

6–10 July, 2026, Santiago de Compostela, Spain.

A Free Boundary Value Problem for a Nonlinear Stationary Black–Scholes Equation Arising in Finance

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Abstract

We prove existence and uniqueness of a solution to a boundary problem for a stationary generalized Black-Scholes equation with nonlinear volatility. We derive a single implicit equation for the free boundary position and the closed form solution. It is a generalization of the well-known explicit closed form solution derived by Merton for the case of a constant volatility. We apply it to the problem of pricing American style of perpetual put options under transaction costs.

References

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