



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

12th Annual International Conference on
**Mathematics and Statistics: Teaching,
Theory & Applications**
2-5 July 2018, Athens, Greece

Edited by
Gregory T. Papanikos

2018

Abstracts
12th Annual International
Conference on
Mathematics and Statistics:
Teaching, Theory &
Applications
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Athens, Greece

Edited by Gregory T. Papanikos

First published in Athens, Greece by the Athens Institute for Education and Research.

ISBN: 978-960-598-210-2

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8 Valaoritou Street
Kolonaki, 10671 Athens, Greece
www.atiner.gr

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Preface

This book includes the abstracts of all the papers presented at the 12th *Annual International Conference on Mathematics and Statistics: Teaching, Theory & Applications (2-5 July 2018)*, organized by the Athens Institute for Education and Research (ATINER).

In total 31 papers were submitted by 33 presenters, coming from 19 different countries (Australia, Brazil, Ethiopia, Germany, India, Ireland, Italy, Kuwait, Peru, Portugal, Romania, Serbia, South Africa, South Korea, Spain, UAE, UK, Uruguay, USA). The conference was organized into 10 sessions that included a variety of topic areas such as Mathematical and Quantitative Applications, Time Series Studies, Biostatistics, Teaching and Learning Strategies, and more. A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven divisions and 37 units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
President

12th Annual International Conference on Mathematics and Statistics: Teaching, Theory & Applications
2-5 July 2018, Athens, Greece
Organizing and Academic Committee

All ATINER's conferences are small events which serve the mission of the association (<https://www.atiner.gr/mission>) under the guidance of its Academic Committee (<https://www.atiner.gr/academic-committee>) which sets the policies (<http://www.atiner.gr/acceptance>). In addition, each conference has its own academic committee. Members of the committee include all those who have evaluated the abstract-paper submissions and have chaired the sessions of the conference. The members of the **academic committee** were the following:

1. Gregory T. Papanikos, President, ATINER.
2. Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
3. Timothy M. Young, Director, Center for Business & Manufacturing Excellence (CBME) & Professor and Graduate Director, Center for Renewable Carbon, The University of Tennessee, USA.
4. Codruta Simona Stoica, Head, Mathematics & Statistics Unit & Professor and Vice-Rector, Aurel Vlaicu University of Arad, Romania.
5. Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA.
6. Ampalavanar Nanthakumar, Academic Member, ATINER & Professor, State University of New York at Oswego, USA.
7. Diarmuid O'Driscoll, Head of Department of Mathematics, Mary Immaculate College, Ireland.
8. Chang Yu, Associate Professor, Department of Biostatistics, Vanderbilt University School of Medicine, Vanderbilt University, USA.
9. Juan Barrios, Associate Professor, Universidad ORT Uruguay, Uruguay.
10. Armine Shahoyan, Business Department Chair, University of Holy Cross and Professor, Tulane University, USA.
11. Sujay Datta, Associate Professor, University of Akron, USA.
12. Michael Aristidou, Academic Member, ATINER & Associate Professor, American University of Kuwait, Kuwait.
13. Samer Elhajjar, Assistant Professor, University of Balamand, Lebanon.
14. Mehmet Mendes, Academic Member, ATINER & Professor of Biometry/ Biostatistics, Çanakkale Onsekiz Mart University, Turkey.
15. Elizabeth Stojanovski, Academic Member, ATINER & Lecturer, University of Newcastle, Australia.
16. Tim Lueger, Research Assistant, Darmstadt University of Technology, Germany.

The Organizing Committee of the conference was:

1. Zoe Charalampous, Researcher, ATINER.
2. Olga Gkounta, Researcher, ATINER.
3. Despina Katzoli, Researcher, ATINER.
4. Eirini Lentzou, Administrative Assistant, ATINER.
5. Konstantinos Manolidis, Administrator, ATINER.
6. Kostas Spyropoulos, Administrator, ATINER.

