Interventions Tests Summary

To test the nature of interventions as implemented in our project, we wanted to analyze the impact interventions have on the evolution of the game. We developed a testing strategy to test the impact of interventions on the game (compared to no interventions), the variance introduced by interventions, and finally, the different impacts of those impacts when altering the intervention settings. This strategy fixes the resource file and country file and varies the interventions file. The “MLD 0.5 ARQ 2” input case from part was chosen as the country file due to the variance in resource distributions used for that test case. The “Resources” input case, a file defined specifically for part 2, was chosen to represent the resources. Finally, we used 5 different files to represent different input scenarios. These are summarized in the table below.

|  |  |
| --- | --- |
| Name of Case/File | Notes |
| Interventions Off – No File | “Base Case” for comparison |
| Case 0 | Case 0 of Interventions |
| Case 1 | Case 0 + Added new intervention w/ fixed prob |
| Case 2 | Case 0 + Increased prob. chances |
| Case 3 | Case 2 + Increased Impacts |

The first experiment involved analyzing each case of the intervention inputs to determine a mean impact of interventions relative to the base case. The findings are included below.

|  |  |
| --- | --- |
| Trial | Quality Change of MyCountry after 7 Turns |
| No Interventions | 6,395,139.843 |
| Case 0 | 6,378,887.242 |
| Case 1 | 6,251,688.168 |
| Case 2 | 6,275,885.771 |
| Case 3 | 4,082,547.174 |
| Interventions Mean | 5,747,252.09 |
| Interventions Std. Dev | 1,111,172.77 |

The findings show that the interventions impact the game evolution by lowering the change in state quality change after 7 rounds and introducing a small amount of variance. This is in-line with our original goal for adding interventions. Only in Case 3, which involved numerous high-probability, high-impact events did we notice a substantial drop in quality from beginning to end of game. This confirms that our implementation is flexible enough to alter the game either gently or substantially depending on the input parameters for interventions.

The second experiment involving generating confidence intervals from the data used in experiment 1. Using a t-distribution and alpha of 0.1 (two-tailed), we determined the 90% confidence interval for the intervention impact was (3,378,402.00 : 8,116,102.18). This means the reduction of quality is not statistically significant at the 90% level. However, using our domain knowledge and the fact Case 3 had a substantially higher impact than the other cases, we believe our interventions implementation is producing meaningful results in the intended manner (reducing quality only slightly while increasing variance).

The complete output of the 5 test cases is included below.

No Interventions Case: