargaining literature shows that the more patient adversary has the higher relative bargaining strength. By substituting the constraint as an equality into equation (4) and optimizing, we get the negotiation solution:

$$\frac{u_G - d_G}{u_T - d_T} = \frac{k}{h}. \tag{5}$$

With this solution, it can be shown that, as d_T rises relative to d_G, the terrorist negotiation success increases. Moreover, the terrorists' negotiation prospects increase as h/k rises (Dixit & Skeath, 2004: 575-576).

A large hostage seizure lowers d_G because the government becomes responsible for more potential lives lost if an agreement is not struck. These lost lives can have political consequences if citizens view the governments not doing enough to free the hostages. The Russian government was severely criticized for the large loss of life in the Moscow theater siege (October 2002) and the Beslan school incident when negotiations with the Chechen rebels failed. Large potential citizen casualties give the terrorists greater leverage or bargaining strength. A large hostage pool means that some hostages can be used to gain food and other comforts during negotiations. Thus, hostage numbers should bolster negotiation prospects for the terrorists. Terrorist casualties, which include wounded comrades, reduce h/k as the terrorists become more

impatient to end the incident to relieve their fellow terrorists' suffering. These terrorist casualties can also reduce d_T relative to d_G, because terrorist human resources have been impaired. Both factors reduce the negotiation success of the terrorists, especially in nonkidnappings where terrorist casualties are more apparent to the government and the public. Nonterrorist casualties, which include hostages, lowers d_T relative to d_G as the terrorists hold fewer lives in the balance so that negotiation failure results in less additional deaths – thus, d_G rises. This negative influence on negotiation success can be more marked in nonkidnappings where the fate of hostages, bystanders, and the police are easier to spot than in kidnappings during negotiations. The above discussion implies:

H3: Terrorist negotiation success increases with the number of captured hostages as the government's disagreement value and relative bargaining strength fall.

H4: Terrorist negotiation success decreases with casualties (terrorists or nonterrorists) as the terrorists' relative bargaining strength and/or relative disagreement value are reduced. This decrease is anticipated to be more important for nonkidnappings.

If the bargaining model is developed further, Dixit and Skeath (2004: 590-592) show that bargaining over two or more demands promotes a negotiation success by increasing the size of the negotiation set. In a skyjacking, a government may be willing to allow for the reading of a propaganda statement and safe passage, but not to ransom payments that will lose public respect. By bargaining over multiple dimensions, a deal may be struck, much as in selling a house where other dimensions may include closing dates and appliances.

The length of the hostage incident is apt to affect the success of negotiations. As a hostage incident drags on, pressure mounts on the government for nonkidnappings or on the victim families or corporations for kidnappings to make concessions. Time works in the favor of

terrorists in securing some of their demands as the relative bargaining strength of terrorists, h/k, increases as public pressure augments government's impatience.

The above discussion results in:

H5: Terrorist negotiation success increases with two or more demands as the bargaining set is expanded, especially in nonkidnappings.

H6: Terrorist negotiation success increases with the length of the incident owing to an increase in the terrorists' relative bargaining strength.

We have two additional potential determinants of negotiation success that do not follow from the bargaining model. In particular, we are interested in whether the types of demand influence negotiation success. For our sample, money is demanded in only 9.82% of the nonkidnappings, while it is demanded in 47.16% of the kidnappings. Given these observations, we will also test the influence of money demands on negotiation success in nonkidnappings and kidnappings. Our expectation is that demanding money fosters favorable negotiation outcomes in kidnappings. Finally, we are interested in ascertaining whether governments, which often pledge not to concede to terrorists, are less likely to concede when protected persons have been abducted, especially in nonkidnappings where government's inconsistent behavior is in full view.

Method

Statistical Analysis

We estimate two sets of quantal-choice statistical models to identify the determinants of terrorist logistical success for hostage missions and terrorist negotiation success for nonkidnappings and kidnappings, respectively. In each set of models, the dependent variable is a binary choice

variable $y_i = 1$ if the event happens [i.e., the terrorists achieve logistical (negotiation) success] and $y_i = 0$ if the event fails for observation *i*. The probability (Pr) of success (i.e., the mission succeeds) is written as:

$$\Pr\left(y_i=1\middle|x_i\right)=E\left(y_i\middle|x_i\right)=F\left(x_i,\beta\right), \tag{6}$$

where x_i is a $k\times 1$ vector of explanatory variables, β is a $k\times 1$ vector of parameters, $E(\bullet)$ is the expectation operator, and $F(\bullet)$ denotes a cumulative distribution function (CDF). The vector of parameters indicates the influence of the explanatory variables on the response variable.

