



## Risk and Uncertainty

An individual's attitudes towards risk depend upon his choices and the returns he expects to obtain from them. Generally, higher returns are expected from higher risk. Any decision on the part of an individual reflects his attitude or preference from risk. The risk preferences differ from one individual to another. Some persons are willing to take risk, others are averse to taking risk and still others neutral to risk. Persons who take risk expects a reward in the form of higher returns, profits or money income or utility.

Uncertainty is '0' or '1'. Risk is between '0' and '1'. If an event happens with certainty, then its probability is '1'. Non-occurrence implies a probability of '0'. Uncertainty consists of binary variable occurrence or multi-occurrence. Or it never becomes '0' or '1'. Risk is always about occurrence. For example: rain will occur with a probability 0.7,  $P(X) = 0.7$ . the event X is occurrence of rain. Uncertainty is about whether rain will occur at all.

Consider once again a firm under perfect competition. It faces a state of nature or environment, which it cannot control but which could affect the price of its product, the prices of its inputs as well as the production function. For example, an unexpected surge in consumer confidence can increase the demand for the product and therefore the price of the product; an unanticipated disruption of petroleum supplies could increase the price of some of the inputs and a shift in winds could bring rain when it is needed and improve the natural productivity even though there were to be no change in the inputs. The occurrence of any particular state of nature is stochastic. This implies that there is another that is a third element in the analysis of a firm. In the traditional theory of perfect competition, there were only two elements. The first of these was the price of the product and the prices of the inputs, which were parametric to an individual firm, but were determined by the model. The second was the level of production, which an individual firm had to decide taking onto account the given product and the input prices. These prices are not expected to change from the current period at which the decision is taken by the firm and the subsequent period at which the desired quantity of output materializes. Even if the change were to occur, the change, its timing and quantum would be perfectly anticipated. This made the analysis entirely deterministic. With uncertainty being brought into the analysis there is a third element, the state of nature, which is stochastic. In the period subsequent to the one the firm has to make a decision, it could have the effect of altering the prices of the product and the inputs in several ways, depending on the state of nature that occurs. The state of nature cannot be predicted in advance, and yet the firm must take that into account in order to take a decision. With these possible input and product price changes, the profit outcome of the firm's actions is not uniquely determined. Instead, there may be several distinct outcomes, some of which may be negative. Under this circumstance is rational decision making possible? If so, how would a firm or for that matter any economic agent go about it? It can be seen that with uncertainty, the outcome of any action will not be unique, and that there may be several possible outcomes depending on the state of nature that would occur. It may be possible to attach a probability



to each of these possible outcomes, either based on some experience, or a priori reasoning such as the probability of obtaining a head on tossing an evenly weighted coin. If this were to be the case some sort economic calculation is possible. This would place the economic agent in a position of risk. If on the other hand, no probabilities could be attached to the outcomes, the economic agent would be in a situation not of risk, but of pure uncertainty. The analysis in this lesson, from now on, will be confined to situations of risk and not pure uncertainty. The choice made by an economic agent would depend upon the degree of risk and the economic agent's attitude towards risk.

To explain a person's attitude towards risk, consider a gamble when a coin is tossed and payment is made to a player. Suppose a person has Rs. 10,000 and he offers to bet Rs. 10,000 on the toss of a coin. If a head is tossed, he earns Rs. 10,000 and if a tail is tossed, he loses Rs. 10,000. Each of the two possible outcomes is equally likely to happen. It means that the probability of each outcome is 50 per cent. The expected (monetary) value or payoff of this game is  $E_v = 0.5 (10,000) + 0.5 (-\text{Rs. } 10,000) = \text{Rs. } 5,000 - \text{Rs. } 5,000 = 0$

This is called a fair game in which the expected value of the outcome is zero. These are three types of individual attitudes towards risk which depend upon whether or not a person would accept a fair game.

### **1. Risk Neutral:**

A risk neutral is a person who will play the game if the odds are favourable to him. He will not play if the odds are unfavourable and will be indifferent about playing a fair game.

### **2. Risk Loving:**

A person is risk loving if he is prepared to play the game even when the odds are unfavourable to him. He will play the game even if the chance of winning is Rs. 1,000 against losing Rs. 10,000.

### **3. Risk Averse:**

A risk averse person will not play the game if the odds are unfavourable to him. But he may play if the odds are sufficiently favourable to him. He will not be prepared to play even a fair game.

