

Models containing undirected cycles

Consider a DynRisk model with only three nodes, A, B and C. In the influence diagram there are edges from A to B, A to C, and B to C. If we delete the directions on the edges, we get an “undirected cycle”.

In most cases undirected cycles in influence diagrams are perfectly OK. It is the directed cycles that cause trouble. However, if some of the nodes are correlation nodes, you have to be more careful.

Assume e.g., that A is an independent node, while B and C are correlation nodes. Given the directions of the edges, DynRisk will calculate the nodes in the following order: A, B and C.

Node A is just an independent node, and can be calculated without any problems. Node B is a correlation node with only one predecessor, i.e., node A, and does not create any trouble either. Node C is a correlation node with two predecessors, A and B. The correlation algorithm then combines the values from A and B, and correlates the result with C. However, when the values from A and B are combined, it is assumed that these two are independent, which in this case is not true. The effect of this is that node C will not get a correct standard deviation.

The important lesson is that those parts of the influence diagram which contain correlation nodes and their respective predecessors should not contain undirected cycles.