Time consistent and information monotone risk functionals

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Abstract

We give the (obvious) definitions of time-consistent and information monotone risk functionals and demonstrate that both properties are desirable, but the class of functionals exhibiting both properties is very small. For the distortion functionals, we show that only the extreme cases, the essential supremum and the expectation are time-consistent and the same extremes also qualify for compositions of conditional functionals to become information monotone.

However, a new decomposition in time allows us to write a given risk functional as a decomposition in random risk functionals such that the notion of time consistency can be kept. However, this means that a decision maker planning with a certain risk functional today has to anticipate that tomorrow, he/she has to valuate risk in a differently in a way, which depends on the information obtained in the meantime. These cdecompoistion schemes allow also for efficient numerical solution.