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# The Istambul option: where European becomes Asian

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We introduce a new type of option, similar to Asian options but where the averaging period is random. The average begins when the underlying price hits a barrier for the first time in the case of a continuous average. The average begins when the underlying price exceeds a barrier for the first time in the case of a discrete arithmetic average. We give a closed-form formula for the price in both cases, based on the Lognormal approximation of Asian options. The formula involves an integral or a sum of Black-Scholes type formulæ. The basic step in the derivation is the use of the strong Markov property of Brownian motion. Numerical values are presented and compared to Monte-Carlo simulation. A few remarks on delta-hedging are given.