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The assassin and the donor as third players in the traditional deterrence game

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We develop two extensions of the traditional deterrence game (TDG), played between two players, to examine the influence of third players, called Assassin and Donor, respectively, upon the behavior of a Challenger toward a Defender. The results present the optimal behavior of Challenger when Assassin and Donor are included in the TDG. The results from the Assassin extension for example can account for the assassinations of leaders such as Anwar Sadat and Yitzhak Rabin and, just as importantly, can also account for the non-assassinations of leaders such as Yasser Arafat. We also show that the Assassin extension generates a very interesting tradeoff between domestic and international conflict.

The results from the extensions of the traditional bilateral deterrence game can for example account for assassinations of leaders such as Anwar Sadat and Yitzhak Rabin and non-assassinations of leaders such as Yasser Arafat. A key counterintuitive finding is that Challengers who eventually back down when facing a Defender are more prone to initiate conflict in the first place than are Challengers who eventually escalate against a Defender.

The key result from both extensions is that Challengers who eventually back down when facing a Defender, and who thereby activate an (internal) Assassin or assistance from an (outside) Donor, are more prone to initiate conflict in the first place than are Challengers who escalate against Defender, and thereby avoid Assassin or Donor. As will be discussed, this finding is remarkably counterintuitive with respect to Assassin but is very intuitive with respect to Donor. Even so, the Donor extension reveals cases where Challenger operates as a blackmailer of Donor by initiating a crisis with Defender so as to be offered a reward by Donor in order to end the crisis peacefully. The Donor extension, then, may be employed to understand the behavior of countries such as North Korea and Libya.

The traditional deterrence game

The traditional deterrence game (TDG) involves two players, Challenger and Defender.[1] Challenger moves first and can choose from two strategies, Threaten or Not Threaten (see the decision tree in Figure 1). If Challenger chooses Not Threaten,

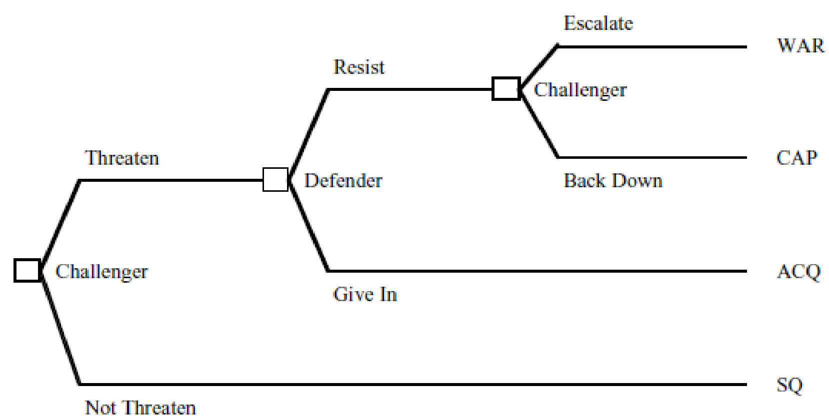

Figure 1: The traditional deterrence game (TDG)

then the game terminates and the outcome is the status quo (SQ). If Challenger chooses Threaten, then Defender can choose either Resist or Give In. If Defender chooses Give In, then the game terminates in Defender's acquiescence (ACQ). If Defender chooses Resist, then Challenger can choose either Escalate or Back Down. If Challenger chooses Escalate, then the game terminates in conflict (WAR); if Challenger chooses Back Down, then the game terminates in Challenger's capitulation (CAP).

The TDG posits that Challenger and Defender each can be one of two types — soft or hard — specified by their preference orderings. These are as follows:

- soft Challenger ACQ ≻ SQ ≻ CAP ≻ WAR
- hard Challenger ACQ ≻ SQ ≻ WAR ≻ CAP
- soft Defender CAP ≻ SQ ≻ ACQ ≻ WAR
- hard Defender CAP ≻ SQ ≻ WAR ≻ ACQ

where the symbol ≻ means that the outcome to the left of the symbol is preferred to the outcome on its right. Thus, soft and hard Challengers both prefer acquiescence to status quo but a soft Challenger prefers capitulation to war whereas a hard Challenger prefers war to capitulation.

