

# Bayesian Updating for Complementarily Additive Beliefs under Ambiguity

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## Abstract

This paper proposes a formal characterization of extended Bayesian updating for complementarily additive subjective probabilities under ambiguity, which are compatible with the wide range of choice behavior toward ambiguity. The main result shows that, based on the biseparability in Ghirardato and Marinacci (2001), extended Bayesian updating characterizes the update rule which constitutes a step-by-step composite update of priors, where every step is conducted by only one of Dempster-Shafer rule, Bayes' update rule, and Fagin-Halpern rule. As applications, more specific preference relations are examined, such as the maxmin expected utility preferences by Gilboa and Schmeidler (1989), the Choquet expected utility preferences (Nakamura, 1990), and the Concave expected utility by Lehrer (2009).

**JEL Classification:** D81

**Keywords:** ambiguous belief, Bayesian update rule, multiple priors, capacity, subjective probability