

- **Risk** arises in the investment evaluation because the forecasts of cash flows can go wrong. Risk can be defined as variability of returns (NPV or IRR) of an investment project.
- Decision-makers in practice may handle risk in **conventional ways**. For example, they may use a shorter payback period, or use conservative forecasts of cash flows, or discount net cash flows at the risk-adjusted discount rates. **Statistical techniques** are used to measure and incorporate risk in capital budgeting. Two important statistics in this regard are the expected monetary value and standard deviation.
- **Expected Monetary Value** is the weighted average of returns where probabilities of possible outcomes are used as weights.
- **Sensitivity Analysis** It is a method of analysing change in the project's NPV for a given change in one variable at a time. It helps in asking "what if" questions and calculates NPV under different assumptions.
- **Scenario Analysis** considers a few combinations of variables and calculates NPV for each of them. It is a usual practice to calculate NPV under normal, optimistic or pessimistic scenario.

- Sensitivity or scenario analysis forces the decision-maker to identify underlying variables, indicates critical variables and helps in strengthening the project by pointing out its weak links. Its limitations are that it cannot handle a large number of interdependent variables and at times, fails to give unambiguous results.
- **Simulation Analysis** The analyst specifies probability distributions for variables and computer generates several hundred scenarios, probability distribution for the project's NPV along with the expected NPV and standard deviation. It overcomes the limitations of sensitivity or scenario analysis.
- **Decision Tree Analysis** Another technique of resolving risk in capital budgeting, particularly when the sequential decision-making is involved, is the decision tree analysis. The decision tree provides a way to represent different possibilities so that we can be sure that the decisions we make today, taking proper account of what we can do in the future.

To draw a decision tree, branches from points marked with squares are used to denote different possible decisions, and branches from points marked with circles denote different possible outcomes. In a decision tree analysis, one has to work out the best decisions at the second stage before one can choose the best first stage decision.

Decision trees are valuable because they display links between today's and tomorrow's decisions. Further, the decision-maker explicitly considers various assumptions underlying the decision. The use of decision tree is, however, limited because it can become complicated.

- **Utility Theory** One important theory, which provides insight into risk handling in capital budgeting, is the utility theory. It aims at including a decision-maker's risk preferences explicitly into the capital expenditure decision. The underlying principle is that an investor prefers a higher return to a lower return, and that each successive identical increment of money is worth less to him than the preceding one. The decision-maker's utility function is derived to determine the decision's utility value.

The direct use of the utility theory in capital budgeting is not common. It is very difficult to specify utility function in practice. Even if it is possible to derive utility function, it does not remain constant over time. Problems are also encountered when decision is taken by group of people. Individuals differ in their risk preferences.