Third player: Assassin

In what follows, the TDG is extended by adding a third player named Assassin. It is presumed that Assassin is part of Challenger's domestic constituency, i.e., Assassin

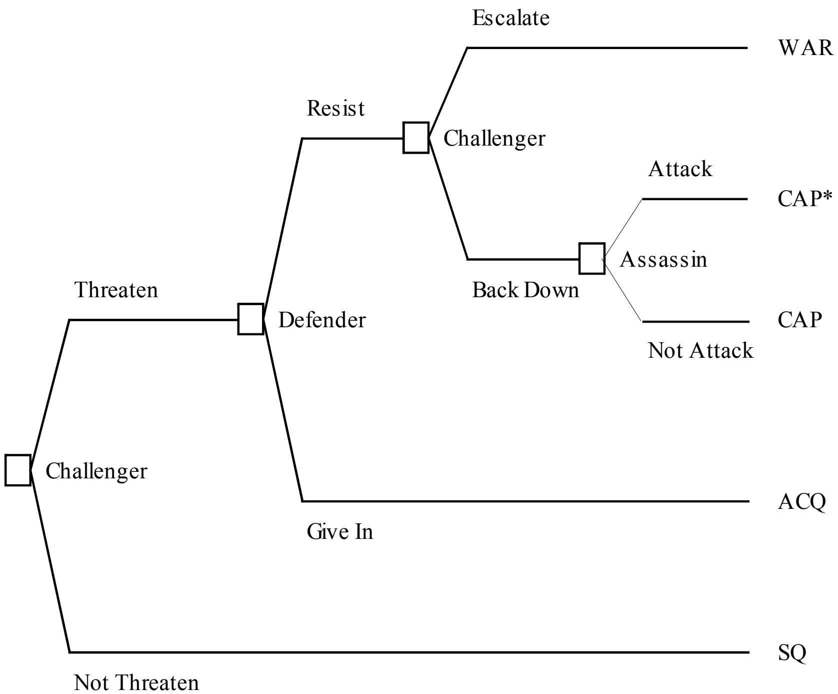

Figure 2: The TDG with Assassin

is one of Challenger's "own people."

Assassin reacts only to Challenger's choice of Back Down, or capitulation (CAP), in which case Assassin's reaction then involves a choice between Attack and Not Attack (see Figure 2). The behavior modeled here has been observed in international relations.[2] If Challenger chooses Back Down and Assassin chooses Not Attack, then the game terminates in CAP, just as if Assassin did not exist. But if Challenger chooses Back Down and Assassin chooses Attack, then the game terminates in a new payoff, CAP*. Importantly, the payoff CAP* can represent an extreme or non-extreme outcome. For example, in the non-extreme case, CAP* can be the embarrassment of backing down perhaps coupled with the cost associated with a peaceful removal from office. Contrariwise, in the extreme case, CAP* can represent Challenger's death by assassination. The term Assassin thus describes a range of possible behaviors by internal opposition, only the most extreme of which is associated with assassination in its literal sense.

We presume that Challenger, regardless of type soft or hard, prefers CAP to CAP* and that Defender, also regardless of type, is indifferent between CAP and CAP*.[3] The assumption that CAP is preferred to CAP* for both hard and soft Challengers yields a three-part specification of Challenger's possible preference orderings, as follows:

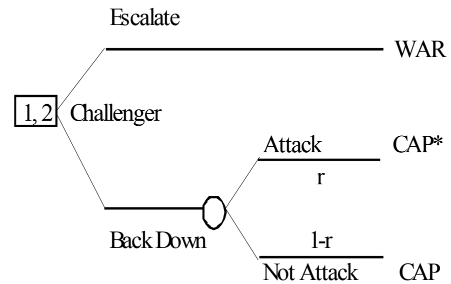

Figure 3: Challenger's view of the endgame

- hard Challenger ACQ ≻ SQ ≻ WAR ≻ CAP ≻ CAP*
- soft-1 Challenger ACQ ≻ SQ ≻ CAP ≻ CAP* ≻ WAR
- soft-2 Challenger ACQ ≻ SQ ≻ CAP ≻ WAR ≻ CAP*

Since Challenger is uncertain about the choice Assassin may make, Challenger sees Assassin as a lottery where the payoff is CAP* (i.e., Assassin attacks) with probability r and CAP (i.e., Assassin does not attack) with probability (1-r). The two-sided incomplete information version of the TDG is employed because this is the only version of the game wherein Challenger chooses Back Down and Assassin is involved in the play of the game. This is presented in Figure A1 which, because of its size, is placed in the Appendix.

