

Exercise Strategies for American Exotic Options under Ambiguity

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Abstract. We analyze several exotic options of American style in a multiple prior setting and study the optimal exercise strategy from the perspective of an ambiguity averse buyer in a discrete model of Cox–Ross–Rubinstein style. The multiple prior model relaxes the assumption of a known distribution of the stock price process and takes into account decision maker’s inability to completely determine the underlying asset’s price dynamics. Solving the optimal stopping problem arising from the American style structure the decision maker uses a class of measures to evaluate her expected payoffs instead of a unique prior. Given time-consistency of the set of priors an appropriate version of backward induction leads to the solution as in the classical case. Using a duality result the multiple prior stopping problem can be related to the classical stopping problem for a certain probability measure – the worst-case measure. Therefore, the problem can be reduced to specifying the worst-case measure. We provide explicit form of the worst-case measure for four classes of exotic options exploiting the observation that the options can be decomposed in simpler event-driven claims. Depending on the payoff structure the worst-case measure changes over time and becomes state-dependent even in iid settings.

Keywords Multiple prior model; optimal stopping under ambiguity; ambiguity averse decision maker; path-dependent worst-case prior;