In particular, we estimate the logit model,

$$\Pr\left(y_i=1\middle|x_i\right)=F\left(x_i,\beta\right)=\frac{e^{x_i'\beta}}{1+e^{x_i'b}}\equiv\Psi\left(x_i'\beta\right), \tag{7}$$

where Ψ denotes the logistic CDF. An alternative would be to apply the probit model. The logit and probit distributions are similar except that the logit has heavier tails. Typically, the two models give similar results and there are no compelling theoretical grounds for favoring one model over another (Amemiya, 1981; Green, 2003). We estimate both models using maximum likelihood methods and report the logit estimates in the text.[4]

Following standard procedures, we also compute the marginal probability effects of the variables. A small complication arises owing to the presence of an interactive variable (Atkf_highpw) in our logistical success estimations. In the logit or any nonlinear model, the magnitude of the interaction effect is not equal to the standard marginal effect of the interaction term (Ai & Norton, 2003; Norton, Wang & Ai, 2004). In fact, the sign of the interaction effect may differ from the sign of the coefficient of the interaction term, and the interaction effect may be nonzero even when the interaction term's parameter is zero. We use the statistical program developed by Norton, Wang & Ai (2004) to compute the correct marginal value of the

interaction effect and its standard error.

Data

We are interested in transnational terrorism involving hostage-taking missions.[5] Transnational terrorism occurs when an incident in one country involves victims, perpetrators, targets, governments, or institutions of another country. The abduction of aid workers from other countries in Baghdad is a transnational terrorist act, as is the skyjackings of a plane with passengers from more than one country if abductors make political demands. The diversion of a domestic flight to another country for political reasons is also a transnational terrorist incident with hostages.

Our data on transnational terrorist incidents involving hostage-taking missions are drawn from *International Terrorism: Attributes of Terrorist Events* (ITERATE) dataset that records the incident date, location type, number of people killed, number of people wounded, and size of the attack force (Mickolus et al., 2006). Some other relevant variables for our study include the number of terrorist nationalities in the attack force, the number of hostages, the number of terrorists wounded or killed, the number of nonterrorists wounded or killed, the presence of a high-powered weapon, and the presence of a protected person. ITERATE relies on the world's news print and electronic media for its information with a large reliance on the Foreign Broadcast Information Service (FBIS) *Daily Reports*, which surveys a couple hundred of the world's newspapers and related sources. ITERATE excludes terrorist incidents associated with declared wars or major interventions as well as guerilla attacks on military targets of an occupying force. Since hostage events are newsworthy even when they fail, we do not see exclusion of failed events to pose a serious problem. Events not making it into the press either did not materialize sufficiently to come to the attention of the authorities or else were squashed

before any initiation. In the latter case, these actions are often reported to the press to show the public that the authorities are vigilant and effective. ITERATE includes numerous hostage missions stopped in the initiation stage.

Only the ITERATE Common file had been updated yearly since 1991. Recently, its Hostage file was updated for the 1978-2005 period and contains observations on over 1400 terrorist hostage incidents. This file is merged with the Common file and includes such variables as the length of the incident, the demands requested (e.g., prisoners to be released and ransoms), and the outcome of negotiations.[6] Because demands were recorded, we can ascertain whether two or more demands were made by the terrorists. Variable 42 from the Common file indicates terrorist logistical success. If this variable is coded as a 6 (i.e., apparently completed mission as planned), then we brand the hostage event as a logistical success with a dummy value of 1. Hostage events are a logistical failure (value of 0) if aborted, stopped by the authorities, or unsuccessful due to error. If the outcome was unknown, we dropped the incident. Logistical success in hostage incidents means securing at least one hostage. Variable 21 of the hostage file indicates terrorist negotiation success when recorded as 1 (received some of their demands) or 2 (received all of their demands) in ITERATE. Negotiation failures include events where none of the demands were received or no demands were made. In the latter case, no demands were made when the incident was ended forcibly by the authorities prior to demands or the adversaries never opened up a communication channel. We viewed both circumstances as a negotiation failure. With the exception of 9/11, there were no suicide mission hostage incidents where demands were never intended. We discarded incidents from the sample when demands were unknown.

Results

Logistical Success

[Table I near here]

Table I presents summary statistics for the logistical success runs. For sample hostage incidents, 61.5% of them were logistical successes, while the remaining incidents were unsuccessful. The attack force on average contained 8.09 members and included just over one nationality. We use the square root (sqrt) of the number of hostages, since going from one to two hostages should have a bigger marginal impact on logistical success than going from, say, 14 to 15 hostages. The last four variables listed in Table I are dummy variables that equal 1 when the stated characteristic is present and 0 otherwise. Protected persons are present in 38.4% of sample abductions. Just over 40% of sample hostage incidents were kidnappings. Terrorists were wounded or killed in 11.6% of sample incidents. Finally, high-powered weapons were present in 60% of hostage incidents.

