

ABSTRACT

ARMS-CONTROL INSPECTION STRATEGIES THAT INDUCE COMPLIANCE: A GAME-THEORETIC ANALYSIS

Arms-control inspection is modeled by two game forms that subsume different games between a Detector (D) and an Evader (E). In each form,

- E may choose to comply with or violate an arms-control agreement;
- D may choose to inspect or not to inspect a possible violation by E.

Besides certain costs and benefits, the parameters of the games include the conditional probability that a violation will be detected if there is an inspection, reflecting the uncertainty of verification.

In the simultaneous form, D and E make simultaneous (or independent) choices. Depending on the parameters, three inspection games, each with a uniquely determined equilibrium--two in pure strategies and one in mixed strategies--are possible. Because none of the equilibria involves certain compliance by E, D is not always able to deter E from violating an agreement.

In the sequential form, D has the first move, announcing--and committing itself, or an independent agency, to--a probability p of inspecting E. E, with full knowledge of p , then chooses to comply or violate the agreement. If the probability of detection is above a certain threshold and certain other conditions are met, D can announce an inspection strategy that will always deter E from violating, which leads to an equilibrium in the sequential form Pareto-superior to that in the simultaneous form. Paradoxically, then, by publicly revealing its inspection strategy in advance, D may help itself as well as E escape a Pareto-inferior equilibrium outcome. Policy implications of this finding, and possible applications of the model, are discussed.