Strategic Ambiguity and Arms Proliferation

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Introduction

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- On the American side, there is a fear that arms will fall into the wrong hands but on the other side there is fear of American motives:

"The U.S. is after an excuse. If we stop nuclear technology, they will find another excuse. They invaded Iraq even though there were no weapons (of mass destruction)" (Habibollah Hosseini, Iranian cleric).
"In the contemporary world, it is obvious that having access to advanced weapons shall cause deterrence and therefore security, and will neutralize the evil wishes of great powers to attack other nations" (*Jumhuri-ye Islami*).

- Nations have deliberately created ambiguity about their weapons capabilities to create deterrence:
  - Saddam Hussein possessed weapons of mass destruction in the early 1990's, but not in the late 1990's. He chose a policy of ambiguity in both situations.
  - Since late 1960s, Israel has neither confirmed nor denied that it possesses WMDs.
- How and why is ambiguity maintained and what are its consequences?

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  - Saddam did have WMDs in early 1990s and did not reveal them (Gordon and Trainor). If he had revealed them it might have triggered fear and attack from the other side - maybe Saddam will use them against Israel, Iran, sell them to terrorists etc.

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  - Israeli Prime Minister Eshkol’s view on publicly revealing absence of nuclear capability: “[I]t does not appear advisable to release President Nasser from any apprehension he may entertain as to Israel’s nuclear capability. Nasser loses no opportunity of publicly emphasizing that war with Israel is inevitable...” (Cohen *Israel and the Bomb*, p. 199)

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  - When revealing to his inner circle that Iraq had no WMDs, Saddam “flatly rejected a suggestion that the regime remove all doubts to the contrary” fearing such a revelation would embolden his enemies to attack (Woods et al. , p. 92 and Gordon and Trainor, p. 65)
- Hence, *strategic ambiguity* may be forced upon a country-opponents do not know if you have WMDs or not.

- Should we force countries to reveal their arsenal? Does strategic ambiguity make the world more dangerous? Does it help America or Iran? Washington Post (May 11, 2003):

"Does an American policy to deny unfriendly nation-states the policy option of creating ambiguity around WMD possession and the support of terrorism make the world a safer place? The Bush administration has made a game-theory-like calculation that it does.

In fact, WMD ambiguity was at the core of Iraq's strategy...[I]f it ever became unambiguously clear that Iraq had major initiatives underway in nuclear or bio-weapons, America....might intervene militarily. If....it ever became obvious that Iraq lacked the unconventional weaponry essential to inspiring fear.., then the Kurds, Iranians and Saudis might lack appropriate respect for Hussein's imperial ambitions. Ambiguity thus kept the West at bay while keeping Hussein's neighbors and his people in line."

- This conventional wisdom that ambiguity reduces “world safety” also captured by Nuclear Non-Proliferation Treaty:

ARTICLE III

Each Non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards...for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.

Our Results:

1. We identify a key *trade-off* between *ambiguity* and *arms proliferation*.
2. We evaluate how this trade-off is evaluated by a country facing a proliferator. This allows us to study *communication*, *proliferation* and the *welfare* impact of different attitudes towards arms inspections.

The Model

- Two players, A and B. A is deciding whether to be aggressive or not against B. A has a type that determines its level of aggression. B has a type that represents its motives for acquiring weapons. B's investment and weapons' status are unknown.
- If B invests, then he will acquire (rudimentary) nuclear weapons with probability $\sigma \in (0,1)$. The cost of investing is $k > 0$.
- B's knows his nuclear capability and his type.
- His nuclear capability is *hard* information that can be verified by (perfectly reliable) weapons inspectors. But B's type is private information and is *soft* information.
- If there is an inspection, then B incurs a small cost $\varepsilon \in [0, \bar{\varepsilon}]$.

- A does not observe B's investment, the success of his weapons program or his type
- Finally, A decides whether or not to be aggressive against B. A derives a private benefit a if he is aggressive. a has a continuous distribution with support $[a_0, a_1]$, where $a_0 < 0 < a_1$. Density is f. B can be "crazy" type z with probability τ or a "normal" type n with probability $1 - \tau$. Other details of payoffs depend on whether B has weapons or not.
- Payoffs

	B has nukes	No nukes
A aggressive	$a - c, -\alpha + \gamma$	$a, \ -\alpha$
A passive	$-d_t, \ \delta_t$	$0, \ 0$

where $d_z > d_n > 0$ and $\delta_z > \delta_n = 0$. Define $\kappa \equiv k/\sigma\gamma$ as the *normalized cost of investing.*

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- For B, weapons used for defense and can be used to counterattack. For A, aggression is costly if B has arms:

$$\alpha > \gamma > 0$$

$$c > 0$$

- The objective of our research is to understand how incomplete information about the opponent's motives and capabilities can trigger arms races and conflicts. Accordingly, we will assume that player A's optimal decision depends on his preferences (his type) and his beliefs.

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A aggressive	$a-c, -\alpha+\gamma$	$a, \ -\alpha$
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- Player A is a *dove* if $a < 0,$ an *opportunist* if $0 < a < c-(\tau d_z + (1-\tau)d_n),$ and a *hawk* if $a > c-(\tau d_z + (1-\tau)d_n).$ The probability that A is a dove is $D \equiv F(0) > 0.$ The probability that he is a hawk is $H \equiv 1 - F(c-(\tau d_z + (1-\tau)d_n)) > 0.$
- Since $a - c < -(\tau d_z + (1-\tau)d_n)$, the opportunist fears B's nuclear arsenal and can be deterred by it, but $a > 0$ implies that the opportunist is aggressive if he thinks B is unarmed. A's optimal decision depends on his beliefs.

