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1.1 Basics and Definitions

Uncertainty is at the heart of insurance. This is already manifested in our limited knowledge about (observable) past events. In the "real" world, all our activities depend on uncertain and unknown circumstances beyond the control of a single individual. Unambiguous, deterministic cause-effect relationships are replaced by ambiguity in the perception of the economic environment. With respect to the future, uncertainty looms even larger. However, it is possible to make forecasts about future events even with incomplete knowledge of past ones.

There are different *degrees of uncertainty*. (1) Uncertainty where the structure of the system and the cause-effect relationships are known. (2) Uncertainty with known probability distributions (uncertainty of the first degree, usually called risk). Individuals have a probabilistic but exact notion of the world. Probabilities can be based on objective evidence or on subjective judgment. (3) Uncertainty without the knowledge of probabilities. (4) Uncertainty arising out of game situations (uncertainty of the second degree), where individuals play against each other and choose from a set of feasible strategies. Note that the adversary also can be "Nature" rather than a human being, in which case the situation belongs to category No. 2. (5) Complete ignorance with regard to the set of feasible strategies and hence their probabilities of occurrence.

In formal decision theory, these five cases are commonly classified according to their information structure:

- Risk situation [case No. 2];
- Uncertainty in the narrow sense [case No. 3];
- Game situation [case No. 4].