

AN IMPROVED APPROACH FOR VALUING AMERICAN OPTIONS AND THEIR GREEKS BY LEAST-SQUARES MONTE CARLO SIMULATION

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ABSTRACT. This paper presents a new methodology to approximate the value of American options by least-squares Monte Carlo simulation. Whereas Longstaff and Schwartz's approach do not utilize the underlying asset price movement, we develop several methods that incorporate it into option pricing. One category improves the R-squares from the regressions by using, [1] the weighted regression with the same regressors and, [2] new regressors which are related to the discount factor from the current decision to exercise time. The other category improves the computational speed without sacrificing the convergence level by, [1] terminating early during the backwardation procedure and, [2] decreasing the number of observations for the regressors. Finally, combining both methods, we can get improved R-squares and computational speed in comparison to Longstaff and Schwartz's approach.

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