Short Review

by Prof. Leda Minkova, DSi, Sofia University
regarding participation in the selecting procedure, published in State Gazette No.108 of 22.12.2020, for the position of Associate Professor in the higher education field: 4.5 Mathematics, Probability Theory (Stochastic Models in Finance).

Information about the procedure. One candidate has submitted an application for the position - Zsvetelin Stefanov Zaevski, PhD.

Information about the candidate. Tsvetelin Zaevski has a master degree in Applied Mathematics from Sofia University. From 2004 to 2009 he worked as a part time teaching assistant in the Faculty of Mathematics and Informatics in Sofia University. He defended his PhD in Probability and Statistics in 2013. During the last two years he gives a course in Mathematical Theory in Financial Markets in Sofia University. Since November 2014 he has been Assistant Professor in the Institute of Mathematics and Informatics.

Publications. 10 papers are presented for application. 9 of them are in journals with IF. The total IF is 21.059. One of the papers is with one coauthor, two with two coauthors, and one of them with 3 coauthors. All the papers are in the field of finance with application of mathematics.

In paper [1] the stochastic volatility model with Lévy jumps is introduced. The European call option formula is derived. Models with tempered stable jumps and compound Poisson jumps are compared empirically .A new algorithm is given in paper [2]. It is based on the method of Spectral Clustering and integrates an additional information about a priori given relations among the genes. The relation between the method of Spectral Clustering and Principal Component Analysis (PCA) is given. A method for pricing the defaultable derivatives is given in paper [3]. The asset price is described by a SDE driven by a jump process. The stopping time is the time of the first jump. The main result is Theorem 3.2. In paper [4], two schemes for pricing the defaultable derivatives are analyzed. The underlying assets are Gaussian or Lévy. The intensity and loss rates are deterministic or stochastic. The corresponding differential equations are derived.

American perpetual options are analyzed in papers [5] and [6]. A new form of the early exercise premium for the American type derivatives is given in [5]. The main result is the decomposition of American derivatives (Theorem 2.2). Some examples of American put options are given in [6]. A new approach for deriving an early exercise boundary is presented and compared with other numerical methods.

In papers [7] and [8], the perpetual game options are considered. These exotics behave similarly to the American options, giving their owner the additional right to cancel the contract at a randomly chosen time. The analyzed options are American type with stochastic maturity date. The optimal time to exercise the option is obtained. Actually, in this way, the option pricing problem is to estimate the first passage time problem.

A special kind of game option is presented in [9]. The amount that the seller has to pay in case of early exercise is the usual option payment multiplied by a constant. Additionally, the discount factor is introduced. The fair option price is calculated as a first exit problem.

The Laplace transform of the first hitting time of a Brownian motion to piecewise linear functions is derived in [10].

Remark. The paper [3] should be cited in paper [4].

Conclusion. In view of the above, I am fully convinced that Tsvetelin Zaevski deserves to be appointed as Associate Professor in Probability and Statistics. I strongly believe that the members of the Scientific Jury should vote positively.

Sofia, April, 2021 Leda Minkova