Some thresholds relating to the occurrence of cheating can be inferred from Table 1. This model is not an exact representation, and cheating levels of 2% or 3% should probably be interpreted as insignificant. With this interpretation, it takes 4 inspections to effectively deter violations,if there are 5 slots, whereas if there are 10 slots (not shown in Table 1) violation becomes negligible when there are at least 7 inspections.

If the number of time periods (n) is fixed, the factors which affect the inspectee's value and the total amount of violation are the number of inspections (k), the detectability of cheating (r), and the penalty for detected violations (K). A sensitivity analysis was undertaken to assess the relative sensitivity of the inspectee's value (V) to each of these three variables.

The value to the inspectee, who is assumed to be motivated to cheat, always decreases as k, r, and K increase. But it is the relative rates of change of V with respect to those variables which are of interest. The elasticity of V with respect to r [the ratio of relative (or percentage) rates of change of V and r] was ~1-2. This means, for example, that a 10% increase in r (detectability of cheating) typically results in a 10-20% decrease in V (the value to the inspectee) and in q (the inspectee's optimal cheating level). This elasticity decreases as V decreases (and r increases).

The elasticity of V with respect to K is very similar to, but perhaps slightly less than, the elasticity of V with respect to r. Finally, V appears to be somewhat more sensitive to k than to either r or K, with elasticities in the ~1-3 range. The elasticity of V with respect to k increases as k increases (and V decreases), so that increasing the number of inspections becomes more and more effective at reducing cheating the longer the increase continues. A figure showing typical changes in value is given in Appendix A, along with some details of the calculations.

Certain policy implications can be discerned from this study of elasticities. In negotiating a treaty, it may be necessary to trade off measures which increase the detectability of cheating (longer inspections, a larger inspection team, etc.) against measures which increase the penalty for detected cheating (increased negative publicity, the right to control facilities where violations have occurred, the right to destroy stocks and equipment, etc.). In such a situation, it is important to be able to estimate the net effects of trade-offs of this type. The methods developed here provide estimates of these effects, estimates which can be fine-tuned to some extent.

It is also possible, using these methods, to estimate how other variables, such as the total number of inspections allowed, affect the violation frequency. Yet another variable, concealment effort, is introduced in Appendix A. Concealment refers to activities of the inspectee which camouflage violations; these activities are costly, so that the value of undetected cheating is reduced along with detectability. Appendix A contains some preliminary work involving the incorporation of concealment effort into the model, and the effect of this additional strategic variable controlled by the inspectee.

One additional policy implication is clear from this analysis. Uncertainty over inspections always deters the violator, so that it is better to fix the number of inspections over longer rather than shorter time periods, in order to reduce violation. [For another model, this phenomenon was observed previously by Brams, Davis, and Kilgour (1988).] For example, a treaty with k inspections allowed each year for 2 years might be altered to allow 2k inspections over 2 years. Thinking of the number of time periods (inspection opportunities) as doubling, the appropriate comparison is of the amount of violation with 2n slots and 2k inspections, as compared to twice the amount of violation with n slots and k inspections. For the standard case shown in Table 1, the net amount of violation, as measured by the value to the inspectee under optimal strategies, is as follows: