

DySES conference 2022 at NEOMA

Conference Program



NEOMA Business School, France
October 5-7, 2022



Dear Colleagues, Dear Friends,

It is my pleasure to welcome you in NEOMA Business School in Rouen (France) for the 7th DYSES Conference. The purpose of the DYSES conference is to bring together all the Socio Economic Systems community every two years. This time, it has been a gap of four years. It has been a very difficult four years, with lockdowns, social distancing and no travel. I did not want a virtual or hybrid conference because the unofficial face-to-face meetings are for me the most valuable. How many new ideas are born during a discussion in the coffee breaks? You can also ask the speaker in the corridors to explain to you more details, the small part you did not understand during the presentation. This conference will have the same format as the previous DYSES conferences. We are honored to have four distinguished plenary speakers: Vernon Smith (Nobel prize for Economics, Chapman University); Ashraf Labib (University of Portsmouth); Bice Cavallo (University of Naples Federico II); Panos Pardalos (Paul and Heidi Brown Preeminent Professor in Industrial & Systems Engineering, University of Florida). Round table, historic guided tour and a gala dinner are also organized to encourage networking between the participants.

It has been a long time since we met last time; enjoy the conference!!

Alessio Ishizaka

Co-Chair of the DYSES 2002 conference



It's a pleasure and an honour for me to take part, with NEOMA BS in the project and the organization of the Conference DYSES 2022 / Dynamics of socio-economic systems.

It's a matter of pride the fact that the Conference has established the cooperation between a prestigious University as NEOMA BS and the University of Sannio.

The Conference focus on the management decisions and the analysis of dynamics of complex systems. Prestigious relators will participate, coming from several countries. The themes that will be discussed are of great importance from scientific, cultural and social point of view. This is, in my opinion, a main role of the University and of the research: to conjugate science with material and immaterial needs of people and society.

The range of topics, methods and domains that have been discussed in the framework of Dyses Conferences (we recall the other editions held at Paris, L'Havana, Seville, Usuhaja, Benevento, Pinamar) is truly wide.

Scientific results dedicated to decision procedures as MCDM methods, game theoretic approach or Choquet capacities, with specific applications as climate change, pollution and other issues of interest for the environment; many authors, also in dynamical contexts, have faced with optimization problems. We think that the interdisciplinary approach is the best way to understand and manage with complex systems; this is also the spirit of Dyses 2022 at Rouen!

Massimo Squillante

Co-Chair of the DYSES 2002 conference

Organising Committee

Fouad	Ben Abdulaziz	Decision Making	NEOMA BS	France
Lenlan	Cao	Marketing	NEOMA BS	France
Webin	Cao	Finance	NEOMA BS	France
			University	
			Mediterranea of	
Tiziana	Ciano	Applied Mathematics	Reggio Calabria	Italy
Alessia	Donato	Applied Mathematics	University of Messina	Italy
Denis	Gallot	Information Systems	NEOMA BS	France
Jehangir	Khan	Decision Making	NEOMA BS	France
Ludovico	Mascia	Graphics	MIUR	Italy
Chibane	Messaoud	Finance	NEOMA BS	France
Arash	Moheimani	Decision Making	NEOMA BS	France
Maria Grazia	Olivieri	Applied Mathematics	University of Sannio	Italy
Vijay	Pereira	Human resources	NEOMA BS	France
Salvatore	Scognamiglio	Applied Mathematics	University Parthenope	Italy
Giacomo	di Tollo	Applied Mathematics	University of Sannio	Italy

Scientific Committee

First name	Last name	Research field	Affiliation	Country
Amjad D.	Al-Nasser	Statistics	Irbid University	Jordan
Marcel	Ausloos	Physics	University of Liege	Belgium
			University of Naples	
Achille	Basile	Applied Mathematics	Federico II	Italy
Maria	Barbati	Applied Mathematics	Univ. Ca Foscari	Italy
			Interacademic Center for	
			Actuarial Studies and	
Augusto	Bellieri dei	Applied Mathematics	Risk Management	Italy
Matteo	Brunelli	Applied Mathematics	University of Trento	Italy
		Artificial Intelligence and		
Michael	Campbell	Econophysics	Aurislink	USA
			University of Naples	
Bice	Cavallo	Applied Mathematics	Federico II	Italy
Alessio	Cavicchi	Economics	MUR	Italy
			University of Naples	
Maria	Cerreta	Appraisal and evaluation	Federico II	Italy
Roy	Cerqueti	Applied Mathematics	University of Macerata	Italy
Raffaele	Cerulli	Operational Research	University of Salerno	Italy
Mario	Ciaburri	Management	ISSNOVA	Italy
		Psychometrics and		
Enrico	Ciavolino	Statistics	University of Salento	Italy
Salvatore	Corrente	Applied Mathematics	University of Catania	Italy
Salvador	Cruz Rambaud	Finance	University of Almeria	Spain
			University of Naples	
Livia	D'Apuzzo	Applied Mathematics	Federico II	Italy
			University of	
Paolo	De Angelis	Applied Mathematics	Rome Sapienza	Italy
Paolo	Esposito	Management	University of Sannio	Italy
Gerarda	Fattoruso	Applied Mathematics	University of Sannio	Italy
Michele	Fedrizzi	Applied Mathematics	University of Trento	Italy
			University Mediterranea	
Massimiliano	Ferrara	Applied Mathematics	of Reggio Calabria	Italy
Pier Paolo	Forte	Law	University of Sannio	Italy

Maria Incoronata Serge Marcello	Fredella Galam Galeotti	Management Physics Galeotti	EPOS ERIC CNRS CISA (Firenze) University of Naples “L’Orientale”	Italy France Italy
Michele	Gallo	Statistics	University of Milano- Bicocca	Italy
Rosanna	Grassi	Applied Mathematics	University of Catania and University of Portsmouth	Italy, UK
Salvatore	Greco González Rodríguez	Applied Mathematics	University of Sevilla	Spain
Rosa	Herteliu	Statistics	Bucharest Academy of Economic Studies	Romania
Claudiu	Jannelli	Enterprise Risk Management	University of Sannio	Italy
Roberto	Kacprzyk	Soft Computing	Polish Academy of Sciences	Poland
Janusz Sharfuddin	Khan	Supply chain	University of Regina	Canada
Ahmed	Kyriakou	Bayes Business School	London	UK
Ioannis Banu	Lokman	Management	University of Portsmouth University of Naples Federico II	UK Italy
Mauro	Maldonato	Psychology	University of Sannio	Italy
Antonella	Malinconico	Finance	University of Tirana	Albania
Gelina	Maliqi	Statistics	O P Jindal Global University	India
Sachin Antonio	Mangla di Nola	Supply chain Mathematics	Italian Society for logics Universidad Nacional de La Plata	Italy Argentina
Noemi Panos	Olivera Pardalos Marques	Law Optimization	University of Florida,	USA
Ricardo Alberto	Pereira	Applied Mathematics	University of Trento	Italy
Philippe	de Peretti	Finance	Paris 1 Panthéon- Sorbonne University	France
Francesca	Perla	Applied Mathematics	University Parthenope Naples	Italy
Giulia	Rotundo	Applied Mathematics	University of Rome Sapienza	Italy
Michelangelo Biagio	Russo Simonetti	Urban planning Statistics	University of Naples Federico II University of Sannio	Italy Italy
Roman Giuseppe	Slowinski Spina	Operations Research and Computational Intelligence Management	Poznań University of Technology STELLANTIS	Poland Italy
Barbara	Vantaggi	Probability	University of Rome La Sapienza	Italy
Aldo G.S.	Ventre	Applied Mathematics	Accademia Peloritana dei Pericolanti	Italy
Viviana Antonio	Ventre Violi	Applied Mathematics Applied Mathematics	University of Campania Luigi Vanvitelli	Italy Italy
Jorgen Ronald	Vitting Andersen Yager	Physics Information Systems	University of Sannio Paris 1 Panthéon- Sorbonne University Yona College, NYC	France USA

ESSENTIAL INFORMATION

Venue

All event sessions, coffee break and lunch will be held in Rouen Buildings.

Address: NEOMA Business School, 1 Rue du Maréchal Juin, 76130 Mont-Saint-Aignan, France.

Registration

The registration desk will be located in Building B, **B005**, where you will be able to collect your name badge and registration pack for the event.

Your name badge

You should wear your name badge at all times during the event. It is your admission to the venue (includes refreshments and lunch), and social events.

Wi-Fi Access

Wi-Fi access is also available at NEOMA Business School. To connect to the internet, please choose the Wi-Fi network NEOMA BS Guest and use the following credentials login: dyses@neoma-bs.fr, password: 8Agz6666.

Travelling To Rouen

- **To Rouen By Train:** Direct trains from Paris Saint-Lazare to Rouen central station (1 hr 15). The Rouen railway station is 20 minutes from the campus. See SNCF website at <https://www.sncf.com/en> for more details about coach times and prices.
- **To Rouen By Bus:** Direct Buses from Paris La Defense to Rouen Rive Gauche (1hr 30). Check <https://www.sncf.com/en> for more details.
- **In Rouen to NEOMA campus:** You can take the following busses to arrive at NEOMA's campus (Please see the ASTUCE website <https://www.reseau-astuce.fr> for more information):
 - **8: La Varenne**
 - **F2: La Varenne**
 - **T1: Station Campus**
- **Uber:** Use the Mobile app
- **Taxis Jaunes Rouen: 02 35 88 50 50**

Accommodation

Please find below a suggestive list of hotels in Rouen:

- **RADISSON BLU HOTEL ROUEN CENTRE******

6-8, rue du Donjon 76000 ROUEN

Tel: +33-2.77.64.57.57 info.rouen@radissonblu.com

www.radissonhotels.com

- **BEST WESTERN HOTEL GUSTAVE FLAUBERT******

33, rue du Vieux Palais 76000 ROUEN

Tel: +33 2.35.71.00.88 Fax : +33 9.70.29.54.65

contact@hotelgustaveflaubert.com www.hotelgustaveflaubert.com

- **MERCURE ROUEN CENTRE CATHEDRALE******

7, rue Croix de Fer 76000 ROUEN

Tel: +33 2.35.52.69.52 Fax: +33 2.35.89.41.46 H1301@accor.com

www.mercure.com

- **NOVOTEL Suites ROUEN Normandie******

10, Quai Boisguilbert 76000 ROUEN

Tel: +33 2.32.10.58.68 Fax: +33 2.32.10.58.69 h6342@accor.com

www.accorhotels.com

- **BEST WESTERN HOTEL DE DIEPPE******

Place Bernard-Tissot, 76000 ROUEN

Tel: +33 2.35.71.96.00 contact@hotel-dieppe.fr

www.hotel-dieppe.fr

- **HOTEL LE CARDINAL*****

1 Place de la Cathédrale, 76000 ROUEN

Tel: +33 2.35.70.24.42 Fax: +33 2.35.89.75.14 hotelcardinal.rouen@orange.fr

www.cardinal-hotel.fr

- **CAMPANILE ROUEN NORD MONT SAINT AIGNAN*****

Parc de la Vatine – 1 rue Jacques Monod

76130 MONT SAINT AIGNAN

Tel: +33 2.35.59.75.00 Fax: +33 2.35.59.86.63

rouen.montstaignan@campanile.fr

www.campanile-rouen-nord-mont-saint-aignan.fr

- **IBIS STYLES ROUEN CENTRE CATHEDRALE*****

9, Place de la République 76000 ROUEN

Tel: +33 2.35.71.93.58 Fax: +33 2.35.71.92.15 ha0x8@accor.com

www.ibisstyles.com

Social Media

We encourage our guests to share event highlights using social media. For those using twitter, please use the hashtag #DySES2022 and #NEOMAbs.

Contact

Please e-mail alessio.ishizaka@neoma-bs.fr for all queries and requests.