Table II indicates the logit results for three alternative models. Model 1 is our primary model, which is based on the theoretically derived hypotheses. The other two models, as we discuss below, are used to analyze the sensitivity of our variables to the exclusion or inclusion of another regressor.

[Table II near here]

In Table II, baseline Model 1 confirms many of our priors: an increase in terrorist nationalities is a negative determinant of logistical success, while the attack force-weapon interaction term is a positive determinant of logistical success.[7] Both variables are statistically significant, thereby lending some support for *H1* on the impact of terrorist resources. The number of hostages and kidnappings are significant positive determinants of logistical success, whereas terrorist casualties are a negative determinant of logistical success, thus supporting *H2* on the effect of target vulnerability. However, our results do not show that the size of the attack

force, high-powered weapons, or protected persons are significant influences on logistical success. This could be due to a relatively strong correlation of these variables with other independent variables. For example, the correlation between protected persons and the square root of hostages is around .4; the correlation between attack force and high-powered weapon is .17; and the correlation between attack force and the interaction term is .85. In addition, we examine the presence of multicollinearity using the Condition Index, whose value is around 10, suggesting a moderate multicollinearity problem. To investigate this issue, we sequentially dropped hostages (Model 2), and the high-powered weapon and interaction terms (Model 3) from the baseline model. When the square root of hostages is excluded, the presence of protected persons becomes statistically significant at the .10 level, with the anticipated negative sign. When, however, the high-powered weapon and interaction terms are left out, the attack force variable becomes positive and statistically significant at the .05 level. These results should be taken with caution, keeping in mind that excluding relevant variables leads to biased estimates. The sign and significance of other independent variables are robust across all three models.

The sample size changes for the three models, since we have to drop observations with missing values as variables are added. We perform Likelihood Ratio (LR) test of the overall significance of each logit model. The LR chi-squared statistics in Table II are significant at the .01 level for all three models.

[Table III near here]

Next, we turn to the significant marginal influences of these variables, evaluated at their means, on the probability of logistical success, given in Table III. Attack force is not significant for Model 1 and Model 2. For Model 3, an additional terrorist in the attack force only adds 0.7% to the likelihood of logistical success. This near-zero value suggests that, on average, terrorists choose an optimal sized force from their perspective. Each extra terrorist nationality in the

attack force reduces logistical success from between 18 to 22%. The interactive effect indicates that, in going from nine (the approximate mean for the attack force) to ten operatives, combined with high-powered weapons, the likelihood of logistical success increases by between 0.8 to 1.6%. In terms of the square root of hostages, a marginal increase in hostages adds just under 2% to the logistical success probability. The two most important marginal influences on logistical success are kidnappings and terrorist casualties. Kidnappings are, on average, between 37.4 to 46.7% more successful at the execution stage compared to other hostage missions. Thus, terrorists understandably favor kidnappings over other hostage operations. Although we do not know at what point terrorists sustain injuries or fatalities, the results in Table III suggest that it is on occasion at the incident onset, given the large significant negative impact (between 49 to 55% reduction) of these casualties on logistical success. Finally, targeting a protected person as a hostage reduces logistical success by 15.4% in Model 2.

Negotiation Success

The determinants of negotiation success may or may not overlap with those of logistical success. For negotiation success, we present separate logit estimates for nonkidnappings and kidnappings because our hypotheses indicate that the magnitudes of the associated coefficients differ. In addition, we perform an empirical test on pooling the nonkidnappings and kidnappings samples together for negotiation success. The Likelihood Ratio test indicates that the coefficient estimates of the nonkidnappings jointly differ from those of kidnappings at .01 level of significance. Making demands over two or more dimensions is a negotiation variable of interest to both nonkidnappings and kidnappings, but is of more interest to nonkidnappings where it was used in 70.5% of sample incidents (see Table IV). Although their influence is apt to differ in the two stages of a hostage incident, the number of hostages, protected persons, and terrorist

casualties are likely influences on the relevant probabilities of success. Table IV indicates the number of observations, the mean, and standard deviation of the variables used for the investigation of negotiation success in nonkidnappings and kidnappings. The number of observations is smaller than in Table I because an incident must first be logistically successful if negotiations become relevant.[8]

[Table IV near here]

