Delta Gamma Hedging and the Black-Scholes Partial Differential Equation (PDE)

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Abstract

The objective of this paper is to examine the notion of delta-gamma hedging using simple stylized examples. Even though the delta-gamma hedging concept is among the most challenging concepts in derivatives, standard textbook exposition of delta-gamma hedging usually does not proceed beyond a perfunctory mathematical presentation. Issues such as contrasting call delta hedging with put delta hedging, gamma properties of call versus put delta hedges, etc., are usually not treated in sufficient detail. This paper examines these issues and then places them within the context of a fundamental result in derivatives theory - the Black-Scholes partial differential equation. Many of these concepts are presented using Excel and a simple diagrammatic framework that reinforces the underlying mathematical intuition.

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