

**Efficient Approximations to American Option Prices, Hedge Parameters and Exercise Boundaries**

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Abstract:

We introduce a fast and accurate method to price and hedge American options on the basis of a table that gives the values of the exercise boundary at a few “canonical” time points. A key idea underlying this method is the reduction of American option valuation problems to a *single* optimal stopping problem indexed by one parameter in the absence of dividends, and by two parameters in other cases. For a grid of parameter values, an accurate and efficient algorithm has been developed to compute the optimal stopping boundaries. In the canonical time scale, these stopping boundaries are well approximated by certain piecewise linear functions that can be easily tabulated. Once the boundary is determined in this way, one-dimensional numerical integration can be used to evaluate the option price for any parameter value in the grid, and option prices for parameter values not belonging to the grid can be obtained by interpolation.