# Efficient binomial methods for the evaluation of options with cash dividends

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**Abstract.** In this contribution, we consider options written on stocks which pay cash dividends. Dividend payments have an effect on the value of options: high dividends imply lower call premia and higher put premia. While exact solutions to problems of evaluating both European and American call options and European put options are available in the literature, for American-style put options early exercise may be optimal at any time prior to expiration even in the absence of dividends. In this case numerical techniques, such as lattice approaches, are required. Discrete dividends produce a shift in the tree; as a result, the tree is no longer reconnecting beyond any dividend date. Methods based on non-recombining trees give consistent results, but they are computationally expensive. We analyze efficient binomial algorithms based on an interpolation technique and other enhancements that allow us to compute fast and accurate option prices even in the case of multiple dividends. Finally, we present numerical results.

**Keywords:** Options on stocks, discrete dividends, binomial lattices.

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