

Purposes NPV risk analysis is a useful means of analysing overall project risk during the earlier phases of a project. It can be used to:

1. Support early decisions as to whether or not to continue the project e.g. bid/no bid decisions.
2. Validate the project business case from a risk perspective at key project authorisation points.
3. Quantify the implications of time profiling uncertainties that affect costs and benefits.
4. Support choices between mutually exclusive options when designing the project solution.
5. Identify which sources of uncertainty have the most influence on the project's outcome.

A key advantage is that, by requiring the risk management process to take into account risk to both the project's delivery and its benefits, the analysis clarifies the risk implications of trade-offs between the two.

Limitation The NPV approach requires the project's benefits to be modelled in economic terms (i.e. as a cash value). In some cases this is too difficult to do meaningfully. In particular, some projects sponsored by governments and charities may be too difficult to assess in this way.

Techniques Simple NPV risk models can sometimes be developed deterministically e.g. using a calculator. In most cases, however, a spreadsheet model will need to be developed for Monte Carlo simulation. Typically, the spreadsheet will include a breakdown of project costs and benefits listed vertically with accounting periods (usually years) arranged horizontally. Factors driving costs and benefits, together with uncertainty in their timing as driven by key milestones are represented using probability distributions i.e. the input risk estimates.

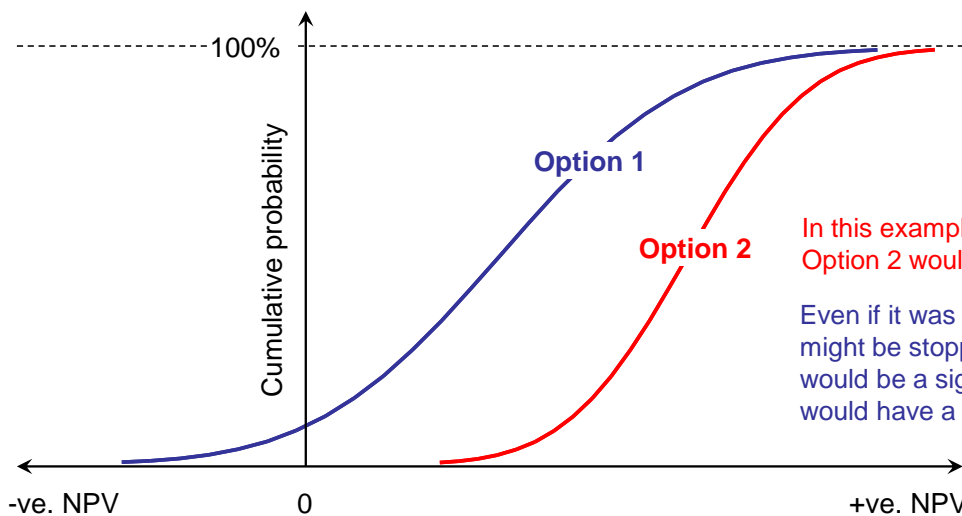
Annual and cumulative cash flow and NPV values can be calculated in the spreadsheet by subtracting overall costs from benefits and applying the NPV formula. A Monte Carlo simulation can then be used to calculate how these outputs are driven by the risk inputs, typically displaying the results in S-curve format.

The NPV formula

$$NPV = \sum_{t=0}^n C_t / (1 + D)^n$$

C_t = the net cash flow over a period of time (typically 1 year),
 t = the period of time during which that cash flow takes place,
 D = discount rate (%), real terms rate of loss in the value of cash,
 n = the number of time periods over which NPV is calculated

Example NPV Risk Analysis results



Common faults

- Failure to develop the level of detail in the NPV risk model iteratively in a top-down manner e.g. by using a detailed deterministic NPV risk model as the starting basis.
- Including a risk adjustment in the discount rate used for the risk model – in effect double counting for risk.
- Failure to use robust risk estimating techniques when developing input estimates to the model – all quantitative risk modelling of this nature is critically dependent upon the quality of the input data.
- Using NPV risk analysis to make choices between projects in a portfolio – although this is common practice, strictly speaking the approach should only be used to support mutually exclusive choices.