EXAMINER'S ASSESSMENT

regarding the selection procedure for the academic position of „Professor"

in the area and professional field 4.5. Mathematics (Probability and statistics)

for the needs of Sofia University „St. Kliment Ohridski" (SU),

Faculty of mathematics and informatics (FMI),

announced in the State Gazette, issue 21 dated 13 March 2020 year and

on the Internet sites of FMI and SU

This examiner assessment is prepared by a**ssoc. prof. PhD Pavlina Kalcheva Jordanova (Yordanova),** from the departament "Economics and mathematical modeling", Faculty of Mathematics and Computer Science, Konstantin Preslavsky University of Shumen, area and professional field 4.5. Mathematics (Theory of probability and mathematical statistics), in my capacity as a member of Academic Jury for the selection procedure for the academic position of **Professor** on the basis of Sofia University's Rector's order No РД 38-267 dated 10.07.2020 year.

Only one candidate assoc. prof. Dr. Mladen Svetoslavov Savov from the Institute of Mathematics and informatics (IMI), Bulgarian Academy of Science (BAS) has applied for the selection procedure.

I. General description of the provided materials

1. General introduction of the procedure

The presented documents by the candidate for this selection procedure fulfil the Requirements of the Law for Development of the Academic Staff in the Republic of Bulgaria, the Regulations for application of the Law for Development of the Academic Staff in the Republic of Bulgaria, and the Requirements for the Development of the Academic Staff at Sofia University.

For participation in the selection procedure the candidate Assoc. Prof. Dr Mladen Savov has presented a **list of totally 14 titles**. All of them are published in international scientific journals. **6 of them are already published studia (papers longer than 20 pages), and 1 of them is an accepted studia**. For participation in the selection procedure there are no monographs, books, patents, neither textbooks nor solution manuals presented. **The enclosed list of all publications** of the candidate contains **33 titles.** There are **copies of 14 papers which participate in the procedure** and **22 another copies** of appendixes, declarations, applications, lists and reports prepared by the candidate and supporting his achievements. For participation in the selection procedure **11 another documents** in the form of official notes, certificates from the employer, or another relevant evidence not prepared by the applicant are enclosed. All the documents are well prepared, carefully arranged and precisely written.

2. General introduction of the candidate

Mladen Savov graduated with a bachelor's degree in Mathematics from Sofia University "St. Kliment Ohridski", FMI, receiving an award for honors in mathematics education in 2004. In 2008, after defending a dissertation on "Behavior of Levy's processes around zero" at the University of Manchester in the UK, he became a PhD of probability and again received an award. This time it is for a young scientist of the year at the Faculty of Engineering and Physical Sciences. In 2008 and 2009 he worked with Prof. J. Bertoin at the Marie-Pierre Curie University in Paris, France. Between 2009 and 2012, he held a position as a Junior Research Fellow in Mathematics at Oxford. In 2011 he received the Scopus Award for Young Mathematical Scientist. From 2012 to 2014 he was a lecturer in Probability and Statistics at the University of Reading, UK. Since 2014 he is an associate professor at IMI - BAS, professional field: Theory of Probability and Mathematical Statistics. He has participated in prestigious international research projects. He has presented papers at numerous international conferences and workshops. In 2016, after successfully defending his dissertation on "Theory

of exponential functionals of Levy's processes" Mladen Savov became a Doctor of mathematical sciences at IMI at BAS-Sofia. Since 2017 he is a guest lecturer at FMI, Sofia University "St. Kliment Ohridski " and associate professor at IMI at BAS-Sofia.

3. General characteristics of the candidate's scientific works and achievements

Mladen Savov has a successfully defended PhD student with a dissertation on the topic "Sample path's properties of Levy's processes" at the University of Reading, UK.

He has led at least one individual international project MOST which is part of "Marie Skłodowska-Curie" activities of the European Framework for Research and Innovation programme Horizon 2020.

He has participated in at least two national projects, namely:

- "Center of Excellence for Informatics and Information and Communication Technology", BG05M2OP001-1.001-0003, headed by Acad. Vesselin Drensky and

- "New mathematical and statistical methods for machine learning with applications in contemporary technologies for genetic sequencing", BNSF I02 / 19, headed by Prof. Dr. Sc. Evgenia Stoimenova.

The following table describes the quantitative characteristics of the scientific works which Mladen Savov submitted for participation in this selection procedure.

