

PRICING THE ASIAN CALL OPTION

VINH XUAN DANG,
SCOTT GLASGOW,
HARRISON POTTER,
STEPHEN TAYLOR

ABSTRACT. Background material on measure-theoretic probability theory and stochastic calculus is provided in order to clarify notation and inform the reader unfamiliar with these concepts. These fields are then employed in exploring two distinct but related approaches to fair option pricing: developing a partial differential equation whose solution, given specified boundary conditions, is the desired fair option price and evaluating a risk-neutral conditional expectation whose value is the fair option price. Both approaches are illustrated by example before being applied to the Asian call option.

Two results are obtained by applying the latter option pricing approach to the Asian call option. The price of an Asian call option is shown to be equal to an integral of an unknown joint distribution function. This exact formula is then made approximate by allowing one of the random variables to become a parameter of the system. This modified Asian call option is then priced explicitly, leading to a formula that is strikingly similar to the Black-Scholes-Merton formula, which prices the European call option. Finally, possible methods of generalizing the procedure to price the Asian call option both exactly and explicitly are speculated.