For nonkidnappings, we include the incident length in hours; for kidnappings, we include the incident length in days. This difference reflects the fact that kidnappings last longer owing to the undisclosed location. A footnote to Table IV indicates that, when three lengthy nonkidnappings are removed, the mean length is just over two days. These incidents are, however, included in our estimates. We use a square-root transformation on days to allow any positive influence of length of kidnappings to have a diminishing effect on negotiation success. For sample incidents, negotiation success occurs in 60.2% of the logistically successful nonkidnappings and in 36.5% of the kidnappings. Terrorists are almost twice as likely to be hurt in nonkidnappings as in kidnappings, while nonterrorists are only slightly more likely on average to be hurt in nonkidnappings than in kidnappings. These casualty figures are sobering and indicate that, since 1978, hostage taking results in bloodshed more than a quarter of the time.

[Table V near here]

Table V presents logit estimates of negotiation success in nonkidnappings for three different sets of independent variables. Based on Likelihood Ratio tests, all three models are significant at the .01 level. Baseline Model 1, which conforms to our theoretical development, shows that the square root of the number of hostages is a positive and significant determinant of the terrorists' ability to consummate a deal. More lives hanging in the balance augment the government's willingness to negotiate a solution, consistent with *H3*. Casualties of any kind

work against a negotiated outcome, which partly supports *H4*. The coefficients for two or more demands and hours are not statistically significant in Model 1, which does not support *H5*. Model 2 includes two additional variables, demand for money and protected persons, discussed in the theory and hypotheses section. According to Table V, incident length is a positive and significant variable in Model 2, lending support to *H6.* Demanding money is a strong negative determinant of striking a deal in nonkidnappings. For sensitivity purposes, Model 3 excludes the number of hostages, which shows relatively high correlation with protected persons (–0.29). The two or more demands variable is now statistically highly significant with a positive sign, as anticipated by *H5*. The presence of protected persons also becomes statistically significant, indicating that such hostages in nonkidnapping incidents work against achieving a negotiation success. This underscores that governments are reluctant to strike deals for the release of officials when the public is watching. Estimates of hours and terrorists casualties, which are significant at the .10 level in Model 2, are now insignificant. The remaining variables are robust across all three models.

[Table VI near here]

Table VI presents the marginal influences of the independent variables on the negotiation success probability in nonkidnappings for the alternative models. The hostages (sqrt) variable increases the negotiated success probability at the margin between 4 to 5%. Terrorist *or* nonterrorist casualties reduce negotiation success at the margin from between 28.8 to 34.9% or from 26.1 to 31.1%, respectively. One message is clear: bloodshed does not bolster a negotiated outcome. For Model 3, the presence of two or more demands increases successful negotiations by around 32%. Demand for money decreases negotiation success in nonkidnappings between 34.7 to 49.5%. Unlike kidnappings (see Table VII and VIII), demanding money does not help negotiations in nonkidnappings. In hours, the length of the incident had a very small positive

marginal impact of 0.06%, indicating that terrorists held onto hostages about the right amount of time from their vantage in nonkidnappings.

[Table VII near here]

Finally, we turn to the determinants of negotiation success in kidnappings where the hostages' and hostage takers' location is typically unknown. Two alternative models are displayed. Model 1 is based on our theoretically derived hypotheses, while Model 2 includes variables for demand for money and protected persons. Based on Likelihood Ratio tests, both models are significant at the .01 level. The results are generally quite robust to the two sets of variables. The square root of hostages is a positive and significant variable in both models, thereby supporting *H3*. The presence of terrorist casualties is a negative influence, and is significant in Model 2, which supports *H4*. The presence of nonterrorist (i.e., hostages, authorities, or bystanders) casualties is negative and significant to varying degrees in both models in line with *H4*. Issuing two or more demands is not a significant variable. Demanding money is a positive and significant determinant, which helps to distinguish kidnappings from nonkidnappings. Kidnapping protected persons is not advantageous and is not significant. The length of the incident is a positive and significant variable for both models, consistent with *H6*.