Table 1

№	Scientific Data Base	IF (5 year IF)	Quartile according to WoS	SJR according to Scopus	Number of citations in		
					papers in WoS	papers in Scopus	****
[1]	WoS, Scopus ets.	1,496 (1,6)	Q2	2019 1.993	***	***	***
[2]	WoS, ets.	Accepted	***	2019 1.895	***	***	***
[3]	WoS, Scopus ets.	1,62 (1,638)	Q2	2019 0.452	***	***	***
[4]	WoS, Scopus ets.	1,047 (1,028)	Q2	2019 0.946	***	***	***
[5]	WoS, Scopus ets.	1,243 (1,402)	Q3	2019 0.742	***	***	≥ 1
[6]	WoS, Scopus ets.	3,764 (3,046)	Q1	2019 1.036	***	***	***
[7]	WoS, Scopus ets.	2,377 (2,609)	Q1	2019 3.5	≥ 1	**	≥ 2 another
[8]	WoS, Scopus ets.	0,901 (1.026)	Q3	2017 1.792	≥ 1	≥ 2 another	**
[9]	WoS, Scopus ets.	1,94 (2,01)	Q1	2016 4.41	≥ 1	**	**
[10]	WoS, Scopus ets.	0,682 (0,589)	Q4	2015 0.64	***	***	***
[11]	WoS, Scopus ets.	0,484 (n/a)	Q4	2015 0.567	≥ 2	**	**
[12]	WoS, Scopus ets.	0,619 (0,663)	Q4	2014 1.278	***	***	***
[13]	WoS, Scopus ets.	1,296 (1,392)	Q2	2013 1.968	≥ 4* + 4 = 8	≥ 1 another	**
[14]	WoS, Scopus ets.	1,396 (1,867)	Q1	2013 1.894	≥ 4*	≥ 2 another	**
Total		18,865(18,87)		**21.12**	**≥ 17**	**≥ 5 another**	**≥ 3 another**

*Papers do not described in the presented materials for this selection procedure.

** I do not find another.

*** I do not find.

**** monographies, PhD theses ets. internationally referenced issues.

The results in these 14 papers do not repeat those of previous procedures for acquiring a scientific title or academic position. There is no legally proven plagiarism for them.

All these articles are in English and co-authored. In 8 of them the candidate has one more co-author and in the other 6 articles there are a total of three co-authors. In 2 of the publications Mladen Savov is the first author. As far as I do not find declarations for co-authoring in the submitted materials, I assume that the contribution of the co-authors is equal in all the articles.

I suppose that the small number of citations of the submitted works is due to the fact that 1 of the articles is still accepted for publication, 3 of the articles were published in 2020 and 3 of the articles were published in 2019.

Mladen Savov has an h-index 8 according to data from the Web of Science and h-index 9 according to Scopus. He has at least 162 citations, without self-citations. Citation of other articles that have not participated in previous competitions and the citing articles are indexed at least in Web of Science (WoS) or Scopus are over 55.

The presence **of a successfully defended PhD student**, **the described participation in projects and the indicators for the scientific papers described in Table 1** show that the candidate fully meets the minimum national requirements of the Law for Development of the Academic Staff in the Republic of Bulgaria and the additional requirements of Sofia University "St. Kliment Ohridski " for holding the academic position of "professor" in the professional field 4.5. Mathematics (Probability and Statistics).

A more detailed description of the scientific and applied achievements of Mladen Savov can be found in item 5 of this assessment.

4. Characteristic and assessment of the candidate's teaching activities

According to the presented documents Mladen Savov has an extensive teaching experience both in the country and abroad. I have attended some of his on-line lectures. They were characterized by accuracy and a high scientific level. He has prepared many additional materials for his students. He tries to pass on to students the knowledge which he has acquired during the process of his professional and scientific development. Some of his lectures are available for students via online films.

Mladen Savov has a successfully defended PhD student.

5. Content analysis of the scientific and applied achievements of the candidate contained in the materials for participation in the selection procedure

Mladen Savov investigates mainly the asymptotic behavior of various Levy, Markov or Selfsimilar processes and the impact of this behavior on the finiteness of the integrals in which these processes participate.

