OPINION

by Prof. Irina Aleksandrovna Radeva, PhD,
Institute of Information and Communication Technologies – Bulgarian Academy of Sciences,
external member of the Scientific Jury,

on the competition for the academic position "Professor"
in the area of higher education 4. Natural Sciences, Mathematics and Informatics,
professional field 4.5. Mathematics,
scientific specialty "Operations Research" (Financial Mathematics),
for the needs of the Department of Operations Research, Probability and Statistics
of the Institute of Mathematics and Informatics – Bulgarian Academy of Sciences

1. Data on the competition

The competition was announced by IMI – BAS in the State Gazette, issue 63 of 10.07.2026. The Scientific Jury was appointed by Order No. 73 of 23.07.2026 of the Director of IMI – BAS, Corr. Member Prof. P. Boyvalenkov, DSc, on the grounds of Art. 29a, para. 1 of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), Art. 12, para. 4 of the Regulations of BAS on the acquisition of scientific degrees and the occupation of academic positions (BAS Regulations), and a decision of the Scientific Council of IMI (Protocol No. 7 of 10.07.2026). One candidate submitted documents within the deadline: Assoc. Prof. Tsvetelin Stefanov Zaevski, DSc, from the Department of Operations Research, Probability and Statistics (ORPS) of IMI – BAS. The submitted set of documents is complete and complies with Art. 9, para. 1 of the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at IMI – BAS.

2. Data on the candidate

Tsvetelin Zaevski was born in 1974. In 1999 he graduated in Applied Mathematics from the Faculty of Mathematics and Informatics (FMI) of Sofia University "St. Kliment Ohridski" with a Master's degree. In 2013 he defended there a PhD thesis entitled "Combined Itô and Lévy Processes" (supervisor Prof. Racho Denchev, DSc). In 2025 he defended at IMI – BAS a thesis for the scientific degree "Doctor of Sciences" entitled "A Method for Pricing American-Type Derivatives" (diploma No. 001727 of 03.04.2025).

Since 2014 the candidate has worked at IMI – BAS. Since 2021 he has held the academic position "Associate Professor" in the scientific specialty "Probability Theory and Mathematical Statistics" (Stochastic Models in Finance). In 2020 – 2024 he was Secretary, and since 2024 he has been Head of the Department of Operations Research, Probability and Statistics (ORPS). According to certificate No. 509 of 12.08.2026, as of 01.08.2026 his length of service at IMI – BAS is 12 years, 6 months and 16 days, of which 5 years and 2 months as Associate Professor.

3. Compliance with the regulatory requirements

The conditions of Art. 29, para. 1 of ADASRB are fulfilled. The candidate holds the PhD degree (item 1) and has held the academic position "Associate Professor" for more than two academic years (item 2). For the competition 16 publications are submitted. They do not repeat the publications submitted for the degrees "PhD" and "Doctor of Sciences" and for the position "Associate Professor" (item 3). This is certified by a declaration of the candidate under Art. 29, para. 1, item 3 of ADASRB (Appendix 3.1). Other original scientific works, assessed as a whole, are also submitted: a complete list of 63 publications (item 4). No evidence of plagiarism or unreliability of the scientific data has been found (item 6).

The minimum national requirements under Art. 2b, para. 2 and 3 of ADASRB, the requirements of IMI – BAS by groups of indicators (Art. 2, para. 1 of the IMI Regulations) and the specific requirements of IMI – BAS (Art. 3 of the same Regulations) were checked against the candidate's reference (Appendix 2.2) and the evidence attached to it. The result is summarised in the table.

Group	Indicators	National requirements (RIADASRB)	Requirements of IMI – BAS	Candidate
A	Indicator 1	50	50	50
B	Indicators 3 or 4	100	100	150
C	Sum of indicators 5 to 10	200	220	406
D	Indicator 11	100	140	594
E	Sum of indicators 12 onwards	100	150	181
	Total	**550**	**660**	**1381**
Specific requirements of IMI – BAS				
	Publications in journals with IF or SJR (Art. 3, para. 1, item 4)	–	12	16
	of which in journals with IF	–	6	14
	Publications after the degree "Doctor of Sciences", 25.03.2025 (Art. 3, para. 3)	–	6	6: [6], [9], [11], [14], [15], [16]

The requirements are fulfilled for all indicators.