MAPS AND DIRECTIONS (Rouen Campus)



PROGRAM OVERVIEW

Day	Time	Venue	Session Details
Tue	17.00-19.00	B005	Registration
Wed	09.00-09.30	B005	Registration + Coffee
	09.30-10.00	B207	Conference Opening
	10.00-11.00	B107 and B109	Parallel Sessions
	11.00-11.30	B005	Tea/Coffee Break
	11.30-12.30	B107 and B109	Parallel Sessions
	12.30-13.30	Castle	Lunch
	13.30-14.30	B207	Plenary Session
	14.30-15.30	B107 and B109	Parallel Sessions
	15.30-16.30	B005	Coffee Break
	16.30-17.45	B207	Plenary Session
Thurs	09.00-09.30	B005	Registration
	09.30-10.30	B107	Plenary Session
	10.30-11.00	B005	Coffee Break
	11.00-12.00	B107 and B109	Parallel sessions
	12.00-12.30	B107	Editor Of Management Decision
	12.30-13.30	Castle	Lunch
	13.30-14.30	B107 and B109	Parallel Sessions
	14.30-15.00	B005	Coffee Break
	15.00-16.00	B207	Round Table
	17.00-19.00	Historical City Guided Tour	
Fri	20:00	Conference Dinner	
	09.00-09.30	B005	Registration
	09.30-10.30	B107 and B109	Parallel Session
	10.30-11.00	B005	Coffee Break
	11.00-12.30	B107 and B109	Parallel Sessions
	12.30-13.30	Castle	Lunch
	13.30-15.00	B207	Plenary Sessions
	15.00-15.30	B107	DySES Award and Conference endin

*Castle: Building D

SOCIAL PROGRAM

City Tour



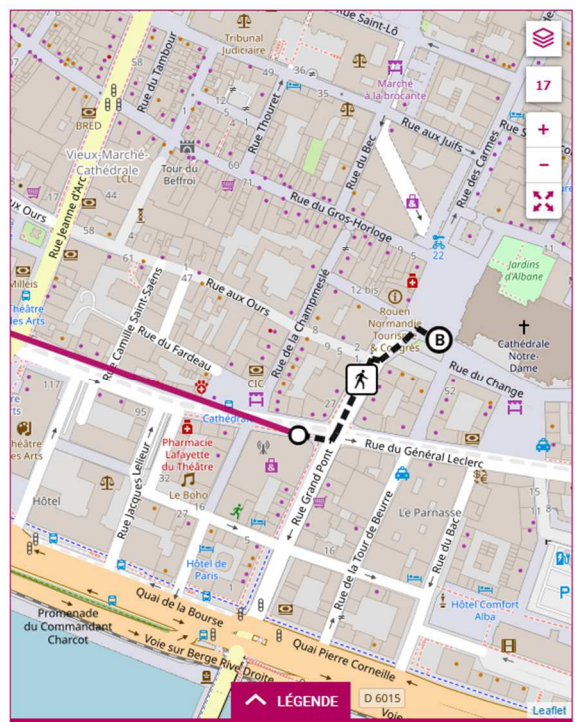
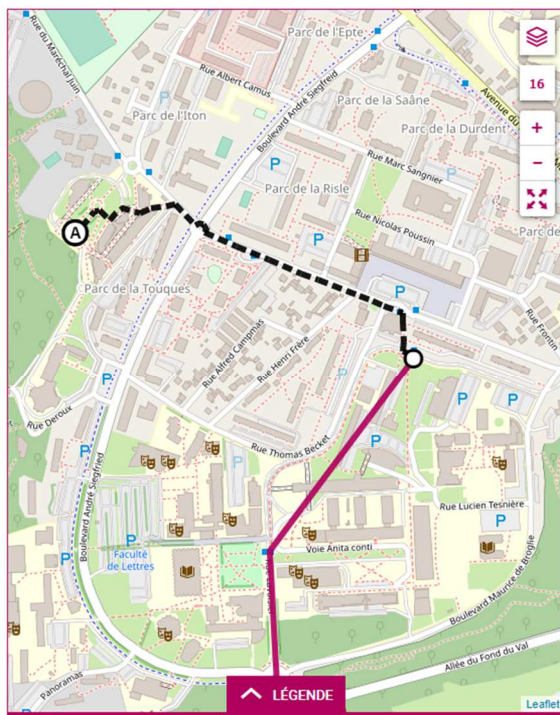
Date: Thursday October 6, 2022

Time: 17h00

Guided Tour "Les hauts lieux de Rouen" : this walking tour is an invitation to discover Rouen through the centuries: the Notre Dame Cathedral, the St. Maclou church and aître, the Gros Horloge, the Parliament of Normandy, the Hotel Bourgtheroulde, the Joan of Arc Church and the Old Market Square. Every conceivable architectural style is represented, from the Middle Ages to modern architecture, Renaissance, Classical, not to mention reconstruction.

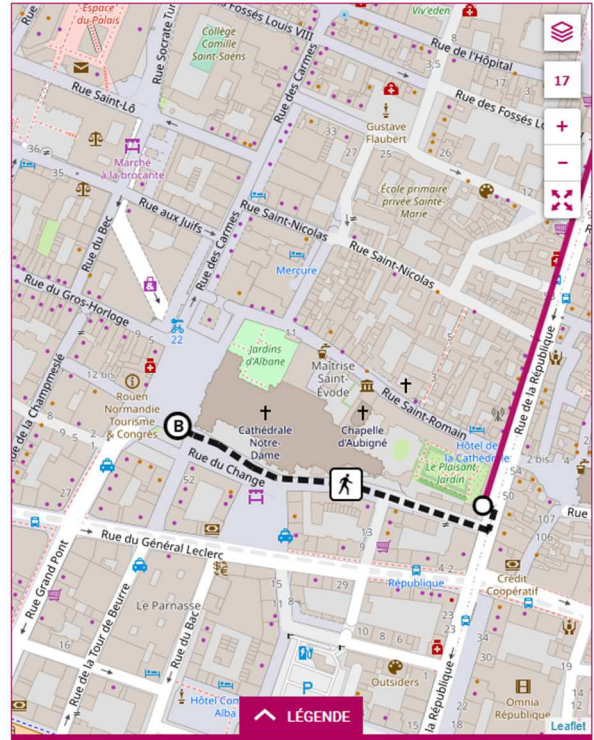
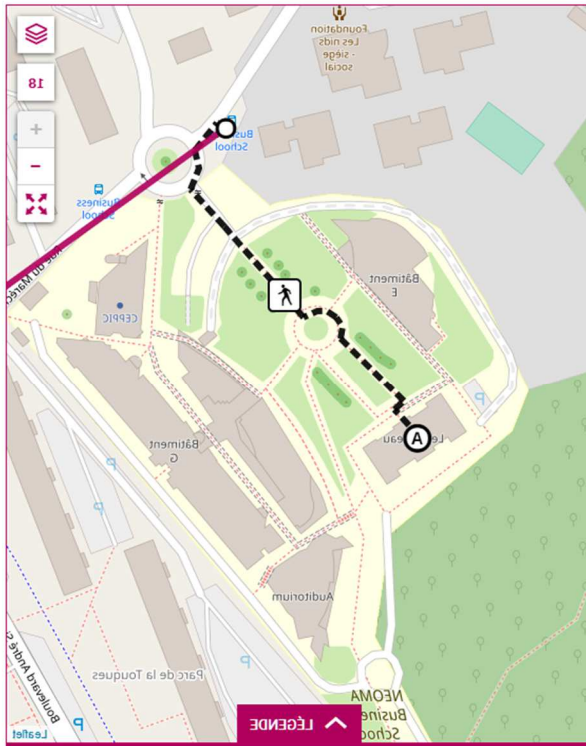
Meeting point: *Tourist office, 25 place de la Cathédrale, Rouen*
Two Bus options– Réseau Astuce (transport company): Bus T1 or Bus F7.

Departure from NEOMA, 10 short minutes' walk to the Place Colbert stop Bus T1, direction CHU Charles Nicolle ROUEN departure every 4 min, 14 min travel time and then to ROUEN Cathedral 3 min walk.



OR

From NEOMA, small roundabout at the exit of the castle. Bus stop : Business School MONT-SAINT-AIGNAN Bus : F7. Direction Hôtel de Ville SOTTEVILLE-LÈS-ROUEN 1 bus every 8 min, duration 24 min. and then to République ROUEN 4 min walk



GALA Dinner



Date: Thursday October 6, 2022

Time: 19h30

Location: HOTEL DE
BOURGTHEROULDE AUTOGRAPH
COLLECTION, 15 Place De La
Pucelle, 76000 Rouen

SCIENTIFIC PROGRAMME

 DySES 2022 conference Oct. 5-7, 2022 NEOMA Business School, Rouen Campus 	
October, 5	
09:00	
Registration + Coffee (B005)	
9:30 - 10:00	
Conference Opening (B207)	
10:00 - 11:00	
Session: Operations and decision support systems (B107)	Session: Advances in Behavioral Finance (B109)
<i>Chair: Messaoud CHIBANE</i>	<i>Chair: Salvador Cruz Rambaud</i>
Title: Impact of de-risking instruments on auctions prices: insights from an agent-based model Authors: Martin Kind; Juan Pablo Pinasco; Nicolas Saintier	Title: To learn or not to learn? Evaluating autonomous, adaptive, automated traders in cryptocurrencies financial bubbles Authors: Alfonso Guarino; Luca Grilli; Domenico Santoro; Francesco Messina; Rocco Zaccagnino
Title: Product Portfolio Depth in Competitive Environments Authors: Sleiman Jradi; Alejandro Lamas ; Mozart Menezes	Title: Market Instability, Investor Sentiment, And Probability Judgment Error in Index Option Prices Authors: G. Charles-Cadogan
Title: Portfolio Optimization In The Presence of Tail Correlation Authors: Fouad BEN ABDELAZIZ; Messaoud CHIBANE	Title: Systemic Risk Macrodynamics in a Multiplex Financial Network Authors: Javier Sánchez García; Salvador Cruz Rambaud
11:00 - 11:30	
Coffee break (B005)	
11:30 - 12:30	
Session: Supply Chain and Decision Systems (B107)	Session: Decision making B(109)
<i>Chair: Hamed Jalali</i>	<i>Chair: David Boix Cots</i>
Title: Supply Chain Vertical Competition and Product Proliferation under Different Power Structures Authors: Lijue Lu; Mozart B.C. Menezes	Title: Analysing the shopping malls' complex problems: Decision on customers' flow drivers and tenants' location optimisation Authors: David Boix Cots; Alessio Ishizaka; Francesc Pardo-Bosch; Pablo Pujadas Alvarez
Title: Assessing risk of disruption of supply chains of perishable products due to Covid-19 with VIKOR-GAIA Authors: Jehangir Khan; Alessio Ishizaka	Title: Integrating economic, environmental, and social impacts into optimal design of a biomass supply chain for semi-arid areas Authors: Neng Fan
Title: Product Proliferation, End of Season Inventory, and the Firm's Operating Performance Authors: Hamed Jalali; Lijue Lu; Mozart B.C. Menezes	Title: Multi-agent system and multicriteria analysis for developing participatory scenarios in an environmental risk area Authors: Caterina Caprioli; Marta Bottero
12:30 - 13:30	
Lunch (Castle)	
13:30 - 14:30	
Plenary Session: Ashraf Labib, "Triple Loop Learning from Catastrophic Events" (B207)	
<i>Chair: Claudiu Herteliu</i>	
14:30 - 15:30	
Session: Political decision and juridical decision - rational and no rational elements (B107)	Session: Decision analysis and Methodological approaches for complex systems (B109)
<i>Chair: Pierpaolo Forte</i>	<i>Chair: Gerarda Fattoruso</i>
Title: The stability if the final judge's decision. Is There an advantage in the complexity if some rules? Authors: Francesco Rota	Title: Evaluation of eco-efficient design strategies coupling a rule-based system with TOPSIS Authors: Cristina López; Fernando Aparicio Rubio
Title: The judge's control over public administration decision-making processes. History and future perspectives. Authors: Biagio Giliberti	Title: A new measure of distance from perfect rationality in the context of intertemporal choices Authors: Roberta Martino; Viviana Ventre
Title: The Sovereign Decision. About what the public interest is and the purpose of public powers Authors: Pierpaolo Forte, L. Perfetti	Title: Dynamic and Prospective PAHP: a new approach for industrial frameworks Authors: Gerarda Fattoruso; Salvatore Scognamiglio; Antonio Violi
15:30 - 16:30	
Coffee break(B005)	
16:30 - 17:45	
Plenary Session: Vernon Smith, "Propriety, Property, and Price Discovery in Adam Smith and Classical	