Challenger, regardless of type, sees the decisions at nodes 1 and 2 of Figure A1 as shown in the "zoomed-in" version in Figure 3. Here, Challenger chooses Escalate over Back Down if and only if the valuation of WAR is greater than the expected value of Back Down, i.e., if and only if

(1) $v(WAR) > rv(CAP^*) + (1-r)v(CAP)$,

where v stands for the Challenger's valuation function.

Hard Challenger

If Challenger is hard, so that WAR ≻ CAP ≻ CAP*, then the foregoing inequality, i.e., $v(WAR) > rv(CAP^*) + (1-r)v(CAP)$, holds for all values of r. For example, if r=1 then Challenger chooses WAR because the value attributed to WAR exceeds that of CAP*. Likewise, if r=0, WAR is chosen because its valuation exceeds that of CAP also. Put differently, a hard Challenger always chooses Escalate, and thereby always avoids Assassin.

A hard Challenger sees the decision problem over whether to choose Threaten or

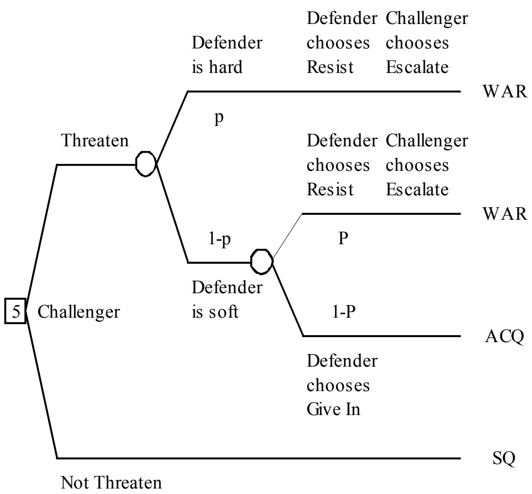

Figure 4: Hard Challenger's view of the first move

Not Threaten at node 5 of Figure A1 as shown in the zoomed-in version in Figure 4. Here, small p stands for the probability that the hard Challenger faces a hard Defender, i.e., one who prefers WAR over ACQ, and of (1-p) of facing a soft Defender. Capital P signifies the probability that the soft Defender chooses Resist. (Note that a hard Defender always chooses Resist, so Challenger's conditional probability that Defender chooses Resist given that Defender is hard equals one.) The hard Challenger chooses Threaten over Not Threaten if and only if the expected valuation of Threaten is greater than the valuation of SQ, i.e., if and only if

(2) $(p+(1-p)P)v(WAR) + ((1-p)(1-P))v(ACQ) > v(SQ)$.

In words, if Challenger is hard, then Challenger chooses Threaten over Not Threaten if and only if the probability Defender chooses Resist is less than a ratio determined by Challenger's valuations of the payoffs. Rearranging the terms in the foregoing inequality thus yields a ratio condition, as follows: hard Challenger chooses Threaten over Not Threaten if and only if

(3) $$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)} .$$

The ratio following the inequality sign is referred to as the first threshold.

Soft Challengers

A soft Challenger chooses Back Down over Escalate if and only if

(4) $rv(CAP^*) + (1-r)v(CAP) > v(WAR)$.

