

As in Section 3.2, this seems to be an illustration of a fairly general phenomenon. As the political parameters shift, the thresholds move — sometimes in concert, and sometimes independently. An allocation which exhibits good balance and is well inside the upper right-hand quadrant of Figure 3 is likely to remain adequate, and an allocation which is barely sufficient on one or both dimensions of Figure 2 is vulnerable. In particular, the political parameters of states at different states of clandestine weapons development programs may differ, suggesting that inspection effort against undeclared sites may need to be increased whenever circumstantial evidence suggests the existence of such a weapons program.

As discussed in the Appendix, our model for Problem 3 incorporates several arguable assumptions. The assumption that violations do not take place simultaneously at declared and undeclared sites is one of these — and it means that conclusions drawn here are suspect whenever that state's motivation to violate is extremely high. But conclusions regarding the deterrence of violations are likely firm. Likewise, the assumption that the two types of inspection are completely unrelated is also incorrect, but this means that levels of resources necessary to deter have probably been overestimated here. The general patterns of optimal allocation would probably remain the same under more realistic models. The simplifications made in developing the model of Problem 3 of the Appendix have been made to increase tractability, and do not seem to alter the conclusions about successful safeguards programs too much.

The contribution of the analysis in this section is to establish and illustrate the principle that the specific allocation of inspection resources within a state is important, and should be subject to the same kinds of consideration of political values and inspection efficiency as the allocation of inspection resources among states. What is important is that all possible types of violation be evaluated both politically and technically, and inspection effort allocated accordingly. Furthermore, change in political factors over the short term may need to be reflected in changes in a safeguards program. For achieving the goals of detecting and deterring violations, the optimal strategy is dynamic.

4. Conclusions

The objective of this study is to develop on which principles to base the IAEA's safeguards programs under the NPT. New ideas for improving effectiveness or decreasing costs of safeguards operations may be especially valuable at this time.