ABSTRACT - We introduce the concept of a risk form, which is a real functional on the product of two spaces: the space of measurable functions and the space of measures on a Polish space. We present a dual representation of risk forms and generalize the classical Kusuoka representation to this setting. For a risk form acting on a product space, we define marginal and conditional forms and we prove a disintegration formula, which represents a risk form as a composition of its marginal and conditional forms. We apply the proposed approach to two-stage optimization problems with partial information and decision-dependent observation distribution. Next, we consider risk measurement in controlled partially observable Markov systems in discrete time. In such systems, part of the state vector is not observed, but affects the transition kernel and the costs. We introduce new concepts of risk filters and study their properties. We also introduce the concept of conditional stochastic time consistency. We derive the structure of risk filters enjoying this property and prove that they can be represented by a collection of law invariant risk measures on the space of function of the observable part of the state. We also derive the corresponding dynamic programming equations. Finally, we illustrate the results on examples.

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