4. Scientific works and citations

For the competition 16 publications from the period 2022 – 2026 are submitted. All are in English, in journals indexed in Web of Science and/or Scopus. Their distribution by quartile, co-authorship and citations (according to the list for the competition) is summarised in the table.

Quartile (JCR)	Publications (IF)	Single-authored	Citations
Q1	[12] 10.8; [7] 7.5; [16] 2.8; [11] 2.3; [15] 1.6	[12], [16], [15]	[12] 2; [7] 20; [11] 2
Q2	[6] 1.5; [4] 0.9	–	[4] 5
Q3	[14] 1.2; [3] 1.0; [13] 0.9	[14], [13]	[3] 2
Q4	[2] 0.7; [8] 0.4; [10] 0.4; [1] 0.3	[10]	[2] 10; [10] 2; [1] 1
Without IF	[9] SJR 0.8; [5] SJR 0.374	–	[9] 2; [5] 1
Total	**16**	**6**	**47**

The six single-authored publications are in the candidate's main research direction: American-type derivatives. His contribution to the joint publications is accepted as equal to that of the co-authors.

The complete list of the candidate's publications (including those submitted for the competition) contains 63 publications from the period 2007 – 2026, of which 54 in journals with IF or SJR and 23 single-authored. Notable are the rising dynamics of the publication activity in 2024 – 2026 (38 of the 63 publications) and its orientation towards journals with IF.

The complete list of citations contains 221 citations of 47 publications, of which 166 in WoS and/or Scopus. The list of citations for the competition contains 99 citations in WoS and/or Scopus of 30 publications, without self-citations. Of them, 47 are of ten of the publications for the competition and the remaining 52 are of earlier works of the candidate. The citations are mainly by foreign authors in journals on financial and applied mathematics. This shows that the candidate's results are recognised by the international community.

5. Scientific contributions

The contributions in the 16 submitted publications are systematised below in three groups.

A. New scientific results

1. The notion of an ϵ-optimal boundary for American options is introduced (Definition 3.1). Its properties are proven: location above the strike (Proposition 3.1), independence of the ϵ-optimal band from the initial price (Proposition 3.2) and coincidence with the optimal boundary at maturity (Proposition 3.3). A closed-form solution is obtained for the perpetual case [12].
2. A put-call duality is proven for cancellable American options with a three-component penalty, without and with maturity (Theorems 3 and 4). This duality does not hold under the classical fixed penalty. Polynomial equations for the optimal boundaries in the perpetual case are derived, with proven existence and uniqueness of the solutions [15].
3. It is established for which values of the three-component penalty the cancellable American option is a proper cancellable option, an (L, v)-American derivative or a standard American option (Theorem 4.16 and Corollary 4.17 for put options and Theorem 5.4 for call options) [14].
4. The domain and the abscissas of convergence are determined for the moment generating function of the log-returns averaged over the stationary distribution of the volatility in the Heston model (Proposition 3.1 and Theorems 3.1–3.4) [8].

B. Development and generalisation of existing results

1. The formulas for the moments and for the mean residual life function of the four-parameter Kies distribution are corrected and proven [1].
2. New families of distributions on a finite interval are defined: composite [2], min- and max-distributions [3], mixtures with random parameters [4] and trigonometric compositions [5]. Their probabilistic properties are derived, including a classification of the density shape of the Kies distribution (Proposition 2.1) [2], closedness of the min-family under the minimum of independent variables (Theorem 3.5) [3] and the tail risk measures VaR, AVaR and ExVaR [2, 3]. Semi-closed-form formulas for the Hausdorff saturation of the new families are obtained (Theorem 4.4 [2], Section 5 [3], Section 4 [4], Propositions 4.1–4.3, 5.1 and 5.2 [5]), as well as a relation between the saturations of dual distributions (Theorem 2.7) [5].
3. Formulas for the Expected Shortfall and for the expectile risk measure are derived via the characteristic functions of the Black-Scholes, Heston and Bates models, the exponential tempered stable model and the stochastic volatility model with tempered stable jumps (Proposition 3.2 and Theorem 3.2) [7]. Formulas for the Entropic VaR for the same models are also derived. It is shown that the measure remains coherent when the domain of the moment generating function is bounded [9].

