

Any inspection program chosen by the IAEA (i.e. any allocation of inspection resources over the two tasks) results in a pair of inspection effectiveness ratings — against declared and undeclared sites. These two ratings represent a point in the large rectangle of Figure 3, just as Figure 2 shows a pair of effectiveness ratings against two states.

Many different rating combinations are possible, but, in general, to approach maximum effectiveness at one site requires such a large commitment of resources that effectiveness at the other site falls to the minimum. Figure 3 also shows the thresholds of inspection effectiveness at each site that guarantee deter violation at that site. Again, note that it is the threshold locations that reflect political parameters; technical parameters are reflected in the location of the point representing the pair of effectiveness ratings.

Once again, it is clear that the possibilities for success of the IAEA's safeguards programs depend on the interplay of political and technical parameters. If inspection resources are high enough, the IAEA can allocate them in such a way that both types of violation are deterred. If inspection resources fall short, then no allocation by the IAEA can deter violations at both sites.

The Appendix contains two additional important points that help in understanding the problem of allocating inspection effort between declared and undeclared sites. First, if inspection efficiency is known, Theorems 3.1 and 3.2 may show how the IAEA can achieve its most effective allocation. Roughly, if there are increasing returns to scale, then it is best to concentrate resources; if there are decreasing returns to scale, then it is best to spread resources. Thus, if doubling the inspection resources at a site does not increase effectiveness by very much, then it is best to use lower levels of resources at most sites. In contrast, if doubling the inspection resources at a site more than doubles the effectiveness at the site, then it is best to concentrate resources in a few sites, chosen unpredictably.

The second contribution of these theorems is to determine some formulae for the best possible allocation of resources in cases where resources are insufficient to deter violations at both sites. As illustrated in Figure A3, following a formula that is optimal in a situation of illegal behaviour is never disadvantageous in situations where legal behaviour is to be expected. Thus, because detailed knowledge may be uncertain in practical cases, efforts to adhere to optimal allocation formulae are always prudent.