Chair: Alessio Ishizaka and Massimo Squillante	
Introduction: Michael Campbell Discussant: Emiliano Brancaccio	
October, 6	
09:00	
Registration opening	
9:30 - 10:30	
Plenary Session: Bice Cavallo, "An algebraic approach to multi-criteria decision making" (B107)	
Chair: Fouad ABDELAZIZ	
10:30 - 11:00	
Coffee break(B005)	
11:00 - 12:00	
Session: Advances in Machine learning and Operations Research for modeling dynamics, complexity and Pandemic issues (B107)	Session: Value, Strategy and management decision (B109)
Chair: Massimiliano Ferrara	Chair: Paolo Esposito
Title: New methodology for optimal location of the bio-gas plants Authors: Giovanna Bimonte; Luigi Senatore	Title: On the impact of financial education on investors' choices: a model to consider external information in multi-group decisions Authors: Pietro Amenta, Antonio Lucadamo, Gabriella Marcarelli, Matteo Rossi
Title: Order acceptance and scheduling problem on identical parallel machines with sequence-dependent setup times Authors: Eslemhoum MOUSTAPHA HACHIMI; Ahmedou HAOUBA; Alexandre DOLGUI; Simon THEVENIN; Mohamed yahya MOUHAMED SALEM ; Ahmed Tchvaghla Zeine	Title: How are decisions affected by risk and the outcome of a previous strategy? Some experimental evidence Authors: Ofer Azar
Title: A novel Fuzzy dynamic expert system applied to an Economy with pandemic dynamics Authors: Massimiliano Ferrara; Ali Ahmadian; Soheil Salashour	Title: Coping Public Value Failure Authors: Paolo Esposito, Emanuele D'Oronzio
12:00 - 12:30	
Meet the editor of Management Decision Chair: Paolo Esposito Editor in Chief: Brandon Randolph-Seng	
12:30 - 13:30	
Lunch (Castle)	
13:30 - 14:30	
Session: Integrated methodological approaches for decision making and performance evaluation (B107)	Session: Networks and risk (B109)
Chair: Antonio Violi	Chair: Mario Eboli and Giacomo di Tollo
Title: A hybrid multi-criteria method to support strategic environmental energy planning activities Authors: Vanessa Assumma; Marta Bottero; Federico Dell'Anna; Giulio Mondini	Title: Locally-Coherent Multi-Population Mortality Modelling via Neural Networks Authors: Salvatore Scognamiglio; Francesca Perla
Title: A fractal-fractional order model of COVID-19 in Pakistan using the Atangana-Baleanu Caputo (ABC) derivative Authors: Bruno Antonio Pansera	Title: A new approach for classes determination for Hierarchical Multi-Criteria Methods Authors: Gerarda Fattoruso, Maria Grazia Olivieri, Massimo Squillante, Giacomo di Tollo
Title: Minimum capital requirement and portfolio allocation for non-life insurance: a semiparametric model with Conditional Value-at-Risk (CVaR) constraint Authors: Alessandro Staino; Emilio Russo; Massimo Costabile; Arturo Leccadito	Title: Systemic risk in Core Periphery interbank networks Authors: Mario Eboli
14:30 - 15:00	
Coffee break (B005)	
15:00 - 16:00	
Round Table: Research and innovations (B207)	
Michael Campbell, Alessio Cavicchi, Gerarda Fattoruso, Alessio Ishizaka, Giuseppe Spina, Massimo Squillante, Luca	
17:00 - 19:00	
Historical City Guided Tour	
19:30	
Conference dinner	
October 7	
09:00	
Registration opening	
13	
9:30 - 10:30	

Session: Risk management (B107)		Session: Risk (B109)	
Chair: Massimiliano Menzietti		Chair: Michele Gallo	
Title: Health care reimbursement assessment with GAMLSS Authors: Davide Biancalana; Fabio Baione; Massimiliano Menzietti		Title: Managers' characteristics and practices: a Rasch analysis Authors: Paolo Bruttini; Tullio Menini; Paolo Mariani; Michele Gallo	
Title: Cohort effect Mortality Model based on Covid-19 Frailty component Authors: Maria CARANNANTE; Valeria D'AMATO; Steven HABERMAN; Massimiliano MENZIETTI		Title: Comparing algorithms for fitting the PARAFAC model to four-way compositions Authors: Violetta Simonacci; Michele Gallo	
Title: Gambling Industry under Benford's Law Approach on Financial Statements Authors: Claudiu Herteliu; Ionel Jianu; Alexandru Isaic-Maniu; Claudiu Brandas; Marius Pompiliu Cristescu		Title: Testing for subpopulations in compositional data sets according to zero patterns Authors: Javier Palarea-Albaladejo; Josep Antoni Martín-Fernández	
10:30 - 11:00			
Coffee break (B005)			
11:00 - 12:30			
Session: Complexity, models and problems (B107)		Session: Multivariate modelling, methodologies and applications for decision support systems (B109)	
Chair: Roy Cerqueti		Chair: Enrico Ciavolino	
Title: Equity Premium Predictions: Taking into Account the Role of Long, even Asymmetric, Swings in Stock Market Behavior Authors: Marcel Ausloos		Title: A Poisson model for overdispersed spatial counts with misreporting Authors: Serena Arima; Crescenza Calculli; Alessio Pollice	
Title: Development of the Cryptocurrency Market: Do Economic Freedom and Uncertainty Affect Cryptocurrency Regulatory Framework? Authors: Khoirunurrofik Khoirunurrofik; Novandra Adi Kusuma; Rino Pandu Wicaksono		Title: Cyber-ambiguity: algebraic and statistical modelling with applications Authors: Mario Angelelli	
Title: Ecosystems: complexity, models and problems Authors: Roy Cerqueti		Title: A Bibliometrix Citation Analysis of PLS Structural Equation Modelling Authors: Enrico Ciavolino; Massimo Aria; Jun-Hwa Cheah; José Luis Roldán	
Title: Predicting Patient Care Consumables: A Knowledge Based System Approach Authors: Bapi Dutta; Luis Martinez			
12:30 - 13:30			
Lunch (Castle)			
13:30 - 14:30			
Plenary Session: Panos Pardalos, "Dynamics of disasters" (B207)			
Chair: Francesca Perla			
14:30 - 15:00			
DySES Award and Conference ending			
POSTER SESSION			
Parsimonious AHP in social choices: a consistency analysis on PCMs.		Gerarda Fattoruso and Maria Grazia Olivieri	
A comparative study for public tenders: ELECTRE III and P-AHP approaches		Gerarda Fattoruso and Gabriella Marcarelli	
Ranking Italian high schools using a multi-criteria approach		Paola Mancini and Gabriella Marcarelli	
New findings in Deep Learning and Sentiment Analysis to manage Fake News during Pandemic New findings in Deep Learning and Sentiment Analysis to manage Fake News during Pandemic Outbreak"		Tiziana Ciano	
Backcasting and trend-breaches": new challenges for a new Global Society with emerging technologies by using literature review as a tool of research		Valentina Mallamaci	
Implementing the effectiveness of training program in higher education institutions		Walter Vesperi	

Wednesday, 10.00-11.00

WED-1-P1

Session: Operations and decision support systems

Room: B107

Chair: *Messaoud CHIBANE*

1. Impact of de-risking instruments on auctions prices: insights from an agent-based model

Martin Kind; Juan Pablo Pinasco; Nicolas Saintier

Auctions are becoming the most widely used mechanism to allocate renewable energies (REs) like solar photo-voltaic, wind, among others. Indeed, more than 100 countries had used auctions at least once by the end of 2018, and the European Union made auctions mandatory to grant support from member states governments from 2017. The use of auctions led to an overall significant decrease of the price of energy.

However, REs auctions are complex to study due to the interactions between their format, the heterogeneity of the participants, the technological changes and the socio-political and economic context of the organizing country. This is particularly true of developing countries which face an increasing demand of energy but are usually perceived as highly risky. Both the cost of debt and cost of equity are higher leading to rise of energy prices. On the other hand, de-risking instruments can be implemented in certain cases, in order to unlock investment and to get lower prices. The RE auctions scheme RenovAr implemented between 2016-2018 in Argentina is a leading case of successful application of risk mitigation instruments in a highly volatile country. However, those instruments have a cost, which will be paid by the government explicitly or implicitly, i.e., translated to the bids if the investors pay for guarantees. In order to reduce the auctioneer's costs, or due to the country quotas, the available instruments can be not enough to cover all the bidders' offers.

By taking ideas from econophysics and game theory, we propose in [1, 2] an agent-based model to study the evolution of prices and the learning process of bidders during several auction rounds. We focus our attention on the impact of the competition level and the proportion of target energy volume covered by the instruments to discover energy policy recommendations.

2. Product Portfolio Depth in Competitive Environments

Sleiman Jradi; Alejandro Lamas ; Mozart Menezes

With the current competitive business environment, firms seek growth through different channels. Thus, firms try to find new markets or introduce new products as a mean to attract more customers by meeting the diversity of their needs. Firms believe that offering products with different varieties attract more customers and thus increase their sales revenues and potentially their market share. Therefore, firms must decide on the number of product varieties that they produce taking into consideration that large product-variety portfolio sizes are usually associated with costs that contribute to complexity in the supply chain.

In this paper, we provide a framework that would help firms decide their product-variety portfolio size when competing with other firms. We guide our work by providing answers to the following question: i) Should firms, when competing, produce more varieties in comparison to their monopolistic choice? ii) Does Nash equilibrium (NE) exist in such competitive games? iii) Does the outcome of the game change when firms compete in a Leader-Follower setting? iv) and how would a firm decide its product-variety portfolio size when its competitor does not reveal information about their production technology?

To answer these questions, we model the demand in the market as an increasing function on the number of varieties with decreasing margins. Consistent with the literature, the operational cost of the firm is a convex increasing function on the number of variants. We study firms' decisions under complete and incomplete information where we show neither of the firms has an incentive to produce more than its monopolistic choice. Although the result is valid for an unlimited number of firms, we focus our attention on duopolies and show that NE exists, and extend our results to the Leader-Follower settings. In addition, we prove that a firm might have an advantage when revealing false information about their manufacturing technology.

3. Portfolio Optimization In The Presence of Tail Correlation

Fouad BEN ABDELAZIZ; Messaoud CHIBANE

We investigate the impact of tail correlation on the portfolio holdings of a risk-averse investor within a CRRA utility framework. We model tail behavior through exponentially distributed boom and crash distributions driven by a trinomial trigger mechanism. We develop a complete analytical framework for the expected utility by the use of exact Laplace transforms. We find that taking into account high-order dependency between asset returns substantially affects portfolio holdings for diversified portfolios and we test the out of sample performance of these modified strategies during the COVID-19 and Ukraine crises. Our results show that taking into account tail correlation in the investor's program substantially increases returns for the least risk-averse investors and decreases returns for the most risk-averse one with little impact to the Sharpe ratio.

Wednesday, 10.00-11.00

WED-1-P2

Session: Advances in
Behavioural Finance

Room: B109

Chair: Salvador Cruz Rambaud

1. To learn or not to learn? Evaluating autonomous, adaptive, automated traders in cryptocurrencies financial bubbles

Alfonso Guarino; Luca Grilli; Domenico Santoro; Francesco Messina; Rocco Zaccagnino

Financial bubbles represent a severe problem for investors.

In particular, the cryptocurrency market has witnessed the bursting of different bubbles in the last decade, which in turn have had spillovers on all the markets and real economies of countries. These kinds of markets and their unique characteristics are of great interest to researchers. Generally, investors and financial operators study market trends to understand when bubbles might occur using technical analysis tools. Such tools, which have been historically used, resulted in being precious allies at the basis of more advanced systems. In this regard, different autonomous, adaptive and automated trading agents have been introduced in the literature to study several kinds of markets. Among these, we can distinguish between agents with Zero/Minimal Intelligence (ZI/MI) and Computational Intelligence (CI) based agents. The first ones typically trade on the market without resorting to complex learning strategies; the second ones usually use (deep) reinforcement learning mechanisms. However, these trading agents have never been tested on the cryptocurrencies market and related financial bubbles, which are still mostly overlooked in the literature. It is unclear how these agents can make profits/losses before, during, and after a bubble to adjust their strategy and avoid critical situations.

This paper compares a broad set of trading agents (between ZI/MI and CI ones) and evaluates them with well-known financial indicators (e.g., volatility, returns Sharpe ratio, drawdown, Sortino and Omega ratio). Among the experiment's outcomes, ZI/MI agents were more explainable than CI ones. Based on the results obtained above, we introduce GGSMZ, a trading agent relying on a neuro-fuzzy mechanism. The neuro-fuzzy system is able to learn from the trades performed by the agents adopted in the previous stage. GGSMZ's performances overcome those of other tested agents. We argue that GGSMZ could be used by investors as a decision support tool.