[Table VIII near here]

In Table VIII, the marginal influences on the negotiation success likelihood are given. A slight increase in the number of hostages around its mean augments negotiation success between 9 to 10%. As in the case of nonkidnappings, bloodshed greatly hurts achieving a negotiation success. In kidnappings, terrorist casualties are more detrimental than nonterrorist casualties on a negotiated outcome, presumably because ransom may have been paid, only later to discover that the hostage(s) had been murdered. The detrimental impact of casualties is smaller in kidnappings than in nonkidnappings; however a statistical test suggests that the difference is not

statistically significant. This result does not support the last part of *H4*. The presence of protected persons is not as much of a negative influence in kidnappings compared to nonkidnappings, where the authorities' actions – willingness to concede for an official – are in full view. The most interesting contrast between the two types of hostage events concerns the nature of demands. In nonkidnappings, asking for two or more demands augments terrorist negotiation success by 31.8% (Model 3); in kidnappings, asking for two or more demands is never significant. This finding is partly consistent with *H5*. Demanding money decreases negotiation success in nonkidnappings between 34.7 to 49.5%, while demanding money increases negotiation success in kidnappings by around 25%. Finally, the length of kidnappings works in the favor of terrorists receiving some of their demands as pressures build on the friends and families of hostages.

Conclusions and Policy Recommendations

Utilizing a new dataset on transnational hostage-taking incident for the 1978-2005 period, this article distinguishes the determinants of terrorist logistical success from those of terrorist negotiation success. Terrorist resources and target vulnerabilities are the essential determinants of success at the execution stage, while influences (i.e., hostage numbers, casualties, and incident length) on the adversaries' disagreement values and relative bargaining strengths are the essential determinants of success at the negotiation stage. The nature of terrorist demands and the presence of protected persons also affect negotiation outcomes. Making two or more demands favors nonkidnapping negotiations, while money demands favors kidnapping negotiations. The capture of protected persons is a significant negative influence on negotiations in nonkidnappings when government actions to concede are more easily scrutinized by the public. Though their channels of influence differ, some determinants overlap between the two stages.

An important innovation is to distinguish between kidnappings and nonkidnappings at the negotiation stage. A Likelihood Ratio test supports this innovation because the coefficients of the independent variables jointly differ for negotiation outcomes between hostage events in known and unknown locations.

A number of policy insights may be gleaned from the empirical results. First, negotiation strategies must be tailored to the two classes of hostage events since the impacts of negotiation variables are different. The results here can inform negotiators not only on strategy, but also on the likely outcome of negotiations given the actions of the terrorist. This insight did not follow from Sandler and Scott (1987), which did not separately analyze kidnappings and nonkidnappings at the negotiation stage. If, for example, negotiations are likely to fail, then the authorities can focus on finding the best time to launch a rescue mission, especially for nonkidnappings. Second, when choosing operational parameters (e.g., the size of the attack force or number of hostages) at the execution stage, terrorists choose near-optimal amounts where the marginal impact is almost zero. This implies that terrorists will react to government policies in a predictable fashion to undermine such actions. Thus, government efforts to harden one type of potential hostage target will induce the terrorists to abduct a less guarded individual. Such policy-induced terrorist responses must be anticipated. Third, in nonkidnapping hostage events, governments appear resistant, as pledged, not to concede to terrorists when protected persons are captured. Fewer adherences to such pledges are associated with kidnappings, where families and corporations may be extorted. With time, this difference may result in terrorists engaging in a larger proportion of kidnappings and the need for governments to adjust protective measures accordingly. Fourth, even though kidnappings greatly foster logistical success, authorities must remain vigilant to nonkidnappings, because the large potential payoffs may warrant the greater risks from the terrorists' viewpoint. Fifth, the ability of governments to

inflict casualties on the terrorists significantly reduces their success at both stages of hostage incidents. In Sandler and Scott (1987), terrorist casualties were not distinguished from other casualties. Sixth, longer incidents are conducive to terrorists receiving some of their demands; hence, waiting out the terrorists has a downside from the authority's viewpoint. This insight is not associated with Sandler and Scott (1987). In the case of kidnappings, the authorities have less control in ending the incidents.

Our methods can be applied to other kinds of terrorist events to ascertain the determinants of success. In, say, the case of bombings, a single (execution) stage is relevant. If datasets become available with government policy variables, then our analysis can evaluate the effectiveness of policy choices in inducing logistical failure.

Footnotes

* The authors gratefully acknowledge the helpful comments of three anonymous referees and Scott Gates on two earlier drafts. Sole responsibility for any remaining shortcomings rests with the authors. Stata 10 was used to generate the statistical results. The data used in this article are available at http://www.prio.no/jpr/datasets. Please direct correspondence to tsandler@utdallas.edu.

1. The descriptions of these hostage events come from Enders & Sandler (2006) and Mickolus, Sandler & Murdock (1989). Also see Hoffman (2006).

2. *N* could also represent the number of terrorist targets so that resources are allocated over hostage-taking and other terrorist operations (e.g., assassinations and bombings). In the text, we ignore these other events, given our focus on hostage taking.

