Quanto European Option Pricing With Ambiguous Return Rates and Volatilities

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This paper presents a model of quanto (quantity adjusting option) European option pricing when returns and volatilities are ambiguity. First, we use set-valued stochastic differential inclusions to describe the Black-Scholes quanto model with ambiguous return rates and volatilities. The risk neutral martingale measures are not unique but a set in this model. So we consider the upper and lower bounds of contingent claim by using the maximal and minimal conditional expectations, respectively. Since the maximal (minimal) conditional expectations are nonlinear, we provide a computational method for calculating maximal (minimal) conditional expectations by backward stochastic differential equations in the second part of this paper. Third, we give the exact upper bound and lower bound formulas of quanto European options and provide a numerical example to illustrate our model. Finally, we show some conclusions and further work.

Published in: IEEE Transactions on Fuzzy Systems (Volume: 25 , Issue: 2, April 2017)

Page(s): 417 - 424

DOI: 10.1109/TFUZZ.2016.2598358

Date of Publication: 05 August 2016

Publisher: IEEE

ISSN Information:

Funding Agency:

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