2. Market Instability, Investor Sentiment, And Probability Judgment Error in Index Option Prices*Aalok Kumar (Indian Institute of Management Visakhapatnam)*

G. Charles-Cadogan

Preamble. "Sentiment" is described as an "emotional reaction to risky situations that often diverge from cognitive assessments of those risks" (Loewenstein, Weber, Hsee and Welch, Psych. Bull., 2001). Even professional options traders are prone to sentiment bias (Haigh & List, JF 2005).

Paper's contribution: We address the unexplored area of probability judgment error as a measure of investors' sentiment that drives financial market instability, and estimate the transition probability that a seemingly stable sentiment driven financial market will become unstable over time.

Abstract

How do financial markets switch from states of optimism to pessimism and vice versa? Given that a financial market is currently stable, what is the probability that it will become unstable and crash because of investor sentiment? We answer those questions in the context of a natural experiment with market risk sources of probability judgment error, i.e., source functions, implied by index option prices. Source functions reflect investors sentiments about probability ranks for an option's attractiveness and the weight they place on each rank. We introduce a novel behavioural process "Behavioural Local Lyapunov Exponent" (hereinafter BELLE), constructed from noise in investors probability judgment, that (1) characterizes investor sentiment about tail events in index option prices over time and probability ranks, and (2) provide early warning signals of market instability. BELLE admits a closed form expression for the time varying transition probability that a stable market state will move to an unstable state because of change in sentiment regime. The model makes the fatalistic prediction that given enough time investor sentiment will cause financial markets to crash almost surely.

3. Systemic Risk Macrodynamics in a Multiplex Financial Network

Javier Sánchez García; Salvador Cruz Rambaud

The financial system is becoming more and more interconnected. Although this has led to a considerable development of international financial markets, it also has a dark side. Higher connectedness means that shocks to one agent can propagate to others generating widespread crises (Demirer et al., 2018; Mendoza and Quadrini, 2010). Quantitative models have to account for this intrinsic characteristic of modern financial systems; however, as indicated by Blanchard (2014), the body of theory feeding contemporaneous macroeconomic models capture reasonably well periods of stable business cycles (1987-2007) but cannot yet explain or predict periods of crises and instability (2007-2009). Thus, another class of models are needed to solve this limitation, as it is not yet possible to include both stability and instability scenarios in the same framework.

Advancing in this research line, we build a multiplex international financial network model based on the complexity theory in order to analyze the dynamics of propagation of financial shocks in some of the largest economic systems of the world. Our objective is to measure the resilience of the financial system to a crisis depending on its capital levels. We separate the network in four layers and analyze the dynamics of a shock with the propagation algorithm of Bardoscia et al. (2015). This approach allows us to get a deeper understanding of how shocks affect different kind of institutions, rather than focusing exclusively on banks. Moreover, we are able to analyze for which capitalization levels Monetary and Financial Institutions (MFIs) are able to resist shocks. These

parameters are crucial to measure the true health of the financial system. Finally, our work distinguishes from previous literature in that we analyze the multiplex macrodynamics of the international financial system instead of restricting to a set of banks or MFIs.

Wednesday, 11.30-12.30

WED-1-P2

Session: Supply Chain and Decision

Room: B107

Chair: Hamed Jalali

1. Supply Chain Vertical Competition and Product Proliferation under Different Power Structures

Lijue Lu; Mozart B.C. Menezes

The strategic importance of product proliferation has been highlighted in the past decades. It is commonly believed that the increase in product variety can help firms with market segmentation, thus achieving better sales performance and higher profitability. However, product proliferation also suggests greater manufacturing complexity, heavier operation costs, and higher defect rate. Firms need to weigh up all the pros and cons to carefully choose the optimal number of products.

In this paper, we study a game in supply chain management in which pricing and product line depth decisions need to be made. We analyse different scenarios depending on which member has the first-mover advantage in terms of pricing and on which member has the power to determine the number of product variants that are put on sale. The objective of this work is to study the interaction between pricing and assortment strategies and to investigate how the power structure affects these decisions in a supply chain.

We characterize the Stackelberg and Nash equilibria for pricing and assortment games in different scenarios and propose a revenue-sharing scheme to achieve coordination. Unfortunately, like some other coordination mechanisms, this contract is applicable in limited cases, when the number of product variants is below the optimal (coordinated) channel level, but cannot reduce product proliferation. We finally discuss some managerial implications.

2. Assessing risk of disruption of supply chains of perishable products due to Covid-19 with VIKOR-GAIA

Jehangir Khan; Alessio Ishizaka

In the last few decades, the world experienced an abrupt rise in undesirable events that readily affect the economy and the environment. Recently, the spread of the COVID19 pandemic instigated serious disruptions to global supply chain management. The ripple effects of these disruptions affected almost every economic activity around the world. Under such circumstances, the handling of perishable products became a key challenge. Although many researchers studied the impact of the COVID19 pandemic on perishable food items i.e. Vegetables, Fruits, Flowers as gifts and ornamental purposes, Seafood and its byproducts, Meat and its byproducts, Ice cream products, Dairy products, Beverages, and Chocolates. However, the least attention has been provided to visualize the risks associated with a supply chain of these products based on the Multi-Criteria Decision Making (MCDM) tools. Therefore, the current study focuses on the risk assessment of the supply chain of perishable products followed by visual analysis. For this purpose, a new method is proposed i.e. VIKOR-GAIA which is identified as a literature gap for this study. The methodology is used to assess the aforementioned perishable products based on eight criteria. The outcome of the study revealed that the meat and its byproducts experienced the highest risk followed by seafood and its byproducts, fruits, vegetables, and ice cream products as second, third, fourth, and fifth respectively. On contrary, the flowers as gifts and for ornamental purpose is ranked lowest i.e. ninth which indicates lower risks to their existence, the beverages, dairy products, and chocolates are ranked sixth, seventh and eighth respectively. Afterward, the ranking is validated using a visualization approach that provides a more detailed picture of the results. The findings of this research will help the authorities and policymakers to develop a proactive plan for perishable food items. Furthermore, the VIKOR-GAIA methodology can be extended to resolve other complex decision problems.

3. Product Proliferation, End of Season Inventory, and the Firm's Operating Performance

Hamed Jalali; Lijue Lu; Mozart B.C. Menezes

The objective of this paper is to analyse the assortment and inventory decisions in a single-period and stochastic setting. In particular, we consider the case where the system operates according to the Newsvendor model. We propose an integrated framework for the analysis of consumer choice process: customers choose the product with the highest utility among the first η preferred products. If none of them is available, then after all customers arrive, the firm assigns the leftovers to clients with unfulfilled orders. By attaching different values to η , we are able to capture a variety of demand realizations under different assumptions.

The two extreme cases of $\eta = 0$ and $\eta = \infty$ correspond to the customer assignment (CA) and customer choice (CC), respectively. In the CA mode, the consumers reveal their preferences, and the firm assigns them the acceptable products. This happens for different packaging finishing of same size and service assignment. The CC mode is equivalent to the most general consumer choice model, where customers choose the SKU that yields highest utility from the in-stock products when they visit the store. For a value of $0 < \eta < \infty$, this model represents many demand processes of different assumptions with respect to the substitution behaviours.

We present some structural properties of the objective function and develop a heuristic algorithm based on the profit margin of each item. The numerical experiments show that our approach is efficient and effective compared with some other known approaches in the literature.

Wednesday, 11.30-12.30

WED-2-P2

Session: Decision Making

Room: B109

Chair: David Boix Cots

1. Analysing the shopping malls' complex problems: Decision on customers' flow drivers and tenants' location optimisation

David Boix Cots, Alessio Ishizaka, Francesc Pardo-Bosch, Pablo Pujadas Alvarez

The relentless growth of metropolises and the increase in the pace of life of its habitants have raised the interest in shopping malls. These infrastructures, which contains a large number of tenants such as shops and services in a confined space, have changed the customers' shopping patterns, becoming a major axis of commerce in the areas in which they are located.

Hence, how to improve the shopping malls' attractiveness to generate and retain customers' flow and how to optimise its effectiveness by ensuring rental security for the shopping mall owners have been a concurrent topic of study, in which multiple features have been analysed. However, most of these studies are focused on marketing recommendations with little comprehensive scientific inputs due to the complex nature of these problems, which have to handle a large number of variables, subjectivities and uncertainty. In particular, there are two crucial facts that have not been addressed in the current literature because of their difficulty.

The former is related to the selection of the main shopping mall tenants, known as anchors, which are the main generators of customer' flow (C. Y. Yiu & Xu, 2012) and have a direct impact at the quality of the shopping mall (Anikeeff, 1996; Kiriri, 2019). To address this issue, we present a novel sorting method that is used to analyse the shopping mall tenants to help the owners to select those ones that should be considered anchors. Through a multi-criteria sorting analysis, the tenants that bring the most benefits to the overall shopping centre are obtained.

The latter refers to where tenants should be located. This problem, known as tenant mix problem, has been widely studied to determine their number and type (Borgers et al., 2010), but there is no scientific contribution regarding what their position should be considering the relationships between them (C.-Y. Yiu et al., 2008). To address this issue, we present an innovative localisation optimisation process which introduces four novel scientific contributions: the modified MIVES, the product correlation system, the interrelation index and a metaheuristic combination algorithm. This process allows to obtain the optimal position of each of the tenants considering the relationship between them, thus improving their sales by contemplating the consumer's perception.

2. Biomass supply chain, optimization, semi-arid area, economic impacts

Neng Fan

Scarce water resources have made crop production as a key management decision in the agriculture sector, especially in arid and semi-arid regions. In this talk, optimization approaches are applied to design sustainable biomass supply chains, from field production planning, harvesting scheduling, process facility location, transportation, to machinery scheduling, with the consideration of economic benefits, environmental and social impacts. The whole supply chain involves of three major decision support modules, and each of them is modeled through an advanced optimization model through stochastic, multi-objective or large-scale optimization. The proposed methods are studied for two low-water-use crops which have great potential for the agricultural economy of the Southwestern America, with the analysis on their economic, environmental, and social impacts of the semi-arid areas.

3. Multi-agent system and multicriteria analysis for developing participatory scenarios in an environmental risk area

Caterina Caprioli; Marta Bottero

Decision-making problems, particularly in transformation and planning processes, often involve multiple conflicting objectives/criteria that should be considered. However, it is possible to distinguish between problems where a predefined and discrete set of alternatives has to be evaluated and those where, conversely, the set of suitable solutions is not explicated in advance but requires constraint functions for its definition. Solving this latter group of problems means supporting decision-makers in finding the most preferred solution. This can only be accomplished by directly involving stakeholders and decision-makers in the evaluation by asking for their preferences regarding the transformation. However, alternative generation for choice problems is a vital activity in decision analysis that is sometimes overlooked and undeveloped. Within this context, the presented contribution proposes a multi-methodological approach for supporting a stakeholder participatory process of scenario planning. Specifically, information provided by context analysis through SWOT and Stakeholder Analysis, and the elicitation of preferences expressed by the main stakeholders involved in the planning process through a multicriteria method are combined into a spatially explicit Multi-agent system (MAS). MAS supports the scenario building phase, taking into account both the satisfaction of citizens' and stakeholders' preferences and the overall sustainability of the site, according to a set of multi-dimensional indicators. The creation of alternative scenarios is strongly based on preferences and sustainable performance, but also on the suitability of current and new land uses, which are based on a rich set of GIS data. The case study of Basse di Stura in Turin (Italy) represents a useful example to test the applicability of the integrated framework, since the transformation is at an impasse, due to the high pollution of the soil and the different perspectives of stakeholders involved.

Wednesday, 13.30-14.30

Wed-PI-1

Session: Plenary Session

Room: B207

Chair: Claudiu Herteliu

“Triple Loop Learning from Catastrophic Events”

Ashraf Labib

It is now about 10 years ago since we had the catastrophe of the nuclear power plant in Fukushima, Japan. What are the lessons learnt from such disaster? How can we learn lessons using a hybrid of analytic tools? Is nuclear power energy safe? These are some of the questions that will be addressed during the talk.