In [1], a necessary and sufficient condition for the finiteness of an integral of a non-negative, locally bounded, and continuous function of a Levy process is obtained. A generalization of Variance-Gamma processes is discussed in [2]. The contribution of the paper comes from the replacement of the Gamma process by a subordinator, which is a Levy process. Instead of a Wiener process the authors use a strong Markov outer process. Conditions have been found under which these processes are a solution of the Volterra equation. Their asymptotic behavior is thoroughly investigated. In [3] the solution of a specific differential equation (of Wigner) is considered. It arises from problems in thermodynamics and it is analyzed by using the theory of operators in the space L^2. The Monte Carlo method for solving it is proposed. The rate of convergence is estimated by the Berry–Esseen inequality. These make it possible to select the appropriate number of steps to achieve the required accuracy of the approximation. In [4] the asymptotic behavior of the maximum number of subsets with a fixed number of elements of the partition of the set $\{1, 2,\ldots, N\}$ into disjoint subsets is studied. The asymptotics of Bell numbers and the Lambert function are used. The article [5] considers the extinction times of classes of non-Markov self-similar random processes with two-sided jumps and finds their distribution via expressing the corresponding Mellin transformations with appropriate Bernstein-Gamma functions. In [6] the authors attempt to apply stochastic differential equations in financial mathematics. The price of the asset is modeled via a Levy process and the severity of the loss of the asset in case of an accidental stopping of the investment is examined. Publication [7] applies Krein's spectral theory of strings to two strong Markov processes. It is shown that if the transformed killed processes are transformed via a positive linear operator, then due to the Krein's bijective correspondences, the certain forms of duality between the killed and the initial process exist. The article [8] examines the critical case of Brownian motion with drift over the points of Poisson process and shows that, compared to the specific measure considered by it, the process tends to a Bessel process started by a random variable. In [9] the authors examine the convergence of various conditional measures born by the local time of the Brownian motion at zero. Then, they obtain some

properties of the limiting process. A Central Limit Theorem for a specific branching process with possibility of mutation and competition is obtained in [10]. The asymptotics of the probabilities for a Levy process to stay between monotonic boundaries are studied in [11]. In [12] the theory of compact operators on Banach space and the general theory of indecomposable positive semigroups are applied to study the distribution of a Levy process stopped to a certain level. In [13] a Law of Iterated Logarithm is obtained for a Levy process at zero. In the article [14] some of the results are applied in the textile industry.

In the enclosed documents another 15 articles are described. They are supposed to be used if these 14 articles are not enough for the successful outcome of thся selection procedure for the candidate. As far as the articles in Table. 1 cover the Requirements for the Development of the Academic Staff at Sofia University, the rest of the articles described by the candidate are not analyzed here.

6. Critical comments and recommendations

I have no significant critical remarks about the preparation of the documents and the quality of the scientific results, which are used in this selection procedure.

For the sake of readability of Mladen Savov's articles, I would recommend him, when using strictly specific terms and notations, to define them at the first place of their usage or in a supplementary material.

Taking into account the high scientific level of the subjects taught by Mladen Savov, the necessity imposed by our time to make the lectures accessible to applied specialists in the field, and due to the increasing student employment during their education, I think that it is necessary, and would be extremely useful, the candidate to publish detailed coursebooks with specific examples of the subjects he teaches.

7. Personal impressions of the candidate

I know Mladen Savov from the conferences we participated in together, from our meetings at the IMI of BAS, from his lectures which I attended online, and from our meetings at the Bulgarian Statistical Society, where Mladen Savov is currently a chairman. According to me, he strives to keep a good scientific and professional ethics. Despite his young age, as a result of his diverse experience with highly qualified specialists in the field of the competition, Mladen Savov has an extremely high mathematical culture and extensive professional experience. These allow him to defend these qualities in the scientific community in Probability and statistics, and makes him extremely useful for improving the quality of the research in the area.

8. Conclusion on the selection procedure

After getting acquainted with the materials and scientific works presented in the selection procedure and on the basis of the analysis of their significance and the scientific and applied contributions contained in them, I confirm that the scientific achievements of **Mladen Svetoslavov Savov fulfil the requirements** of the Law for Development of the Academic Staff in the Republic of Bulgaria, the Regulations for application of the Law for Development of the Academic Staff in the Republic of Bulgaria, and the Requirements for the Development of the Academic Staff at Sofia University for holding the academic position of "**professor**" in the scientific area and professional field of the selection procedure. In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been established in the scientific papers submitted at this procedure.

Therefore, **I give my positive assessment** of the candidacy.

II. CONCLUSION

On the basis of the aforewritten I **recommend** to the Academic Selection Committee to recommend to the competent authority for the selection procedure of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to vote **POSITIVELY** for awarding the **academic rank PROFESSOR Mladen Svetoslavov Savov in the area of 4.5. Mathematics, professional field Probability and Statistics.**

31 August 2020 г. Prepared by: .....

Assoc. Prof. PhD Pavlina Jordanova (Yordanova)