As noted, a soft Challenger can be either a soft-1 Challenger or a soft-2 Challenger. If Challenger is soft-1, so that CAP ≻ CAP* ≻ WAR, then the foregoing inequality holds for all values of r. Thus, a soft-1 Challenger always chooses Back Down. If Challenger is soft-2, so that CAP ≻ WAR ≻ CAP*, then the foregoing inequality holds for some but not all values of r. Thus, a soft-2 Challenger chooses Back Down if and only if

(5) $rv(CAP^*) + (1-r)v(CAP) > v(WAR)$,

which rearranges to

(6) $$r < \frac{v(CAP) - v(WAR)}{v(CAP) - v(CAP^*)} .$$

If this inequality holds, r is "low"; otherwise, r is "high". Thus, a soft-2 Challenger facing a low r chooses Back Down and sees the decision problem at node 5 of Figure A1 as shown in the zoomed-in version in Figure 5 (overleaf). A soft-2 Challenger facing a low r chooses Threaten over Not Threaten if and only if the expected valuation of Threaten is greater than the valuation of Not Threaten, i.e., if and only if

(7) $(p+(1-p)P)[rv(CAP^*) + (1-r)v(CAP)] + ((1-p)(1-P))v(ACQ) > v(SQ)$.

In words, a soft-2 Challenger facing a low r chooses Threaten over Not Threaten if and only if the probability that Defender chooses Resist is less than a ratio determined by the valuations of the payoffs and the probability r. Rearranging the terms in the foregoing inequality yields another ratio condition, as follows: a soft-2 Challenger facing a low r chooses Threaten if and only if

(8) $$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - [rv(CAP^*) + (1-r)v(CAP)]} .$$

The ratio on the right-hand side of (8) is referred to as the second threshold.

Now consider a soft-2 Challenger facing a high r. Here the interesting result is that this Challenger behaves in exactly the same way as a hard Challenger. First, a soft-2 Challenger facing a high r chooses Escalate over Back Down and thereby plays contrary to the soft-player type. Second, a soft-2 Challenger facing a high r sees the decision problem over whether to choose Threaten at node 5 of Figure A1 in the same way that a hard Challenger sees the problem, i.e., as in Figure 5. Therefore, a soft-2 Challenger facing a high r chooses Threaten at node 5 in Figure A1 if and only if

(9) $$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)} ,$$

i.e., in accordance with the first threshold. Thus, one obtains the striking result that a soft-2 Challenger facing a high r behaves exactly like a hard Challenger with respect to both the decision whether to choose Escalate and the decision whether to choose Threaten. Therefore, both the hard Challenger and the soft-2 Challenger facing a high r avoid Assassin.

This behavior is in distinction to that of a soft-1 Challenger and a soft-2 Challenger facing a low r, where Challenger chooses Threaten over Not Threaten if and only if Challenger's probability that Defender chooses Resist is in accordance with the second threshold, i.e., if and only if

(10) $$p + (1\text{-}p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - [rv(CAP^*) + (1\text{-}r)v(CAP)]}.$$

A second, and particularly counterintuitive, result involves the difference between the first and second thresholds. Since

(11) $$rv(CAP^*) + (1\text{-}r)v(CAP) > v(WAR)$$

for both a soft-1 Challenger and a soft-2 Challenger facing a low r, we have

(12) $$\frac{v(ACQ) - v(SQ)}{v(ACQ) - [rv(CAP^*) + (1\text{-}r)v(CAP)]} > \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)}.$$

Thus, the set of points <p,P> for which

(13) $$p + (1\text{-}p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)}$$

is a proper subset of the set of points <p,P> for which

(14) $$p + (1\text{-}p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - [rv(CAP^*) + (1\text{-}r)v(CAP)]}.$$

The significance of this result is that the Challengers who choose Back Down, and thereby may encounter Assassin, are more prone to initiate a crisis with Defender in the first place than are the Challengers who choose Escalate and thereby avoid Assassin.

Third player: Donor

The foregoing analytic structure can be employed to examine the role played by a Donor. We presume that Donor is an actor who, as a third player, is independent of both Challenger and Defender and reacts to Challenger's choice of Back Down. In particular, if Challenger chooses Back Down, then Donor's reaction involves a choice between Donate and Not Donate.