Mental models for root cause analysis and multiple criteria decision-making tools will be utilised in the investigation. A model of three loops learning is then proposed and verified through applying it to the case study.

Wednesday, 14.30-15.30

WED-3-P1

Session: Political decision and
juridical decision - rational and
no rational elements

Room: B107

Chair: Pierpaolo Forte

**1. The stability if the final judge's decision. Is There an advantage in the complexity if
sume rules?**

Francesco Rota

In the legal world there is a need for certainty that has led over time to the identification of instruments aimed at limiting or excluding, in the presence of dermined circumstances, the possibility of returning to decisions made. This need also applies to decisions made at the conclusion of trials, the value of which is linked to their ability to definitively close a given dispute.

The ascertainment (decision?) contained in the judgment that has acquired the authority of *res judicata* translates and is realized in a precise legal bond connected with the stability of the decided legal relationship. This gives rise to a binding and ultratractive effect of the ascertainment and a prohibition to have a new judgment with the same object and between the same parties. This has led legal doctrine to question at length the objective and subjective limits of judged thing and its effectiveness. Inevitably, what has been described leads to a special relationship with error: it is no longer a way of continuing to seek the "truth" but can become a (procedural) truth that produces effects and that, except in limited cases, can no longer be discussed.

The issue, moreover, requires the resolution of a preliminary question: whether "the interpreter, faced with the given system, is in a merely cognitive position or whether instead the interpreter continually recreates, in continuity with the given system, his own system."

The different needs and interests involved have led the Italian system to identify a very complex discipline of decision stability.

The proposed study aims to try to understand, starting from the discipline of decision stability, whether there is an advantage in rule complexity, when complexity can be an advantage, and what the advantage of complexity can be.

**2. The judge's control over public administration decision-making processes. History
and future perspectives.**

Biagio Giliberti

A common principle of European constitutions is that of the justiciability of administrative measures, i.e. the possibility given to people to act before a court to request the annulment of administrative decisions they consider harmful to their interests.

This principle has been the subject of uninterrupted interest, because the need to offer people full protection against abuses of public power had to face the evolutions of the principle of the separation of powers, starting from original reconstruction according to which no decision of the judicial power can replace that of the executive power without violating the institutional balance between such powers.

This perspective has for a long time limited the possibilities of defense for individuals, because it has justified the creation of judicial systems pursuant to which the judge's control over administrative decisions could only be external to their content, in the name of the existence of an administrative merit that cannot be questioned.

All this, however, has not prevented the need, over time, to offer people a higher degree

of protection, in the name of certain fundamental constitutional principles that recognize the inviolable value of persons and the consequent idea that such value imposes a deeper judicial control over the public decision.

Technically, this was made possible by using the legal institute of abuse of power, i.e. a form of judicial control capable to verify the appropriateness of the content of administrative decisions. In the same time, judges were given the opportunity to check not only the reasonableness of administrative decisions but also if the public administration had correctly reconstructed the facts on the basis of which it decided.

These evolutions have not affected the traditional structure of the administrative process, which essentially remains a demolishing instrument; administrative measures can be annulled by the judge but the latter, in case of discretionary powers, is not allowed to grand a measure itself to rule the relationship between the parties.

The contribution is aimed at understanding whether further steps can be imagined in the name of full protection of persons and, in particular, whether constitutional visions can impose or only legitimize changes to the structure of the administrative process whereby the judge not only annuls unlawful measures but replaces the administration in setting the rule to be applied.

3. The Sovereign Decision. About what the public interest is and the purpose of public powers

Pierpaolo Forte, L. Perfetti

Contemporary public decision-making is multi-structured, articulated in several sections, but the political segment is the one that has supremacy over the others (the governmental, the administrative, the judicial ones), because there, in the political quota of public decision-making, resides the intimate core of sovereignty, which in fact legitimises it and places it at the apex. The constitutional provision, which in turn is the most fundamental core of the political trait of public deliberation, is therefore the highest, and thus unquestionable, political instruction of the contemporary world; whose eminent position is seen particularly when it provides for the protection of certain human situations, which it intends to protect in terms of inviolability, or even of serious intangibility: fundamental rights and freedoms, and those otherwise constitutional, are in short supreme sovereign wills.

Wednesday, 14.30-15.30

WED-3-P2

Session: Decision analysis and Methodological approaches for complex systems

Room: B109

Chair: Gerarda Fattoruso

1. Evaluation of eco-efficient design strategies coupling a rule-based system with TOPSIS

Cristina López; Fernando Aparicio Rubio

Purpose: Since United Nations (UN) provided the Sustainable Development Goals (SDGs), increasingly companies are now waking up to the central importance of transforming their business models to reach a more sustainable world for all. In this way, construction firms play a vital role due to these are one of the largest polluters during their project execution (Abergel et al., 2019), at the same time their finalized buildings generate a large proportion of emissions, resource used and energy consumed worldwide. The sector might thus lead to a positive and huge impact on sustainable developments, although it requires embracing further sustainable business models based on multiple stakeholder-driven innovation (Baldassarre et al., 2017; Lüdeke-Freund et al., 2018). These sustainable business models should be articulated around specific eco-efficient design strategies, which allow to simultaneously meet environmental, economic, and social goals (Elkington, 1999). However, the literature lacks a clear understanding on how these can be achieved. Hence, the research purpose focused on developing a framework for sustainable performance evaluation of eco-efficient design strategies in the construction sector.

Design/methodology/approach: An exploratory case study was developed to determine what eco-efficient design strategies have improved sustainable performance of a construction firm. This company presents a successful sustainable business model addressed at constructing innovative passive building. With the goal of evaluating its eco-efficient design strategies, it was applied rule-based system coupled with TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) (Ishizaka and Nemery, 2013). Data collection was performed through two-stage questionnaire process.

Findings: The results provide a targeted framework for sustainable performance evaluation in construction sector. This is made up of two dimensions. The first dimension brings together those eco-efficient design strategies considered as excellent. A total of six eco-efficient design strategies reached the highest score. The second dimension contains the sustainable goals that the firm sought to fulfil. Based on this framework, the application of the proposed method suggests a ranking of eco-efficient design strategies.

Relevance/contribution: The study states the most important eco-efficient design strategies to successfully embrace a more sustainable business model. The proposed framework also provides more explicit knowledge to academics to investigate more on sustainable goals. It is proposed a new method to evaluate eco-efficient design strategies. The evaluation provides valuable insights to practitioners on the order in which they ought to develop eco-efficient design strategies.

2. A new measure of distance from perfect rationality in the context of intertemporal choices

Roberta Martino; Viviana Ventre

Time is a great mystery that has prompted investigations from various fields of study over the years, such as psychology, philosophy, and neuroscience. Although the existence of an objective time is known, the perception of it can vary from individual to individual. The purpose of the present work is to investigate the perception of time in inter-temporal choices to clarify how subjective perception can have an important impact on the development of preferences and

the discount function. In particular, the existence of a point at which the normative exponential trend and the empirical hyperbolic trend coincide determines two intervals in which hyperbolic time is less or greater than exponential time. From an operational point of view, the definition of a transformation function of perceived time with respect to temporally inconsistent preferences makes it possible to define a new measure for temporal inconsistency. The greater the misperception of time, the greater the inconsistency associated with the hyperbolic discount function and vice versa. The results are confirmed by an experimental phase. In addition to enriching the information of the hyperbolic discount, the present study has an important impact in the field of neuroscience. Some developments and implications are considered here, such as the distinction between the concept of impatience and impulsivity. Furthermore, this paper highlights how a disciplinary approach is essential and indispensable for investigating complex behavioral phenomena. Indeed, it is evident how decision theory can help explain psychological and neurological phenomena and vice versa.

3. Dynamic and Prospective PAHP: a new approach for industrial frameworks

Gerarda Fattoruso; Salvatore Scognamiglio; Antonio Violi

Multi-criteria decision methods (MCDMs) are used as an effective tool to support decision makers (DMs) in critical decision processes. These methods are used in several fields of application by analyzing static decision-making problems in which it is assumed that the decision is made at a precise moment. By increasing the complexity of decision-making problems and operating in increasingly competitive production sectors, very often analyzing a decision-making problem in a static way is not enough. This paper deals with considering the temporal variable in the construction of a dynamic MCDM, which takes into account historical and current data in order to learn from the past; and prospective also allowing to have a forecasting perspective of future data through the use of techniques that work in this sense. Our approach was tested in a multinational company in the manufacturing sector. The results show that the use of dynamic approaches allows DMs to obtain more precise alternative rankings given the information they exploit from the past; furthermore, the use of the prospective model, integrated with the dynamic one, makes it possible to provide greater detail on the possible future rankings of the alternatives that update their positions based on the feedback received. The approach allows for drawing advantages from a management point of view as it defines a complete decision support tool for the choices related to the planning and control of production processes. Our approach can be implemented in corporate information systems.

Furthermore, the involvement of the DM in the construction of the model helps to define a learning process that feeds the decision-making process by generating greater awareness of the DM on the choices to be made.

Wednesday, 16.30-17.45

Wed-PI-2

Session: Plenary Session

Room: 207

Chair: Alessio Ishizaka and Massimo Squillante

“Propriety, Property, and Price Discovery in Adam Smith and Classical Economics”

Vernon Smith

Adam Smith published *The Theory of Moral Sentiments* in 1759 articulating a theory of society based on emergent rule-governed norms of social **propriety**. Society is here based on people who care enough, or not, about getting along with their neighbors that they follow rules of Beneficence and of Justice as Security from Injury, that create order that includes **property**. He published *The Wealth of Nations* in 1776, in which he models price discovery in markets—important for his fundamental theorem is that wealth is created by specialization and is determined by the extent of markets.

Neoclassical economics failed to articulate a model of price discovery by buyers’ and sellers’ interacting in markets, because Utility Maximizing Demand expressed pre-market demand conditional on “given” prices before prices can be discovered in markets. The classical economists got it right and we provide an information-based mathematical model of their thought process.

Thursday, 09.30-10.30

Thurs-PI

Session: Plenary Session

Room: B207

Chair: Fouad ABDELAZIZ

“An algebraic approach to multi-criteria decision making”

Bice Cavallo

Pairwise comparisons have been a long-standing technique for comparing alternatives/criteria and their role has been pivotal in the development of modern decision-making methods. Pairwise comparisons can be performed within several theoretical frameworks such as multiplicative, additive and fuzzy preference systems, which are particular instances of a more general framework based on Abelian linearly ordered groups. In this context, several coherence conditions and incoherence indices have been proposed. Finally a suitable weighted vector has been proposed.

Thursday, 11.00-12.00

THUR-1-P1

Session: Advances in Machine learning and Operations Research
for modeling dynamics, complexity and Pandemic issues

Room: B107

Chair: Massimiliano Ferrara

1. New methodology for optimal location of the bio-gas plants *Maura Hunt*

Giovanna Bimonte; Luigi Senatore

With the growing problem of the global fossil energy crisis and environmental degradation, all countries are turning their attention to the development and application of new energies. The energy infrastructure in Europe is fragile, due to several factors, i.e. increasing energy density of the consumption pattern, strongly fluctuating barrel prices, persistent disputes over the feasibility of nuclear energy, continued dependence on imported fuel from abroad and the discretion of governments and organisations, and growing environmental concerns. One of the immediate and most effective ways to address this challenge is to reduce waste and minimise losses by maximising the efficiency of the resources that are used. The use of alternative energy sources is key to decreasing dependence on fossil fuels and increasing the security and sustainability of our energy supply, as well as stimulating local productivity. The natural tendency of the energy infrastructure will be to move towards a decentralized system, based on small- to medium-scale, highly efficient generation and distribution. To address the problem presented by the resource imbalance, this paper proposes the use of the Voronoi diagram with conditional constraints. With this approach, the plane (specific area, city, region..) is divided so that the distance from any position in each polygon to the point is shorter than the distance from the polygon to the other points considering also non-spatial attributes. The objective is to plan and allocate resources according to the capacity of the site and other non spatial-attributes in the coverage area to maintain a balance between supply and demand to achieve the optimal distribution effect.