3. If corner solutions are allowed, then this equality would hold for the set of hostage targets where $r_i > 0$. Some targets would not be pursued because the associated marginal expected benefits – the left-hand side of (3) – are less than the shadow price.

4. The probit results are very close to those of the logit model and can be obtained from the authors upon request.

5. If we had domestic hostage data, we would drop terrorist nationalities as a logistical-stage independent variable. The other independent variables remain the same at the two stages; however, protected persons would include domestic officials and military personnel but not foreign diplomats.

6. We use ITERATE hostage data since no other dataset records negotiation variables needed for this study.

7. We also interacted high-powered weapons with kidnappings, but the coefficient was not significant.

8. The negotiation success sample includes only logistically successful terrorist events, while we are interested in making statements regarding the determinants of negotiation success for all hostage events. If the characteristics of those terrorists that succeeded logistically are different from those who failed, and if some factors of logistical success are also relevant to the negotiation success process, then a selection-bias problem arises, unless the relationship between logistical and negotiation success is through observable controlled characteristics. To investigate this concern, we estimated the Probit model with sample selection and the two-step Heckman selection model for both kidnappings and nonkidnappings. We found no statistical evidence for selection bias for these estimates, based on the Likelihood Ratio test for the Probit estimates and the inverse Mill's ratio for the Heckman model.

References

Ai, Chunrong & Edward C. Norton, 2003. 'Interaction Terms in Logit and Probit Models', *Economics Letters* 80(1): 123–129.

Amemiya, Takeshi, 1981. 'Qualitative Response Models: A Survey', *Journal of Economic Literature* 19(4): 1483–1536.

Berrebi, Claude & Darius Lakdawalla, 2007. 'How Does Terrorism Risk Vary Across Space and Time? An Analysis Based on the Israeli', *Defense and Peace Economics* 18(2): 113–131.

Corsi, Jerome R., 1981. 'Terrorism as a Desperate Game: Fear, Bargaining and Communication in the Terrorist Event', *Journal of Conflict Resolution* 25(1): 47–85.

Dixit, Avinash & Susan Skeath, 2004. *Games of Strategy*, 2nd Ed. New York: W. W. Norton & Co.

Ehrlich, Isaac & Gary S. Becker, 1972. 'Market Insurance, Self-Insurance and Self-Protection', *Journal of Political Economy* 80(4): 623–648.

Elster, Jon, 2004. 'Kidnappings in Civil Wars', paper presented at Workshop on "Techniques of Violence", Oslo, 20-21 August.

Enders, Walter & Todd Sandler, 2006. *The Political Economy of Terrorism*. Cambridge, UK: Cambridge University Press.

Gardner, Roy, 1995. *Games for Business and Economics*. New York: John Wiley & Sons, Inc.

Greene, William H., 2003. *Econometric Analysis*, 5th Ed. Upper Saddle River, NJ: Prentice-Hall.

Hoffman, Bruce, 2006. *Inside Terrorism*, Revised Ed. New York: Columbia University Press.

Mickolus, Edward F., 1980. *Transnational Terrorism: A Chronology of Events, 1968-1979.* Westport, CT: Greenwood Press.

Mickolus, Edward F.; Todd Sandler & Jean M. Murdock, 1989. *International Terrorism in the*

1980s: A Chronology of Events, 2 vols. Ames, IA: Iowa State University Press.

Mickolus, Edward F.; Todd Sandler; Jean M. Murdock & Peter Flemming, 2006. *International Terrorism: Attributes of Terrorist Events, 1968-2005 (ITERATE 5)*. Dunn Loring, VA: Vinyard Software.

Norton, Edward; Hua Wang & Chunrong Ai, 2004. 'Computing Interaction Effects and Standard Errors in Logit and Probit Models', *The Stata Journal* 4(2): 154–167.

Sandler, Todd & John Scott, 1987. 'Terrorist Success in Hostage-Taking Incidents: An Empirical Study', *Journal of Conflict Resolution* 31(1): 35–53.

Wilson, Margaret A., 2000. 'Toward a Model of Terrorist Behavior in Hostage-Taking Incidents', *Journal of Conflict Resolution* 44(4): 403–424.

