

Adiabaticity Conditions for Volatility Smile in Black-Scholes Pricing Model

L. Spadafora, G. P. Berman, F. Borgonovi

(Submitted on 17 Mar 2010 (v1), last revised 24 Mar 2010 (this version, v2))

Our derivation of the distribution function for future returns is based on the risk neutral approach which gives a functional dependence for the European call (put) option price, $C(K)$, given the strike price, K , and the distribution function of the returns. We derive this distribution function using for $C(K)$ a Black-Scholes (BS) expression with volatility in the form of a volatility smile. We show that this approach based on a volatility smile leads to relative minima for the distribution function ("bad" probabilities) never observed in real data and, in the worst cases, negative probabilities. We show that these undesirable effects can be eliminated by requiring "adiabatic" conditions on the volatility smile.

Subjects: **Pricing of Securities (q-fin.PR)**

Cite as: [arXiv:1003.3316v2](https://arxiv.org/abs/1003.3316v2) [q-fin.PR]

Submission history

From: Luca Spadafora [[view email](#)]

[v1] Wed, 17 Mar 2010 07:53:00 GMT (182kb,D)

[v2] Wed, 24 Mar 2010 15:09:59 GMT (182kb,D)

[Which authors of this paper are endorsers?](#)

Link back to: [arXiv](#), [form interface](#), [contact](#).

Download:

- [PDF](#)
- [Other formats](#)

Current browse context:

q-fin.PR

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1003](#)

Change to browse by:

[q-fin](#)

References & Citations

- [NASA ADS](#)

Bookmark([what is this?](#))