2. Order acceptance and scheduling problem on identical parallel machines with sequence-dependent setup times

Eslemhoum MOUSTAPHA HACHIMI; Ahmedou HAOUBA; Alexandre DOLGUI; Simon THEVENIN; Mohamed yahya MOUHAMED SALEM ; Ahmed Tchvagha Zeine

This paper focuses on a assemble-to-order production system, where rejection of some orders is inevitable due to limited production capacity. In such a system, accepting all orders may cause overloads, order delays, and customer dissatisfaction. For this reason, firms tend to reject some orders. The Order Acceptance and Scheduling (OAS) problem consists of simultaneously deciding which orders (jobs) are going to be accepted for processing as well as their associated schedule [Silva]. This problem is important because it represents a class of real-world industrial problems. We consider a OAS variant which is an order acceptance and scheduling (OAS) problem on identical parallel machines with sequence-dependent setup times, where a set of jobs has already been scheduled for processing on identical parallel machines such as each job defined by a processing time, due date, release date, deadline, revenue and penalty weight. If we receive the orders from the customers, The rejection criteria are often based on the trade-off between the revenue received by the company for accepting an order and the corresponding processing costs, which may include, for example, penalty costs for not delivering a particular order up to its due date. The net revenue is the sum of difference between revenues and weighted tardiness The ultimate goal is to maximize the total net revenue of accepted orders.

We modify the model studied in [silva] in order to define a new model adequate for our configuration. Thus, we manage to build a model which can solve up to 50 jobs with 2 or 5 machines.

3. A novel Fuzzy dynamic expert system applied to an Economy with pandemic dynamics

Massimiliano Ferrara; Ali Ahmadian; Soheil Salashour

This study proposes a new fractional dynamic differential-based Cobweb model that is built under fuzzy concept with pandemic parameter to make it well-adapted with this pandemic situation and make the model more efficiently dynamic in practice. The general solution of this new model is obtained using Laplace transform method. Considering the current uncertain conditions and the fact that using random, stochastic and other similar parameters are complex and increase the cost of computation which is critical in economic models, we employ fuzzy concept to address the uncertainty of parameters appearing in the Cobweb model. The theoretical foundations of this research is supported by a toy model in the last part where we exemplify the proficiency of the new model in terms of proposed pandemic parameter and investigate the unbalancing between demand and supply which is considered in the new model based on the current fact of world economy. Besides, this work analyzes the value of fuzzy equilibrium price by changing the values of pandemic parameter under different conditions. This new approach can be easily expanded to other economic models and approach to make them suitable, flexible and easily adaptable with similar situation which may be happen in near future.

Thursday, 10.30-11.30

THUR-1-P2

Session: Value, Strategy and management decision

Room: B109

Chair: Paolo Esposito

1. On the impact of financial education on investors' choices: a model to consider external information in multi-group decisions

Pietro Amenta, Antonio Lucadamo, Gabriella Marcarelli, Matteo Rossi

After the economic crisis of 2008-2009, the increase of investor Financial Literacy (FL) has become a public policy objective to improve welfare through better decision making. During the last few decades, the attention to Financial Literacy has produced a growing interest to explore the link between Financial Literacy and Financial Behaviour. However, the first consequence of this attention is that there is no clear definition of Financial Literacy. Moreover, the review of the literature shows a fragmentation, and this has prevented the formulation of a unified point of view on FL and investors' behaviour relation. For these reasons, this topic requires new and deeper studies.

In this paper, we propose a theoretical model to study if financial education and financial literacy influence the diversification strategies in financial choices. Following the model suggested by Rossi et al (2020), for evaluating an investment choice, we analyse three criteria: the return of the stock market, the performance of government bonds and the calendar effects in the financial markets. Then, in order to test if Financial Education have a positive impact on decision-making investors' process, we submitted a questionnaire to three groups of operators: a financial illiterate operator group, a financial moderately literate operator group and a financial highly literate operator group.

Since group membership may affect the investment choice, we consider external information introduced by Takane and Shibayama (1991) to compute a set of suitable weights and aggregate individual judgments in a common group preference matrix (Amenta et al. 2020). The analysis takes into account this information and produces three different priority vectors: the first one concerns the global analysis, the second one shows the ranking due to membership to the different groups and the last one represents what cannot be explained by external information.

2. How are decisions affected by risk and the outcome of a previous strategy? Some experimental evidence

Ofer Azar

The study presents an experiment that addresses two issues. The first issue is the impact of past outcomes of a strategy on the willingness of managers to change it, when these outcomes are not informative and therefore should be irrelevant for a rational decision maker. The psychological literature on regret, however, suggests that bad outcomes that result from abnormal actions cause more regret than similar outcomes that follow normal actions. In addition, a prior bad outcome makes changes more normal whereas a prior good outcome makes changes less normal. This leads to the hypothesis that following past success of a strategy, the manager will be more inclined to retain it, compared to the case in which this strategy was unsuccessful in the past. Surprisingly, this hypothesis is not supported by the data: information about the past outcome of a strategy does not affect how likely it is to be continued.

The second issue addressed by the experiment is how managerial strategic decisions are affected by risk. While risk aversion is often assumed for individuals, the usual assumption is that firms (and therefore their managers) maximize expected profits, which imply risk neutrality. The experimental results indicate managerial tendency towards safer strategies – strategies with less variability in outcomes. In particular, strategies with sure outcomes tend to be

preferred over strategies with two possible outcomes, when the expectation of the outcome is equal in both cases. Thus, the results are inconsistent with the assumption used in much of the theoretical literature in economics and management, which suggests that managers (as agents for the firm) are risk neutral. Consequently, more research on the actual risk preferences of managers in strategic decisions seems to be a worthwhile direction for future research. In addition, the relevant literatures in economics and management can benefit from exploring the implications of risk aversion by managers. For example, if the manager is risk averse whereas the owners are risk neutral, managerial incentive schemes should be planned accordingly (e.g., giving the manager some added incentives to take risks so that eventually the manager's risk preferences match those of the firm's owners).

3. Coping Public Value Failure

Paolo Esposito, Emanuele D'Oronzo

Purpose: The present contribution is characterized by the attempt to systematize the accounting literature focusing on the relationship between corruption, State Capture, accounting policies and false accounting in the public sector, in order to clarify and better define its nature; that is, whether such relationship should be considered a dichotomous one or rather one based on functional interdependence.

Methodology: The relevance of the research topic for the scientific community of reference is offered by the various data processed and represented by the national and international institutions. In the first part of this contribution, we will try to answer the following research questions: (I): Is it possible to define or visualize the nature of the relationship between corruption and false accounting? (II): Is it possible to distinguish "correct or acceptable" policies and budget assessments from those which constitute a true "false budget" or distorted social communications? In the second part of the contribution, the new regulatory measures will be analyzed, observing and "visualizing" the possible relationships of functional interdependence between budget policies and false accounting with the corruption phenomena in public administrations.

Findings: The conclusions reached contribute to the systematization of the literature on the distinction between earnings management, creative accounting, fraudulent accounting and highlight how false accounting ends up being affected by the specific positive discipline of each system. The theoretical framework outlined also highlights the role of the regulatory, cultural and social characteristics of each order in the development of the pathological phenomena of false communication or balance sheet and in the corrupt ones. The "false" balance sheet, by making official a reality that does not exist, or that exists in part or that would exist differently than the correct and real accounting representation, in fact creates a short circuit in the business process of economic-financial communication that distances the reality of companies and of public administrations by citizens, generating a State Capture.

Relevance and implications for research: To public accounting scholars and to sector employees and practitioners, this analysis might constitute a theoretical basis to identify strategies for overcoming public (dis)value factors, with implications of both accounting and managerial nature. False accounting is seen here as a crime-indicator, or crime-means, in relation to the effects corruption produces in the choice and definition of accounting policies within the public sector.

Relevance and implications for policy/practice: To distinguish the use of accounting policies, it is necessary to trigger a more extensive accountability process, in which public management is able to respond to both citizens and political representatives, overcoming a dichotomous vision or static hypocrisy, attempting to recompose the tension between bureaucracy and democracy.

Thursday, 13:30-14:30

THUR-2-P1

Session: Integrated methodological approaches for decision making and performance evaluation

Room: B107

Chair: Antonio Violi

1. A hybrid multi-criteria method to support strategic environmental energy planning activities

Vanessa Assumma; Marta Bottero; Federico Dell'Anna; Giulio Mondini

Participation of the public and stakeholders in decision-making at the local and regional levels is becoming more common in planning and programming activities, thanks to the use of less technocratic and more participatory approaches. Spatial planning and energy and environmental management necessitates the use of appropriate tools that allow planners to manage knowledge acquired in participatory planning processes involving public and private, expert and non-expert actors as effectively as possible. In this context, multi-criteria methods can conduct a comparative assessment of alternative projects or heterogeneous measures based on several criteria and the stakeholders opinions to be considered in the decision-making process.

The purpose of this paper is to investigate the application of A'WOT, a hybrid multi-criteria method, to a real-world problem in the spatial planning context (Kurtilla et al., 2000; Kangas et al., 2001). This method combines two commonly used approaches in decision analysis to produce knowledge and to build real scenarios, namely the Analytical Hierarchy Process (AHP) (Saaty, 2004) and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis (Humphrey, 1966).

The proposed framework was tested for evaluating alternative scenarios of the Valle d'Aosta Region's Piano Energetico Ambientale Regionale – PEAR, Italy. For the application, alternative scenarios based on the goals and objectives set for the given plan were defined first. Second, the assessment context, i.e. decision-making criteria, was fixed. A'WOT was used to assess the alternative scenarios impact in relation to these criteria. Focus groups involving the interest groups (stakeholders) to be considered in the participatory context were organized to obtain stakeholders' opinions on the proposed alternative scenarios and the definition of criteria weights. Then, the alternative scenarios were ranked and their acceptability by stakeholders to propose a final shared decision.

2. A fractal-fractional order model of COVID-19 in Pakistan using the Atangana-Baleanu Caputo (ABC) derivative

Bruno Antonio Pansera

In this talk we addressing the dynamics of fractal-fractional type modified SEIR model under Atangana-Baleanu Caputo (ABC) derivative of fractional order and fractal dimension for the available data in Pakistan.

This model is based on the theory of non-linear functional analysis together with the theory of the fixed point, for qualitative analysis. The fractional Adams–bashforth iterative techniques have been applied for the numerical solution of the said model. The Ulam–Hyers (UH) stability techniques have been derived for the stability of the considered model.

The numerical simulation was carried out thanks to the available data of covid-19 in Pakistan.

The conclusions reached allow us to assert that to stop the pandemic all individuals must change their behavior towards self-protection while maintaining most of the precautionary measures sufficient for the control of covid-19.

3. Minimum capital requirement and portfolio allocation for non-life insurance: a semiparametric model with Conditional Value-at-Risk (CVaR) constraint

Alessandro Staino; Emilio Russo; Massimo Costabile; Arturo Leccadito

We extend an optimization model proposed by Asanga et al. (2014) that seeks to find the minimum capital requirement satisfying solvency and portfolio constraints. In their article, Asanga et al. (2014) developed three portfolio optimization problems that differ in the criterion defining the solvency constraint: the first criterion uses the ruin probability, the second criterion the conditional Value-at-Risk (CVaR) of the insurer's net loss, and the third criterion the expected policyholder deficit. In the present paper, we focus on the second optimization problem. The standard approach for solving this problem is based on a Monte Carlo approximation that leads to a linear programming (LP) formulation (see Rockafellar & Uryasev (2000), Rockafellar & Uryasev (2002), and Krokmal et al. (2002)). However, Alexander et al. (2006) pointed out that the LP formulation becomes inefficient when the number of simulations is large. To tackle this issue, Asanga et al. (2014) proposed a semiparametric approach that reformulates the CVaR constraint using asset return scenarios and the given parametric specification of the liability distribution. When liabilities are lognormal distributed, Asanga et al. (2014) deduced the convexity of the optimization problem. We argue that the convexity of the optimization problem holds for any liability distribution and apply the CVaR optimization problem assuming three different liability distributions: a lognormal distribution, a gamma distribution, and a mixture of Erlang distributions with a common scale parameter. The numerical experiments show that the choice of liability distribution plays a crucial role. In particular, marked differences emerge when comparing the Erlang mixture with the other two distributions. Indeed, since the Erlang mixture can describe the right tail of the empirical distribution of liabilities better than the other two, it implies higher capital requirements.