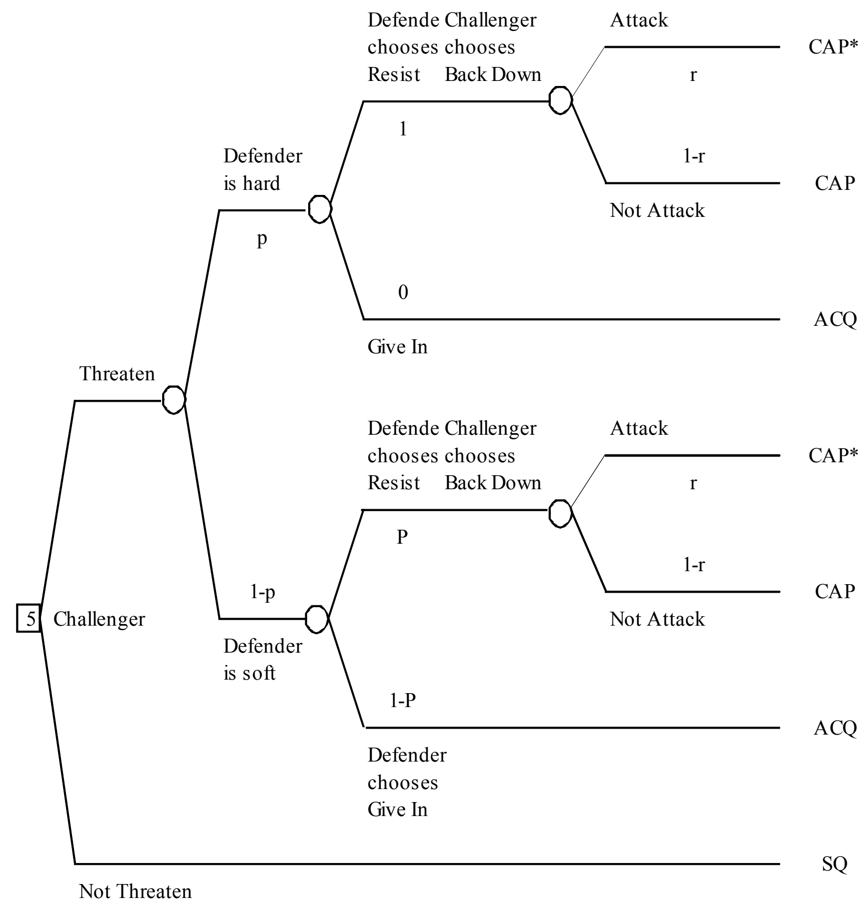

Figure 5: Challenger's view of the first move when Challenger chooses to Back Down

The analysis of the TDG with Donor is quite similar, albeit mirror imaged, to the analysis of the game with Assassin. If Challenger chooses Back Down and Donor chooses Not Donate, then the game terminates in the usual capitulation payoff, CAP. If Challenger chooses Back Down and Donor chooses Donate, then the game terminates in a new payoff, CAP**. Whereas Assassin attempts to influence

Challenger's behavior via a downside payoff, CAP*, Donor attempts to influence Challenger's behavior via an upside payoff, CAP**. Examples of the upside payoff CAP** include financial or military aid, debt relief, or a security guarantee.

It is presumed that Challenger, regardless of type soft or hard, prefers CAP** to CAP, and that Defender, also regardless of type, is indifferent between CAP** and CAP.[4] Furthermore, only the cases where CAP** is reasonably better than CAP are examined, and thus we do not examine the cases where CAP** is the most preferred payoff or the second-most preferred payoff. Finally, we again examine the two-sided incomplete information version of the game.

The assumption that CAP** is preferred to CAP for both hard and soft Challengers yields a three-part specification of Challenger's possible preference orderings, as follows:

- soft Challenger — ACQ ≻ SQ ≻ CAP** ≻ CAP ≻ WAR
- hard-1 Challenger — ACQ ≻ SQ ≻ WAR ≻ CAP** ≻ CAP
- hard-2 Challenger — ACQ ≻ SQ ≻ CAP** ≻ WAR ≻ CAP

As before, Challenger is uncertain about Donor and thus sees Donor as a lottery where the payoff is CAP** with probability R and CAP with probability (1-R). Thus, Challenger chooses Back Down over Escalate if and only if

$$Rv(CAP^{**}) + (1-R)v(CAP) > v(WAR). \tag{15}$$

Soft Challenger

If Challenger is a soft Challenger, so that both CAP** and CAP are preferred to WAR, then the foregoing inequality holds for all values of R. Thus, a soft Challenger plays true to type and always chooses Back Down over Escalate, and thereby may encounter Donor.