Table I. Summary Statistics for Logistical Success

Variables	Observations (*n*)	Mean	Std. Deviation
Logistic success[a]	413	0.615	0.487
Attack force	413	8.092	14.451
Terrorist nationalities	413	1.097	0.430
Hostages (sqrt)[b]	413	4.939	4.912
Kidnapping[a]	413	0.402	0.491
Protected persons[a]	409	0.384	0.487
Terrorists wounded or killed[a]	413	0.116	0.321
High-powered weapon[a]	265	0.600	0.491

[a]Dummy variable equals 1 if the aspect is present and equals 0 otherwise.
[b]Square root (sqrt) of the number of hostages

Table II. Estimates of Logit Models for Logistical Success, 1978-2005 (standard errors in parentheses**)**

Variables	Model 1	Model 2	Model 3
Constant	0.552	0.864**	0.373
	(0.499)	(0.439)	(0.414)
Attack force	–0.003	–0.002	0.028**
	(0.016)	(0.016)	(0.011)
Terrorist nationalities	–0.894**	–0.736*	–0.806***
	(0.383)	(0.385)	(0.309)
High-powered Weapon[a]	–0.515	–0.093	
	(0.346)	(0.304)	
Atkf_highpw[b]	0.084**	0.041*	
	(0.034)	(0.023)	
Hostages (sqrt)[c]	0.077**		0.075**
	(0.035)		(0.030)
Kidnapping[a]	2.288***	1.920***	1.776***
	(0.440)	(0.391)	(0.306)
Protected persons[a]	–0.427	–0.621*	0.148
	(0.393)	(0.339)	(0.277)
Terrorists wounded or killed[a]	–2.432***	–2.305***	–2.600***
	(0.528)	(0.473)	(0.445)
Sample size	263	298	409
LR chi-squared	70.89	70.28	97.57
Degrees of freedom	8	7	6

[a]Dummy variable equals 1 if the aspect is present and equals 0 otherwise.
[b]Interactive variable of attack force and high-powered weapon
[c]Square root (sqrt) of the number of hostages
Significance levels: *** is .01, ** is .05, and * is .10.

Table III. Marginal Logistical Success Probabilities for Logit Estimates, 1978-2005 (standard errors in parentheses)

Variables	Model 1	Model 2	Model 3
Attack force	–0.001	–0.0004	0.007**
	(0.004)	(0.004)	(0.003)
Terrorist nationalities	–0.219**	–0.183*	–0.187***
	(0.094)	(0.096)	(0.072)
High-powered weapon[a]	–0.125	–0.023	
	(0.082)	(0.075)	
Atkf_highpw	0.016**	0.008*	
	(0.007)	(0.005)	
Hostages (sqrt)[a]	0.019**		0.017**
	(0.009)		(0.007)
Kidnapping[a]	0.467***	0.413***	0.374***
	(0.067)	(0.066)	(0.055)
Protected persons[a]	–0.105	–0.154*	0.034
	(0.096)	(0.083)	(0.064)
Terrorists wounded or killed[a]	–0.513***	–0.486***	–0.553***
	(0.074)	(0.068)	(0.061)
Predicted probability	0.572	0.546	0.635

[a]Marginal effect is for a discrete change of the dummy variable from 0 to 1.
Significance levels: *** is .01, ** is .05, and * is .10.

Table IV. Summary Statistics for Negotiated Success

Variables	Observations (*n*)	Mean	Std. Deviation
	Nonkidnappings		
Negotiated success[a]	166	0.602	0.491
Hostages (sqrt)[b]	166	8.815	5.303
Terrorists wounded or killed[a]	166	0.163	0.370
Nonterrorists wounded or killed[a]	166	0.319	0.468
Two or more demands[a]	166	0.705	0.458
Hours[c]	119	127.050	486.748
Demand for money[a]	163	0.098	0.298
Protected persons[a]	166	0.265	0.443
	Kidnappings		
Negotiated success[a]	181	0.365	0.483
Hostages (sqrt)[b]	181	1.701	1.055
Terrorists wounded or killed[a]	181	0.088	0.285
Nonterrorists wounded or killed[a]	181	0.260	0.440
Two or more demands[a]	181	0.453	0.499
Days (sqrt)[b]	181	5.625	4.814
Demand for money[a]	176	0.472	0.501
Protected persons[a]	181	0.619	0.487

[a]Dummy variable equals 1 if the aspect is present and equals 0 otherwise.
[b]Square root (sqrt) of the variable
[c]There are three observations that have a large number of hours. These are February 27, 1980, incident 1 (duration 1416 hours); December 17, 1996 incident 2 (duration 3024 hours); and April 12, 1999 incident 1 (duration 4152 hours). Without these observations, the mean of Hours would be 56.27 with standard deviation of 98.77. The December 17, 1996 incident occurred in Peru where Tupac Amaru Revolutionary Movement (MRTA) attacked a birthday party for Japanese Emperor Akihito and seized 700 people. The case on April 12, 1999 happened in Columbia, where the plane was skyjacked by members of National Liberation Army (ELN) and Revolutionary Armed Forces of Colombia (FARC) and the hostages were later transported to a farm. The February 27, 1980 incident involved the seizure of the Dominican Republic embassy by April 19 Movement (M-19) terrorists.

