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A generic decomposition formula for pricing vanilla options under stochastic volatility models.

Raúl Merino[1], **Josep Vives**[2]

We obtain a decomposition of the call option price for a very general stochastic volatility diffusion model, extending a previous decomposition formula for the Heston model. We realize that a new term arises when the stock price does not follow an exponential model. The techniques used for this purpose are non anticipative. In particular, we also see that equivalent results can be obtained by using Functional Itô Calculus. Using the same generalizing ideas, we also extend to non-exponential models the alternative call option price decomposition formula written in terms of the Malliavin derivative of the volatility process. Finally, we give a general expression for the derivative of the implied volatility under both the anticipative and the non-anticipative cases.

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[1]Departament de Probabilitat, Lògica i Estadística
Universitat de Barcelona
Gran Via 585, 08007 Barcelona, Spain
raul.merino85@gmail.com

[2]Departament de Probabilitat, Lògica i Estadística
Universitat de Barcelona
Gran Via 585, 08007 Barcelona, Spain
josep.vives@ub.edu