A soft Challenger chooses Threaten over Not Threaten if and only if

$$(p+(1-p)P)[Rv(CAP^{*}) + (1-R)v(CAP)] + (1-p)(1-P)v(ACQ) > v(SQ). \tag{16}$$

This inequality condition rearranges to the following: a soft Challenger chooses Threaten over Not Threaten if and only if

$$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - [Rv(CAP^{**}) + (1-R)v(CAP)]} \quad . \tag{17}$$

Hard Challengers

If Challenger is a hard-1 Challenger, so that WAR is preferred to both CAP** and CAP, then v(WAR) is greater than any convex combination of v(CAP**) and v(CAP). Thus, the inequality

$$v(WAR) > Rv(CAP^{**}) + (1-R)v(CAP) \tag{18}$$

holds for all values of R, and a hard-1 Challenger always chooses Escalate over Back Down, and thereby plays true to type. Hence, a hard-1 Challenger never encounters Donor.

Since a hard-1 Challenger chooses Escalate, a hard-1 Challenger chooses Threaten over Not Threaten if and only if

$$(p+(1-p)P)v(WAR) + (1-p)(1-P)v(ACQ) > v(SQ). \tag{19}$$

This inequality condition rearranges to the following: a hard-1 Challenger chooses Threaten over Not Threaten if and only if

$$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)} \ . \tag{20}$$

Now consider a hard-2 Challenger. Given the preference ordering CAP** ≻ WAR ≻ CAP, a hard-2 Challenger chooses Escalate over Back Down only for some but not all values of R, specifically those values of R for which

$$v(WAR) > Rv(CAP^{**}) + (1-R)v(CAP). \tag{21}$$

Thus, by rearrangement, a hard-2 Challenger chooses Escalate over Back Down if and only if

$$R < \frac{v(WAR) - v(CAP)}{v(CAP^{**}) - v(CAP)} \ . \tag{22}$$

R is "low" if the foregoing inequality holds; otherwise, R is "high". Thus, a hard-2 Challenger facing a low R behaves true to type and chooses Escalate, whereas a hard-2 Challenger facing a high R behaves against type and chooses Back Down.

Now consider the decision whether to choose Threaten or Not Threaten. Both a soft Challenger and a hard-2 Challenger facing a high R choose Back Down over Escalate and, therefore, both choose Threaten over Not Threaten if and only if

$$p + (1-p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - [Rv(CAP^{**}) + (1-R)v(CAP)]} \quad . \tag{23}$$

Contrariwise, both a hard-1 Challenger and a hard-2 Challenger facing a low R choose Escalate over Back Down and, therefore, both choose Threaten over Not Threaten if and only if

$$(24) \qquad p + (1\text{-}p)P < \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(WAR)} \ .$$

Note that for the Challengers who choose Back Down,

$$(25) \qquad Rv(CAP^{**}) + (1\text{-}R)v(CAP) > v(WAR)$$

and thereby

$$(26) \qquad \frac{v(ACQ) - v(SQ)}{v(ACQ) - [Rv(CAP^{**}) + (1\text{-}R)v(CAP)]} > \frac{v(ACQ) - v(SQ)}{v(ACQ) - v(CAP)} \ .$$

Therefore, the not very surprising result obtains that those Challengers who choose Back Down, and thereby encounter Donor, are more prone to initiate a crisis than are those Challengers who choose Escalate, and thereby avoid Donor. This result is not surprising exactly because the upside payoff CAP** can be gotten only by choosing Threaten in the first place.

Discussion and conclusion

The inclusion of third players generates new results that cannot be obtained via the two-player traditional deterrence game.[5] The results presented here involve cases where the probabilities that Assassin chooses Attack or that Donor chooses Donate are either high or low, and the conditions under which Challengers choose to initiate a crisis via the decision to Threaten Defender in the first place.