4. The existence of a unique homoclinic orbit for a perturbed SIQR model is proven (Theorem 1). The Melnikov integral is derived for a multi-frequency perturbation, generalised through the characteristic function of a probability distribution [6].

C. Scientific and applied contributions

1. A scheme for pricing American-type derivatives is developed: an explicit solution for the perpetual case, an approximation of the optimal boundary for finite maturity and a solution of the pricing problem by the Crank-Nicolson scheme. It is applied to futures [10], power options [11], ϵ-optimal options [12] and cancellable call options with finite maturity [13].
2. An empirical study of VaR, ES, ERM and Entropic VaR is carried out on the S&P 500 index for the period 2004 – 2022, with calibration of the models on a rolling window [7, 9].
3. A semi-statistical framework is proposed for building the yield curve from primary market data in low-liquidity markets, with calibration of the Vasicek and Cox-Ingersoll-Ross models through the transition densities. It is motivated by the specifics of the Bulgarian government securities market and is validated on data for US debt instruments [16].
4. The Melnikov approach is applied to a SIQR epidemiological model and to antenna arrays [6].

The candidate's reference reflects the obtained results correctly. The most significant contributions are those on American-type derivatives [12, 14, 15]. They introduce new notions and prove new statements in an established field, and they form the candidate's own research direction. By response in the literature, [7] stands out with 20 citations, followed by [2] with 10. The contributions in financial mathematics [7–16] are within the scientific specialty of the competition.

6. Teaching and project activity

According to certificate No. 66 of 05.08.2026, the candidate conducted exercises in "Theory of Finance 2" at FMI of Sofia University "St. Kliment Ohridski" (academic years 2004/2005 – 2008/2009) as a part-time lecturer. Since 2019/2020 he has given lectures, and since 2022/2023 also exercises, in "Mathematical Theory of the Financial Market" for Bachelor's and Master's students. He is a co-author of two textbooks published by the "Paisii Hilendarski" University Press.

The candidate is the supervisor of a successfully defended PhD student, Dragomir Nedeltchev (IMI – BAS, 10.02.2026). He has participated in three national projects, funded under the Recovery and Resilience Facility and the Operational Programme "Science and Education for Smart Growth", and in one project under bilateral cooperation with the Serbian Academy of Sciences and Arts. The participation is certified by certificates from IMI – BAS and Sofia University "St. Kliment Ohridski". Since 2024 he has been Head of the ORPS Department.

7. Personal impressions

I know the candidate from my participation in the Scientific Jury for his procedure for the scientific degree "Doctor of Sciences" (2025). My impressions of his work are excellent. Tsvetelin Zaevski is an established researcher with a clear research direction, high publication activity and the ability to supervise young scientists. Now I have the opportunity to follow also the continuation of the results of his thesis. The publications after the defence, especially those on cancellable options [14, 15], show that the research direction of the thesis continues to develop

and is not a completed cycle. This combination, an established research direction and the ability to develop it further, is for me the strongest argument in support of the candidacy.

8. Conclusion

All conditions of ADASRB, its Implementing Regulations, the BAS Regulations and the Regulations of IMI – BAS are fulfilled. I give a **definitely positive conclusion for the election of Assoc. Prof. Tsvetelin Stefanov Zaevski, DSc, to the academic position "Professor"** in the area of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.5. Mathematics, scientific specialty "Operations Research" (Financial Mathematics).

On this basis, I take the liberty to recommend that the Scientific Jury propose to the Scientific Council of IMI – BAS to elect Assoc. Prof. Tsvetelin Stefanov Zaevski, DSc, to the academic position "Professor" in professional field 4.5. Mathematics, scientific specialty "Operations Research" (Financial Mathematics), for the needs of the ORPS Department.

Sofia, 22.10. 2026 Signature: ……

(Prof. Irina Radeva, PhD)