ordinating many players simultaneously (since this is a multilateral rather than bilateral problem) has many practical difficulties.

3. The decision to violate or not is never probabilistic -- there is always a single best choice, except in the rare event that two particular combinations of costs and benefits happen to be exactly equal in value. Further, the parameters that determine this choice are the benefits and penalties that accrue to the player as a result of his strategy selection alone.

Each player in the model has two strategies -- violate or not. Result 3 says that no matter what the other players do, one or the other of each of these two strategies is *dominant* -- better under all circumstances. Consequently, the decision to violate is dependent only on the expected benefits of violating without getting caught, the expected penalty for getting caught in a violation, and the expected penalty of being falsely accused of a violation. This result contradicts some results from 2-person models that suggest that there is a probabilistic relationship between detection capability and violation -- that a player should randomly violate at a frequency that depends on the expected detection frequency.

4. The probability of false alarms and the penalty attached are crucial in a player's decision to violate or not. A smaller false alarm penalty results in an increase in the threshold at which a player will choose to violate. Similarly, the smaller the probability of a false alarm, the better.

Intuitively, it seems clear that a player would be likely to violate if the expected benefits from cheating exceed the expected penalties from getting caught. This result points out the direct and significant effect of the false alarm rate.

5. A player acting independently will violate only if the probability of detection is less than or equal to the ratio of the difference between the benefit of violating without getting caught and the expected penalty for false alarms to the difference between the benefit of violating and the penalty after getting caught in a violation.

This textual description is more elegant when written as a mathematical formula, such as, for the case where false alarms are negligible:

$$p \leq \frac{\alpha}{\alpha - \beta}$$

where p is the probability of detection, α is the benefit for violating without getting caught and β is the benefit (negative of penalty) for getting caught violating. This simple formula is a consequence of the dominance result, and provides a method for calculating the circumstances under which violation is optimal, given that some method of measuring or relating the appropriate utilities is employed.

Policy Implications

(1) The model indicates that the decision of a party to violate a treaty or not depends on more than the effectiveness of verification systems. There are natural forces that will lead a party to violate or not that are independent of the verification system. Consequently, rather than placing undue emphasis on verification provisions, a treaty negotiator should concentrate on the basic interests of the parties. The structure of these basic interests will determine whether an agreement is fundamentally viable. Verification should then serve to monitor, rather than control, the ongoing relationship.