If the probability that Assassin chooses Attack is high, then a soft-2 Challenger behaves contrary to type and, like a hard Challenger, chooses Escalate. Thus, via the decision to choose Escalate, a soft-2 Challenger facing a high r avoids Assassin. If the probability that Donor chooses Donate is high, then a hard-2 Challenger, via the decision to choose Back Down, behaves contrary to type.

The results show a different set of behaviors when the probabilities that Assassin chooses Attack or that Donor chooses Donate are low. If the probability that Assassin chooses Attack is low, then a soft-2 Challenger behaves true to type and chooses Back Down. In so doing, a soft-2 Challenger may encounter Assassin. If the probability that Donor chooses Donate is low, then a hard-2 Challenger behaves true to type and chooses Escalate. In so doing, a hard-2 Challenger cannot encounter Donor.

The foregoing result for Assassin, regarding the probability of Attack, reveals an interesting nexus, indeed a tradeoff, between domestic and international conflict. Challengers are confronted with domestic conflict with the presence of Assassin in the game. In the case of a soft-2 Challenger facing a high r, domestic conflict with Assassin is avoided via the choice of Escalate, but this avoidance comes at the expense of generating international conflict with all hard, and some soft, Defenders. The link between domestic and international conflict also occurs in the reverse direction for a soft-1 Challenger and a soft-2 Challenger facing a low r. These Challengers avoid international conflict with Defender by choosing Back Down. However, in avoiding international conflict, the behavior of a soft-1 Challenger, and that of a soft-2 Challenger facing a low r, generates the risk of domestic conflict with Assassin.

The key result derived from both extensions of the TDG pertains to the conditions under which a Challenger chooses Threaten in the first place. Specifically, Challengers who choose Back Down, in both the Assassin and Donor extensions, are more prone to initiate a crisis with Defender than are Challengers who choose Escalate. This result is remarkably counterintuitive in the case of Assassin since only the choice of Back Down will activate Assassin. Furthermore, the Challengers who choose Back Down are the very same Challengers who are more prone to initiate the crisis that activates domestic conflict. On the other hand, in the Donor extension it is not particularly surprising that the Challengers who are more prone to initiate a crisis do so in order to realize the upside payoff, CAP**. This result from the Donor extension reveals cases where a Challenger functions as a blackmailer of Donor, i.e., cases where Challenger uses Defender as a means for Challenger to benefit from Donor.

Possible examples of Challengers choosing Back Down, and thereby encountering Assassin, are Anwar Sadat of Egypt and Yitzhak Rabin of Israel. Sadat was assassinated in 1981 for signing the 1979 Israel-Egypt Peace Treaty, and Rabin was assassinated in 1995 for signing the 1993 Oslo Accords. A possible example of a soft Challenger playing like a hard Challenger, and thereby avoiding Assassin, is Yasser Arafat. He chose not to enter into an agreement with Ehud Barak at the 2000 Middle East Peace Summit at Camp David, and thereby avoided assassination. An example of a hard Challenger playing like a soft Challenger, and thereby encountering Donor, is Libya terminating its nuclear weapons program in December 2003 in exchange for membership into the World Trade Organization and an end to the European Union arms embargo. Another example is North Korea who in agreeing to "terminate" its nuclear weapons program received $4 billion in assistance from the United States in the mid-1990s.[6]

Notes

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1. See, e.g., Zagare and Kilgour (1993); Morrow (1994).

2. Öberg, Möller, and Wallensteen (2008).

3. Defender's indifference is a simplifying assumption that is employed to derive a general set of results. This assumption can be relaxed but then the points we wish to make here become lost in the details of the various special cases that obtain and these cases are not considered here.

4. As before, Defender's indifference is a simplifying assumption and is made for the reasons given earlier.

5. Other third-player variations of the deterrence game are treated in Zagare and Kilgour (2003).

6. Sadat: Heikal (1983); Hatina (2005). Rabin: Peri (2000); Sasson and Kelner (2008). Libya: Bahgat (2005). North Korea: Bueno de Mesquita (2006, p. 343).