Thursday, 13.30-14.30

THUR-2-P2

Session: Networks and risk

Room: B109

Chair: Mario Eboli and Giacomo di Tollo

1. Locally-Coherent Multi-Population Mortality Modelling via Neural Networks

Salvatore Scognamiglio; Francesca Perla

Accurate mortality modelling and forecasting are important for social welfare policies and resource budgeting among the government and insurance industry. With this aim, several stochastic models have been proposed in the literature; see [1]. This research proposes an approach for large-scale mortality modelling and forecasting with the assumption of locally-coherence of the mortality forecasts. In general, the coherence prevents diverging long-term mortality forecasts between two or more populations, as discussed in [2]. Despite being considered a desirable property in a multi-population modelling framework, it could be perceived as a strong assumption when a large collection of countries is considered. We propose a neural network model which requires the coherence of the mortality forecasts only within sub-groups of similar populations. Neural Networks are a promising tool for large-scale mortality modelling due to the high dimensionality of the problem and the potentially complex dependence structure of the mortality dynamics of the different populations [3]. Our neural network architecture is designed to

be easily interpretable and induces the creation of some clusters of countries with similar mortality patterns. This aspect also makes the model an interesting tool for analysing similarities and differences between different countries' mortality dynamics and identifying longevity risk diversification and mitigation opportunities. An extensive set of numerical experiments performed using all the available data from the Human Mortality Database shows that our model produces more accurate mortality forecasts with respect to some well-known stochastic mortality models. Furthermore, a massive reduction of the parameters to optimise is achieved with respect to the models available in the literature.

2. A new approach for classes determination for Hierarchical Multi-Criteria Methods

Gerarda Fattoruso, Maria Grazia Olivieri, Massimo Squillante, Giacomo di Tollo

In this paper we consider the evaluation of the best tender in a public procurement process. According to the Most Economic Advantageous Tender (MEAT) criterion, in order to analyze a number of tenders, a group of experts has to consider different criteria, both of qualitative and quantitative nature. Selecting the best tender involves the solution of a multi-criteria choice problem. Indeed, in Italy, the National Anti-Corruption Authority (ANAC) suggested the use of traditional multiple criteria methods to evaluate the qualitative component and provided details on how aggregate the evaluations related to single criteria to derive the ranking of tenders. However, they are rarely used in practice and may have some application drawbacks. This paper aims at proposing the use of ELECTRE (ELimination Et Choix Traduisant the Réalité) III and P-AHP (Parsimonious Analytic Hierarchy Process) as the more effective methods for analyzing public tenders when a great number of alternatives and/or the heterogeneity of scales are involved. The use of the proposed methodologies is completely innovative in the practice, in the Italian context. Furthermore, we carry out a comparative study among these multi-criteria methods and analyse the strengths and the weaknesses of each method in order to help the DMs to identify the more appropriate method. Moreover, we aim to develop easier and user-friendly models that sound practical in the public tender context. The potential advantages of the proposed approach are validated by a real-life contractor-selection case. The results show that the rankings obtained by ELECTRE III and P-AHP are almost the same.

3. Systemic risk in Core Periphery interbank networks

Mario Eboli

This paper studies the exposure to systemic risk of Core-Periphery interbank networks. In the last three decades, national banking systems in all advanced countries have undergone a remarkable concentration and consolidation process. As a result, two-tiered banking systems have emerged, composed of a limited number of large banks and a large number of small banks. There is a large consensus and evidence that these two-tiered banking systems generated networks of interbank claims that appear similar to the stylised Core-Periphery network (hereafter CP) defined by Craig and von Peters (2014). Such a 'perfect' CP network consists of a fully connected core of banks, where each of the latter is connected to a set of periphery banks that are not connected among them but to a single core bank. To wit, a complete network of banks (the core), in which each core bank is the centre of a star network. In this paper, I use Flow Network Theory to study the stability of CP interbank networks, focusing on their exposure to systemic risk. The latter is broadly defined as the risk that the default of one or more banks in a banking system triggers a default contagion, possibly leading to a complete systemic crisis (i.e., the bankruptcy of all banks in the system). Along with other contributions to the study of systemic risk, I evaluate the resiliency to shocks of interbank networks by looking at their contagion thresholds. The contagion threshold associated with an episode of contagion is the magnitude of the smallest exogenous shock that can cause that contagion. In particular, I look at the final contagion threshold of a network, which is the value of the smallest exogenous shock capable of causing the default of all banks in the network. I start with characterising, under general conditions, the three sets of contagion thresholds of a CP interbank network: i) the regional threshold, where a region is a single core-periphery pair; ii) the intra-core threshold, i.e. the smallest shock that causes contagion among core banks; and iii) the final global threshold of a CP, i.e. the smallest shock that causes a systemic meltdown. I show that the value of the latter threshold depends on the allocation of the exogenous shock among the banks in the core. In a CP network, the more a shock is evenly spread among the core banks, the smaller the contagion threshold, the larger the exposure to systemic risk. To wit, the occurrence of common exogenous shocks directly involving many or all core banks poses a significant threat to the stability of a CP interbank network. I then compare the stability of CP networks with two other stylised classes of interbank networks: the complete and the star networks. To carry out his part of the analysis, I characterise the efficient interbank deposits for the three classes, that is, the minimum interbank deposits that deliver complete coverage from liquidity risk, as in Castiglionesi and Eboli (2018). Assuming that the banks cross-hold the efficient deposits in each network structure under consideration, I show that the CP network is more resilient to large shocks than the complete and the star network whilst being exposed to the risk of regional crises, a risk absent in the other two classes. I also show that the CP network is as resilient to large shocks as the complete and the star network if customer deposits are senior to interbank deposits. Finally, I discuss the policy implications that stem from the fragility of CP networks to common shocks involving core banks. The latter are usually large, generalist banks that hold portfolios that can overlap and be highly correlated.

Friday, 09.30-10.30

FRI-1-P1

Session: Risk Management

Room: B107

Chair: Massimiliano Menziatti

1. Health care reimbursement assessment with GAMLSS

Davide Biancalana; Fabio Baione; Massimiliano Menziatti

Generalized Linear Models represent a powerful tool to fit the estimate of the mean of the response variable, conditioned to a set of covariates. In some cases, the restriction on the underlying distribution assumed is not suitable to “best” fit the loss distribution which is one of the main goal of risk assessment and especially in insurance pricing. In this sense, Generalized Linear Models are strongly conditioned to the assumption of the response variable being a member of the exponential family. By the way of example, the ratio between health care reimbursement of a Health Plan is a mixture zero-one-inflated random variable, that cannot be member of exponential family.

To this aim Generalized additive models for location, scale and, shape (GAMLSS) are a flexible class of regression models for analyzing data allowing for a relevant extension of distributions assumed for the response variable even in the presence of truncated or censored data. Given their flexibility and thriftiness they can represent a valid tool for solving actuarial problems, not solvable by GLM.

We will consider the assessment of dependency between policy limitations such as deductibles and policy limits and the reimbursement of a Health Plan. Sex and age will be also considered as covariates, as they are important risk factors for health care reimbursement. Finally, numerical results will be introduced, from an application to a real insurance database

2. Predicting Patient Care Consumables: A Knowledge Based System Approach

Bapi Dutta; Luis Martinez

Prediction of patient care consumables (PCC) that are required for the patients' care during their stay in hospitals, such as dry and wet wipes, dressing sets, diapers, tooth-brush set and tissue boxes, is an essential task for clinical nurses. A nurse spends a considerable amount of time on trips to the storeroom for PCC replenishment depending on the patient's profile. Thus, inaccuracies in such a human intuition-driven process will lead to inefficiencies, such as space utilization, inventory management, replenishment, and increase in waste as certain unused items cannot be returned to the store due to hospitals' infection control considerations. PCC is a high time cost process for nurses that implies they spend less time on their main role, i.e. patient care; and consequently significantly affects the patient care. Previous issues can be resolved by automating the expert-driven PCC prediction process with the help of a prediction algorithm that could be capable of predicting the required consumables with a good accuracy. With this view, this work attempt to develop a knowledge-based PCC prediction system by leveraging the experts' knowledge (experienced nurses) associated with PCC decision. The capability of supplementing the knowledge derived from the data by the experts' knowledge and automating human decision-making by mimicking the reasoning process that humans use makes it easier to develop a knowledge-based prediction/recommender solution for the PCC. The decision support system development begins with a basic understanding of the current PCC decision-making process and identifying the patient-specific factors by the expert. Subsequently, the required knowledge base is created from the experts' knowledge and clinical information related to practice, which are transferred to a set of if-then rules via knowledge engineering. Finally, we utilize a suitable inference mechanism to predict for a new set of inputs by rule matching and conflict resolutions.

3. Cohort effect Mortality Model based on Covid-19 Frailty component

Maria CARANNANTE; Valeria D'AMATO; Steven HABERMAN; Massimiliano MENZIETTI

The recent literature shows that systematic improvements in human longevity phenomenon significantly differ across individuals because of decreasing mortality from several risk factors such as cancer, heart problems, stroke, and high blood pressure (Xu et al. 2019). In particular, mortality improvement trends differ by reflecting the prevalence of health status risk factors connected to the individual's frailty. The frailty concept relies on psycho-physical deterioration process, which declines over time for both male and female cohorts. The impairment due to the Covid-19 could be achieve a systematic structural deterioration of physical age, by determining a sort of cohort effects in the experience of mortality. In other terms the idea is to include, in order to accurately forecasting mortality, the component related to the cohorts who have experienced rapid mortality worsening due to the structural impairment caused by the Covid-19 pandemic. We propose to measure the impairment of the individuals by frailty measures.

The mortality model will be developed in a stochastic environment of the Lee Carter family models.

Friday, 09.30-10.30

FRI-1-P2

Session: Risk

Room: B109

Chair: Michele Gallo

1. Managers' characteristics and practices: a Rasch analysis

Paolo Bruttini; Tullio Menini; Paolo Mariani; Michele Gallo

The labour market is a field in permanent evolution, and this is also tangible in the realization of new professional roles or figures. This study focuses on the manager's professional work. The goal is to detect a definition of the new professional figure of the 'open manager', based on some evidence derived from a survey conducted in 2020, by interviewing a set of managers of Italian companies using a structured questionnaire. The questionnaire applies thirty items to describe the managers' business behaviors and attitudes, useful for defining the concept of 'openness' characterizing the figure of the open manager. Such items were formulated as a 4-point Likert scale. The open manager figure is not actually well defined, so it appears to be as a latent figure, for this reason through the data analysis following this survey it was possible to outline some emerging attitudes and behaviours. Data was analyzed by Partial Credit Model and Differential Item Functioning.

2. Comparing algorithms for fitting the PARAFAC model to four-way compositions

Violetta Simonacci; Michele Gallo

Complex phenomena are often multimodal in nature. For fully crossed problems, such data can be represented as tensors of n -th order. Latent factor detection can be performed on such tensors employing the PARAFAC model, one of the possible multi-way generalizations of bilinear PCA. Three-way applications are widespread in many research fields, and numerous theoretical advancements have been proposed to tackle the estimating issues of three-way PARAFAC. Much fewer applications and theoretical studies can be found for tensors of 4th order. Four-way PARAFAC fitting is generally performed through the quadrilinear alternating least squares algorithm (QALS), which, however, much like its trilinear form, presents known setbacks: slow convergence, high risk of temporary and permanent degeneracies connected to model over-specification, and sensitivity to collinearity. This makes it particularly unsuitable for tensors that require special treatment such as Compositional Data (CoDa). Other algorithms have, however, also been proposed, most of which are variants of the Alternating Trilinear Decomposition (ATLD) adapted in different manners to a four-way setting. These alternatives manage to yield a significant improvement to the mentioned fallacies as they are much faster at converging, less sensitive to over-specification and collinearity, and thus, better equipped to deal with CoDa. Nonetheless, they do not guarantee the same stability and accuracy in terms of modeled noise as AQLD. An integrated approach can be implemented as a solution that concatenates in two subsequent phases a fast ATLD-based algorithm with QALS.

A comprehensive simulation design, much more complete than the ones found in four-way literature, is thus implemented which takes into account many different combinations of factor congruence, noise, and rank. This allows us to compare algorithmic alternatives, including the integrated approach, in the complex framework of CoDa.