Parametric Assumptions

Assumption 1 : $\tau d_z + (1-\tau)d_n < c < d_z.$

- The first inequality in Assumption 1 says that the cost of being aggressive when B has rudimentary nuclear weapons exceeds the *ex ante* expected value of eradicating the threat. The second inequality implies that if A is *certain* that B is crazy then the cost of being aggressive is *smaller* than the expected value of wiping out the threat.
- Our second assumption is that the cost of inspections $\varepsilon \in [0, \bar{\varepsilon}]$ is small. And finally:

Assumption 3: $\frac{k}{\sigma} < (1 - F(c - d_z))(-\alpha + \gamma) + (1 - F(0))\alpha - \bar{\varepsilon}$

- If Assumption 3 is violated, then the cost of investing is so high that there is an equilibrium where the normal type of B never invests and always allows arms inspections.

Timing

- Time 0: A privately learns a. B privately learns $t \in \{z, n\}$
- Time 1: Communication stage.
- Time 2: B decides whether or not to invest in a weapons program. If he invests, then B privately observes the success or failure of the program. A cannot observe anything that happens at time 2.
- Time 3: B decides whether or not to allow inspections. If inspections take place, the inspectors publicly announce whether or not nuclear capability exists.
- Time 4: A decides whether or not to be aggressive.

No informative communication: two possible equilibria

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- As communication is uninformative, under Assumption 3, the normal type of B arms with probability 1 under full disclosure. As crazy type has an even greater incentive to arm, we have:

Proposition 2 There is an equilibrium with full disclosure. Full disclosure implies both types of B arm with probability 1 and there is no informative cheap-talk

- In fact, we can also show that the crazy type arms with probability 1 in *all* equilibria.

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$$\kappa > 1 - F(\sigma(c - \tau d_z - (1-\tau)d_n)), \quad (1)$$

and probability 1 otherwise. Cheap-talk cannot reduce the probability that B invests.

- Freakonomics of LoJack (Ayres and Levitt): Concealed car security devices (LoJack) deter theft in general and hence also protect vehicles *without* such devices installed.
- For us, country B = car owner, LoJack = WMD, country A = car thief and decision to acquire WMDs is endogenized. As there is deterrence from ambiguity if arms investment fails, there is less incentive to acquire weapons than if "LoJack" is public.
- What about A's welfare? If arms acquisition falls dramatically (i.e. κ is high), then A is better off as "LoJack" is a weapon that can be used against A. Hence, in this case, *whatever his type, country A prefers full ambiguity to full disclosure.*
- But what if arms acquisition does not fall dramatically? Then, there is conflict between A's types: the opportunists are willing to accept higher probability of arms acquisition for more information while hawks and doves prefer ambiguity. This suggests the structure of other informative cheap-talk equilibria.

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- This suggests an equilibrium with two informative messages. The intermediate types send a "tough" message that leads to inspections, but also induces B to invest (the message proves to B that A is an opportunist). The extreme types send a "conciliatory" message. After hearing the conciliatory message, B is less likely to invest, but there will be no inspection. We show these are *all* effective cheap-talk equilibria can be taken to have this structure

Equilibria with partial disclosure

Proposition 6 All equilibria with effective cheap-talk can be replicated by a two message equilibrium where, for some a' and a'' with $a'' > a' > 0,$ player A sends a "tough" message if $a \in (a', a'')$ and a "conciliatory" message otherwise. After the tough message, player B invest with probability 1 and allows inspections iff he is armed. After the conciliatory message, the normal type of B arms with positive probability and refuses inspections with positive probability if he is armed.

- We find such a communication equilibrium if two conditions are satisfied. First, the normalized cost of investing must be low (Case 2 above). Otherwise, all of A's types would prefer ambiguity, and no-one would send the "tough" message. Second, the prior probability that A is a hawk must be small. Otherwise, B would invest for sure after the conciliatory message, since it does not distinguish hawks from doves.

Proposition 5 Suppose κ is low and so is $\frac{H}{H+D}$. There is a communication equilibrium where, for some a' and a'', player A sends a "tough" message if $a \in (a', a'')$ and a "conciliatory" message otherwise. Player B invest with probability 1 and allows inspections if he is armed following the tough message. After the conciliatory message, B arms with positive probability and always refuses inspections.

Welfare: Ambiguity vs. Disclosure

- If the partial disclosure equilibrium exists then all of A's types prefer partial to full disclosure (by revealed preference). If the partial disclosure equilibrium doesn't exist, but κ is high, all of player A's types prefer full ambiguity.
- With full or partial ambiguity, A makes mistakes: sometimes opportunists are aggressive even when B is armed, and sometimes they are not aggressive when he is not armed. B prefers full ambiguity if the benefit to deterring opportunists when B is unarmed is greater than the cost of being attacked by some opportunists who do not observe that B is armed.
- *Thus, B may or may not want ambiguity.*

Conclusion

- We suggest that the welfare of a country facing a potential arms proliferator may be increased by allowing the latter to maintain ambiguity. The welfare of the proliferator may also go up.
- The aggressor faces face trade-off between better information and higher probability that the opponent arms. This generates equilibria where types who value information (opportunists) demand inspections and types who do not (Hawks and Doves) allow ambiguity.