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Appendix

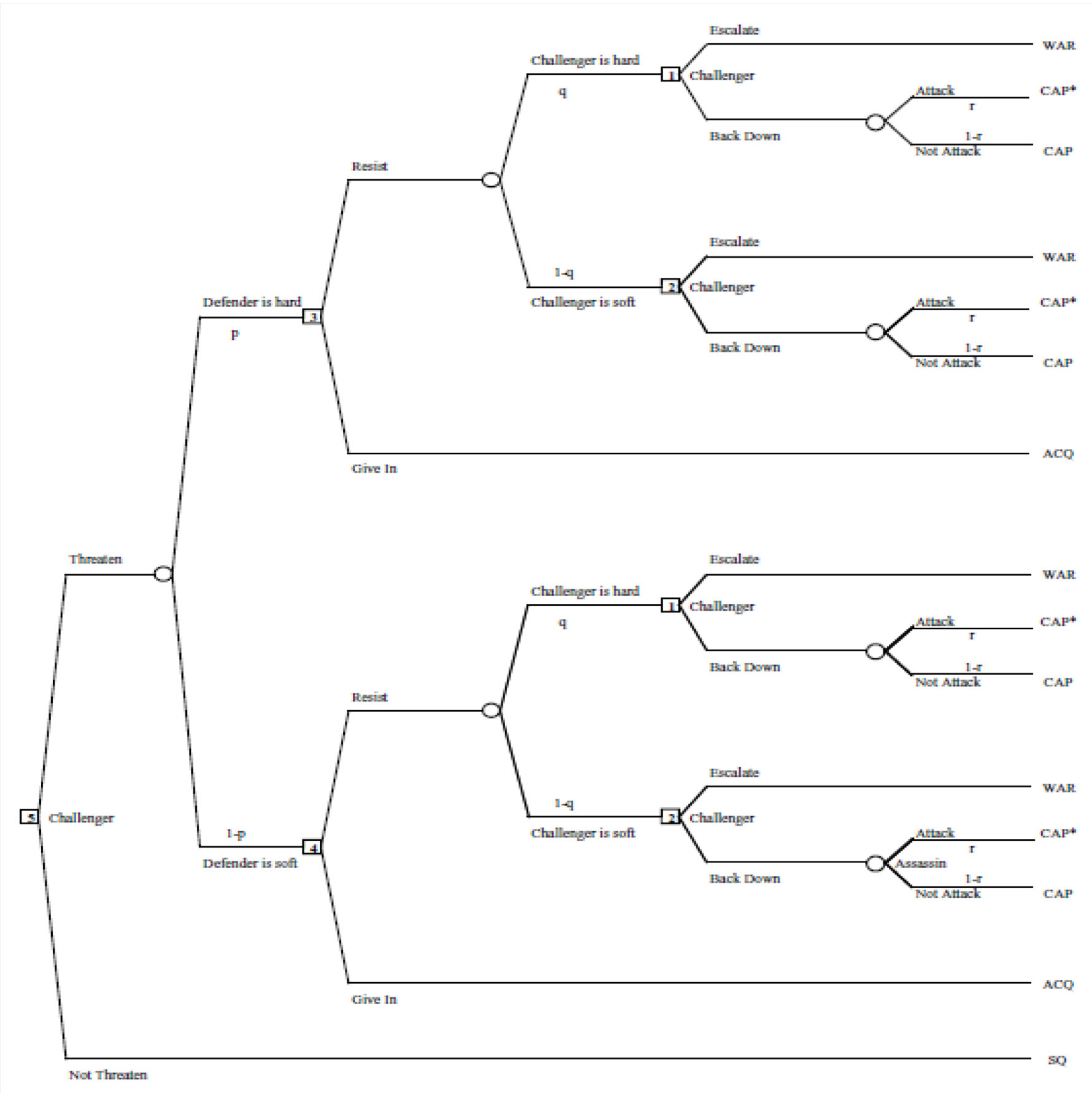

Figure A1: The two-sided incomplete information version of the TDG with Assassin