

Root's Barrier: Construction, Optimality and Applications to Variance Options

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Recent work of Dupire (2005) and Carr & Lee (2010) has highlighted the importance of understanding the Skorokhod embedding originally proposed by Root (1969) for the model-independent hedging of variance options. Root's work shows that there exists a barrier from which one may define a stopping time which solves the Skorokhod embedding problem. This construction has the remarkable property, proved by Rost (1976), that it minimises the variance of the stopping time among all solutions.

In this work, we prove a characterisation of Root's barrier in terms of the solution to a variational inequality, and we give an alternative proof of the optimality property which has an important consequence for the construction of subhedging strategies in the financial context.

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