3. Testing for subpopulations in compositional data sets according to zero patterns

Javier Palarea-Albaladejo; Josep Antoni Martín-Fernández

Compositional data refer to multivariate observations conveying relative information. This is contained in the ratios between variables that comprise parts of a whole, typically expressed in proportions, percentages or similar. It has been shown that proper statistical analysis is

performed in log-ratio coordinates, however these cannot be computed when the data matrix includes zeros for some parts. The presence of zeros can result from an underlying structure of subpopulations in the data set. Investigating this is interesting in practice to decide how to proceed with data analysis and modelling, say either imputing the zeros in a sensible way and then consider the data set as a whole or, instead, split the analysis by subpopulations according to zero patterns.

In this work we introduce some graphical and statistical tools to explore and statistically test for differences between subsets defined by zero patterns, or any other factor in general. Parametric and permutation tests are developed that rely on the information contained in the so-called variation array, as a basic summary of the data location and variability characteristics. These statistical tests are generalised to the case of projections along log-contrasts of interest that can be determined by the practitioner. The methods are supported by illustrate examples and computer routines implemented in the R package *zCompositions* (Palarea-Albaladejo and Martín-Fernández, 2015) to facilitate their use.

Friday, 11.00-12.30

FRI-2-P1

Session: Complexity, models and problems

Room: B107

Chair: Roy Cerqueti

1. Equity Premium Predictions: Taking into Account the Role of Long, even Asymmetric, Swings in Stock Market Behavior

Marcel Ausloos

Through a novel approach, we show that substantial changes in stock market behavior, marked peaks or troughs, have a statistically and economically significant impact on equity risk premium predictability, -both on in-sample and out-of-sample cases. In line with Auer's "B ratio", a "Bullish index" is introduced to measure the changes in stock market behavior, which we describe through a classical "fluctuation detrending moving average analysis" (FDMAA) for returns. In view of constructing the Bullish Index, the daily closing prices of the S&P500 Index are obtained from the Institutional Broker's Estimate System (IBES). The sampling period runs from 1950:12:01 till 2019:12:31. We consider 28 economic indicators.: 14 macroeconomic variables and 14 technical indicators. We do robustness checks. We calculate the "certainty equivalent return gains" index and compare it to the corresponding "historical averages". We find that a "positive shock" as seen in the Bullish Index is closely related to strong equity risk premium predictability for forecasts based on macroeconomic variables for up to six months. In contrast, a "negative shock" is associated with strong equity risk premium predictability with adequate forecasts for up to nine months when based on technical indicators.

2. Ecosystems: complexity, models and problems

Roy Cerqueti

Ecosystems consist of living and non-living entities that interact and create a unified framework (see e.g. Blew, 1996 and Fisher et al., 2009). Starting from the natural definition of such a concept in the environmental context, one has a broad set of applications of the ecosystems -- ranging from social science to economics and finance.

Importantly, ecosystems have relevant fragility properties; in this respect, the stability of an ecosystem is a debatable theme that has to be faced with great care.

In this paper we advance some methods and models for ecosystems. The employed methodological setting is grounded on complex networks and reliability theory. We pay particular attention to economic and financial applications, by highlighting how classical models can be reinterpreted in the context of ecosystems -- hence, showing related problems and discussions.

3. Gambling Industry under Benford's Law Approach on Financial Statements

Claudiu Herteliu; Ionel Jianu; Alexandru Isaic-Maniu; Claudiu Brandas; Marius Pompiliu Cristescu

The paper aims to test if disclosed financial statements of enterprises acting in the gambling industry in Romania obey or not Benford Law. The dataset is an exhaustive one and is originating from disclosed financial statements which should be reported yearly to the ministry of finance.

Friday, 11.00-12.30

FRI-2-P2

Session: Multivariate modelling, methodologies and applications for decision support systems

Room: B109

Chair: Enrico Ciavolino

1. A Poisson model for overdispersed spatial counts with misreporting

Serena Arima; Crescenza Calculi; Alessio Pollice

The aim of this contribution is to perform a bibliometrics citation analysis of the Structural Equation Model (SEM) framework based on Partial Least Squares (PLS) estimator. The Analyses was conducted using the Bibliometrix E package with a sample of documents extracted equal to 3,854, that was selected from the Web of Science (WoS) database by Clarivate

The idea is to create a dynamic picture of the PLS-SEM research activity by finding seminal papers, exploring the research domains and identifying network collaboration involving scholars and countries. Moreover, sources are considered to evaluate the interest of publisher in this field. In the end an the historiographic overview will help to find dominant topics and possible evolution from theoretical and applicative point of view.

2. Cyber-ambiguity: algebraic and statistical modelling with applications

Mario Angelelli

Cyber-risk is a fundamental issue in contemporary digital society. The assessment of cyber-vulnerabilities is a crosscutting need for multiple social and production sectors, and proactive cybersecurity [1] can prevent the emergence of critical incidents, whose potential effects can reflect on physical infrastructures and services for people (denial of services, exfiltration of sensitive data, etc.). The increasing connections between different technological components within larger IT systems underpin the relevance of synergistic effects in the analysis and management of cyber-domains.

Beyond risk, another source of uncertainty to take into account is ambiguity, i.e. the occurrence of unknown events with unknown probabilities. Ambiguity has relevant implications in decision models, leading to deviations from the assumptions underlying standard methods (e.g. maximum expected utility [2]).

Motivated by these issues, in this contribution we aim at relating the two notions of synergy and ambiguity. Starting from a methodological level, we first discuss algebraic notions associated with partial ordered sets (posets), which can be used to highlight ambiguity in a structural framework. Such concepts are therefore quantified through appropriate information measures in the multivariate setting, with special regard to synergistic components in partial information decompositions [3].

The generality of this framework is then specified in the discussion of applications in the cyber-security domain. In particular, we focus on the synergistic effects that may deceive automatic controls of software components [4], and the use of a combination of multiple methods for malware analysis as a potential approach to overcome this limitation. The applicability of the framework in the study of bounded rationality and cognitive resources to address the disinformation phenomenon is discussed too.

3. A Bibliometrix Citation Analysis of PLS Structural Equation Modelling

Enrico Ciavolino; Massimo Aria; Jun-Hwa Cheah; José Luis Roldán

The aim of this contribution is to perform a bibliometrics citation analysis of the Structural Equation Model (SEM) framework based on Partial Least Squares (PLS) estimator. The Analyses was conducted using the Bibliometrix E package with a sample of documents extracted equal to 3,854, that was selected from the Web of Science (WoS) database

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The idea is to create a dynamic picture of the PLS-SEM research activity by finding seminal papers, exploring the research domains and identifying network collaboration involving scholars and countries. Moreover, sources are considered to evaluate the interest of publisher in this field. In the end an the historiographic overview will help to find dominant topics and possible evolution from theoretical and applicative point of view.

4. Integrating economic, environmental, and social impacts into optimal design of a biomass supply chain for semi-arid areas

Neng Fan

Scarce water resources have made crop production as a key management decision in the agriculture sector, especially in arid and semi-arid regions. In this talk, optimization approaches are applied to design sustainable biomass supply chains, from field production planning, harvesting scheduling, process facility location, transportation, to machinery scheduling, with the consideration of economic benefits, environmental and social impacts. The whole supply chain involves of three major decision support modules, and each of them is modeled through an advanced optimization model through stochastic, multi-objective or large-scale optimization. The proposed methods are studied for two low-water-use crops which have great potential for the agricultural economy of the Southwestern America, with the analysis other economic,

Friday, 13.30-14.30

FRI-PI

Session: Plenary Session

Room: B207

Chair: Francesca Perla

“Dynamics of disasters”

Panos Pardalos

Extreme global disasters are a subject of scientific intrigue and a huge amount of research has been devoted to them. Much work is devoted to studying them across the fields of science, ethics, and policy issues of catastrophic risk.

Humans experience a wide array of disasters that generally fall into two categories: natural disasters such as hurricanes, earthquakes, tsunamis, volcanic eruptions, pandemics, etc.; and unnatural, or man-made, disasters such as wars, explosions, wildfires, chemical spills, etc.

Such disasters wreak havoc and provoke extensive and large-scale devastation, and carry extremely serious financial repercussions for nations, organizations, and individuals. In this lecture, we are going to address some of the issues regarding the dynamics of disasters and address some of the latest developments. We hope to stimulate and promote awareness and discussions.

Presenter Index

Presenter	Session ID	Day	Time	Room
Alfonso Guarino	WED-1-P2	Wednesday	10.00-11.00	B109
Cristina López	WED-3-P2	Wednesday	14.30-15.30	B109
G. Charles-Cadogan	WED-1-P2	Wednesday	10.00-11.00	B109
Lijue Lu	WED-2-P1	Wednesday	11.30-12.30	B107
Hamed Jalali	WED-2-P1	Wednesday	11.30-12.30	B107
Vanessa Assumma	THUR-2-P1	Thursday	13.30-14.30	B107
Ofer Azar	THUR-1-P2	Thursday	10.30-11.30	B109
Mario Eboli	THUR-2-P2	Thursday	13.30-14.30	B109
Roy Cerqueti	FRI-2-P1	Friday	11.00-12.30	B107
Jehangir Khan	WED-2-P1	Wednesday	11.30-12.30	B107
Alessandro Staino	THUR-2-P1	Thursday	13.30-14.30	B107
Roberta Martino	WED-3-P2	Wednesday	14.30-15.30	B109
Davide Biancalana	FRI-1-P1	Friday	09.30-10.30	B107
Claudiu Herteliu	FRI-1-P1	Friday	09.30-10.30	B107
Bapi Dutta	FRI-2-P1	Friday	13.30-15.00	B107
Javier Sánchez García	WED-1-P2	Wednesday	10.00-11.00	B109
Martin Kind	WED-1-P1	Wednesday	10.00-11.00	B107
Caterina Caprioli	WED-2-P2	Wednesday	13.30-14.30	B109
salvatore Scognamiglio	THUR-2-P2	Thursday	13.30-14.30	B109
Eslemhoum MOUSTAPHA HACHIMI	THUR-1-P1	Thursday	11.00-12.00	B107
Gerarda Fattoruso	WED-3-P2	Wednesday	14.30-15.30	B109
David Boix Cots	WED-2-P2	Wednesday	10.00-11.00	B107
Javier Palarea-Albaladejo	FRI-1-P2	Friday	09.30-10.30	B109
Violetta Simonacci	FRI-1-P2	Friday	09.30-10.30	B109
Maria CARANNANTE	FRI-1-P1	Friday	09.30-10.30	B107
Massimiliano Ferrara	THUR-1-P1	Thursday	11.00-12.00	B107
Gerarda Fattoruso	THUR-2-P2	Thursday	13.30-14.30	B109
Pietro Amenta	THUR-1-P2	Thursday	10.30-11.30	B109
Khoirunurrofik Khoirunurrofik	FRI-2-P1	Friday	11.00-12.30	B107
Marcel Ausloos	FRI-2-P1	Friday	11.00-12.30	B107

Presenter Index *(continued)*

Presenter	Session ID	Day	Time	Room
MARIA GRAZIA OLIVIERI	THUR-2-P2	Thursday	13.30-14.30	B109
Bruno Antonio Pansera	THUR-2-P1	Thursday	13.30-14.30	B107
Sleiman Jradi	WED-1-P1	Wednesday	10.00-11.00	B107
Neng Fan	FRI-1-P2	Friday	09.30-10.30	B109
Paolo Bruttini	FRI-1-P2	Friday	09.30-10.30	B109
Paolo Esposito	THUR-1-P2	Thursday	10.30-11.30	B109
Serena Arima	FRI-2-P2	Friday	09.30-10.30	B109
Enrico Ciavolino	FRI-2-P2	Friday	11.00-12.30	B109
Mario Angelelli	FRI-2-P2	Friday	11.00-12.30	B109
Giovanna Bimonte	THUR-1-P1	Thursday	10.30-11.30	B107
Francesco Rota	WED-3-P1	Wednesday	14.30-15.30	B107
Biagio Giliberti	WED-3-P1	Wednesday	14.30-15.30	B107
Fouad BEN ABDELAZIZ	WED-1-P1	Wednesday	10.00-11.00	B107
Giacomo de Tollo	THU-2-P2	Thursday	13.30-14.30	B109
Vernon Smith	WED-PI-2	Wednesday	16.30-17.45	B207
Ashraf Labib	WED-PI-1	Wednesday	13.30-14.30	B207
Panos Pardalos	FRI-PI-1	Friday	13.30-14.30	B207
Bice Cavallo	WED-PI-1	Wednesday	13.30-14.30	B107