Table V. Estimates of Logit Models for Negotiation Success in Nonkidnappings, 1978-2005 (standard errors in parentheses)

Variables	Model 1	Model 2	Model 3
Constant	–1.186**	–1.333**	0.271
	(0.532)	(0.614)	(0.385)
Hostages (sqrt)[a]	0.183***	0.210***	
	(0.048)	(0.057)	
Terrorists wounded or killed[b]	–1.458**	–1.191*	–0.604
	(0.637)	(0.704)	(0.552)
Nonterrorists wounded or killed[b]	–1.243**	–1.327**	–1.093**
	(0.510)	(0.548)	(0.470)
Two or more demands[b]	0.659	0.864	1.322***
	(0.501)	(0.555)	(0.496)
Hours	0.0016	0.0026*	0.0018
	(0.0012)	(0.0014)	(0.0012)
Demand for money[b]		–2.223***	–1.450**
		(0.782)	(0.613)
Protected persons[b]		–0.087	–0.985**
		(0.565)	(0.462)
Sample size	119	117	127
LR chi-squared	32.41	41.37	25.38
Degrees of freedom	5	7	6

[a]Square root (sqrt) of the number of hostages
[b]Dummy variable equals 1 if the aspect is present and equals 0 otherwise.
Significance levels: *** is .01, ** is .05, and * is .10.

Table VI. Marginal Negotiation Success Probabilities for Logit Estimates of Nonkidnappings, 1978-2005 (standard errors in parentheses)

Variables	Model 1	Model 2	Model 3
Hostages (sqrt)	0.044***	0.049***	
	(0.011)	(0.013)	
Terrorists wounded or killed[a]	–0.349**	–0.288*	–0.147
	(0.139)	(0.165)	(0.136)
Nonterrorists wounded or killed[a]	–0.297**	–0.311**	–0.261**
	(0.116)	(0.122)	(0.109)
Two or more demands[a]	0.161	0.209	0.318***
	(0.123)	(0.134)	(0.113)
Hours	0.0004	0.0006**	0.0004
	(0.0003)	(0.0003)	(0.0003)
Demand for money[a]		–0.495***	–0.347***
		(0.130)	(0.132)
Protected persons[a]		–0.020	–0.238**
		(0.134)	(0.109)
Predicted probability	0.598	0.622	0.608

[a]Marginal effect is for a discrete change of the dummy variable from 0 to 1.
Significance levels: *** is .01, ** is .05, and * is .10.

Table VII. Estimates of Logit Model for Negotiation Success in Kidnappings, 1978-2005 (standard errors in parentheses)

Variables	Model 1	Model 2
Constant	–1.466***	–2.112***
	(0.413)	(0.594)
Hostages (sqrt)[a]	0.413**	0.450**
	(0.162)	(0.192)
Terrorists wounded or killed[b]	–1.369	–2.023*
	(0.856)	(1.138)
Nonterrorists wounded or killed[b]	–0.933**	–0.931*
	(0.451)	(0.517)
Two or more demands[b]	0.068	0.255
	(0.331)	(0.354)
Days (sqrt)[a]	0.081**	0.068*
	(0.035)	(0.036)
Demand for money[b]		1.173***
		(0.365)
Protected persons[b]		–0.130
		(0.369)
Sample size	181	176
LR chi-squared	20.30	33.67
Degrees of freedom	5	7

[a]Square root (sqrt) of the variable

[b]Dummy variable equals 1 if the aspect is present and equals 0 otherwise.

Significance levels: *** is .01, ** is .05, and * is .10.

Table VIII. Marginal Negotiation Success Probabilities for Logit Estimates of Kidnappings, 1978-2005 (standard errors in parentheses)

Variables	Model 1	Model 2
Hostages (sqrt)	0.093***	0.097**
	(0.036)	(0.041)
Terrorists wounded or killed[a]	–0.242**	–0.284***
	(0.105)	(0.083)
Nonterrorists wounded or killed[a]	–0.193**	–0.180**
	(0.083)	(0.087)
Two or more demands[a]	0.015	0.055
	(0.075)	(0.076)
Days (sqrt)	0.018**	0.015*
	(0.008)	(0.008)
Demand for money[a]		0.251***
		(0.075)
Protected persons[a]		–0.028
		(0.080)
Predicted probability	0.346	0.312

[a]Marginal effect is for a discrete change of the dummy variable from 0 to 1.
Significance levels: *** is .01, ** is .05, and * is .10.

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