Preface

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This Special Issue includes a selection of the extended contributions presented in the XXII SIGEF Congress: *Methods for the analysis of socio-economic uncertainty in the post-covid era* held at the Miguel Hernández University, Elche, Spain, in July 2023, and organized by the International Association for Fuzzy Set Management and Economy (SIGEF) in collaboration with the Economic and Financial Studies Department.

The main purpose of this Special Issue is to stimulate scientific exchanges, promote international cooperation between academic community and companies, and disseminate results of international research. The papers are organized as follows.

The first paper, an application to a model business diagnosis, Vigier *et al.,* extends the theory of fuzzy diseases´ predictions for improving cause detection by introducing fuzzy entropy as an alternative measure for the analysis of causes. With this extension, the model may be useful when developing the appropriate computer systems for monitoring companies' problems, warning of failures, and facilitating decision-making.

The second paper, Navarro Galera et al., addresses the problem of insolvency prediction in the Spanish SMEs from the binary classification standpoint. Their results indicate that, in general, insolvency may be predicted according to very few financial variables and anticipated at least ten years before the insolvency event. As a result, it is possible to provide early warnings to SMEs according to the identified indicators.

In the third paper Brotons *et al*. have developed a methodology for providing an estimate of the number of patients and the level of aggravation of their pathologies according to the delays in their treatments. For this purpose, the authors apply the fuzzy relationship between two factors, the nominal level for each type of the patient whose pathology has been aggravated due to a

delay in medical attention in each period, and the incidence of delay in medical healthcare for each cause of death.

In the fourth contribution, Rodriguez and Lara present the optimal clustering based on the classification of the environmental and financial performance variables. The primary objective was to investigate whether financial and environmental variables were able to classify the controversial and non-controversial firms. An unsupervised classification model was applied for identifying the "natural" clusters in their database.

The paper by Molas-Colomer *et al.* maintains that, by classifying the firms working with log-ratios of compositional data theory with fuzzy cluster analysis, enables to eliminate the problems of the classical methodology, and to reveal the emergence of spurious asymmetric outliers, the appearance of different groupings depending upon the choice of the ratio numerator or denominator, and symmetry loss with respect to the mass centre in the structure of the accounting value.

In the sixth paper by Niskanen, the fuzzy cognitive maps and statistical reasoning are considered from the standpoint of the explainable artificial intelligence. Today these artificial intelligence models should also be transparent, conceivable and have explanatory power for the users. The Author considers how fuzzy cognitive maps may respond to these challenges because these maps provide a simple and conceivable method for modelling complex phenomena in the real world.

In the seventh paper, Ioana *et al.* consider the impact of Russia's invasion of Ukraine on the energy markets. The authors first perform exploratory data analysis of the global energy market and, in particular, of the Romanian electricity market, with an emphasis on the effects of the war on the market trend and structure. Then, they use the available data for constructing nonlinear autoregressive models with deep learning neural network architectures. These models are predicting certain endogenous variables of energy market according to the given exogenous inputs.

The eighth paper by Salas-Molina *et al.* proposes a simplified version of the lexicographic orders that focuses on defining the parameters of the fuzzy numbers. More precisely, the authors show that two lexicographic methods described in the literature for trapezoidal and triangular fuzzy numbers are equivalent to the lexicographic order for reorganizing the vectors of these defining parameters and thus reducing the complexity of these methods. The paper illustrates this approach through a case study on capital adequacy in the banking sector.

The ninth paper by Barbera-Marine *et al.* examines how the climate and economic policy uncertainty affects wheat prices in the spot and future markets (measured by the CPU and GEPU indices, respectively). The main results show that the relationships between CPU and GEPU with the future prices are stronger than those with the spot prices. Furthermore, the futures and CPU exhibit synchronous movements, whereas the futures and GEPU

demonstrate antiphase behaviour. However, in both cases (futures and spots) their relationship with CPU/GEPU is bounded to several time periods and to some frequencies.

Finally, the tenth paper by Ruiz-Valenciano and Cortez, aims to analyze how the economic policy uncertainty affects the stock market capitalization by using the stock prices as a proxy for four of the seven largest banking institutions (referred to as the G7) in Mexico's financial system. This study aims to understand how the economic policy uncertainty will impact on the Mexican banking stock prices by applying fuzzy regression.

The foregoing selected and peer-reviewed Chapters in this Special Issue are expected to provide novel prospects for both the researchers and practitioners when examining the socio-economic uncertainty in the world today. We would like to thank the Referees who have critically evaluated the manuscripts. We would also like to express our thanks to the Editor-in Chief of the MVLSC Journal, Prof. Dan Simovici, for accepting this Special Issue.

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