FINAL CONFERENCE PROGRAM
12th Annual International Conference on Mathematics and Statistics:
Teaching, Theory & Applications, 2-5 July 2018, Athens, Greece

PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

Monday 2 July 2018

08:00-08:45 Registration and Refreshments

08:45-09:30 (Room C-10th Floor) Welcome and Opening Address

Gregory T. Papanikos, President, ATINER.
Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.

Monday 09:30-11:30

Session I (Room C-10th Floor): Mathematical and Quantitative Applications I

Chair: Codruta Simona Stoica, Head, Mathematics & Statistics Unit, ATINER & Professor and Vice-Rector, Aurel Vlaicu University of Arad, Romania.

1. GiSeung Kim, Professor, Pusan National University, South Korea & Hongye Sun, Pusan National University, South Korea. Unobserved Heterogeneous Bias and Wage Effects of Educational Mismatches across 20 OECD Countries.
2. Manoranjan Pal, Professor, Indian Statistical Institute, India, C. S. Biswas, Indian Statistical Institute, India, S. Bannerjee, Indian Statistical Institute, India, A. Ghosh, Indian Statistical Institute, India, S. Chakraborti, Indian Statistical Institute, India, S. Guha, Indian Statistical Institute, India & P. Bharati, Indian Statistical Institute, India. Style of Question Matters: An Experiment with Questions on "Family Related" and "Social" Views on Gender Violence.
3. Juan Barrios, Associate Professor, Universidad ORT Uruguay, Uruguay & Santiago Acerenza, Universidad ORT Uruguay, Uruguay. Feelings about Competition and Self-reported Trust: Evidence from the World Value Surveys.
4. Nizar Zaarour, Assistant Teaching Professor, Northeastern University, USA & Emanuel Melachrinoudis, Professor, Northeastern University, USA. The "Not so Simple" Interpretation of R^2 , for Relatively Small Sample Sizes.

Monday 11:30-13:00

Session II (Room C-10th Floor): Teaching-Learning-Education I

Chair: Juan Barrios, Associate Professor, Universidad ORT Uruguay, Uruguay.

1. Diarmuid O'Driscoll, Head of Department of Mathematics, Mary Immaculate College, Ireland. Teaching Ridge Regression in Polynomial Data Fitting.
2. Armine Shahoyan, Business Department Chair, University of Holy Cross and Professor, Tulane University, USA. Teaching Principles of Economics On-Line: Structured Course vs. Self-Paced Mode. An Empirical Study.
3. Michael Aristidou, Associate Professor, American University of Kuwait, Kuwait. Is Mathematical Logic Really Necessary in Teaching Mathematical Proofs?
4. Lukanda Kalobo, Lecturer, Central University of Technology Free State, South Africa. The Use of Principles of Learning Statistics to Promote the Teaching and Learning of Statistics at High School in South Africa.

Monday 13:00-14:30

Session III (Room C-10th Floor): Biostatistics

Chair: Ampalavanar Nanthakumar, Professor, State University of New York at Oswego, USA.

1. Valeria Sambucini, Professor, Sapienza - University of Rome, Italy. A Predictive Approach for Monitoring Multiple Outcomes in Phase II Clinical Trials.
2. Sujay Datta, Associate Professor, University of Akron, USA. Bayesian Network Structure Learning with Resampling-Based Confidence: Application to Genomics.
3. Chang Yu, Associate Professor, Vanderbilt University Medical Center, USA. Estimating the Proportion from the Null using a Distribution for p-Values in Massive Testing.

14:30-15:30 Lunch

Monday 15:30-17:30

Session IV (Room C-10th Floor): Time Series Studies

Chair: Sujay Datta, Associate Professor, University of Akron, USA.

1. Ampalavanar Nanthakumar, Professor, State University of New York at Oswego, USA. A Comparison of Gaussian and Skew-Gaussian Copula.
2. Helena Viljoen, Senior Lecturer, Stellenbosch University, South Africa. Forecasting Time Series using Stepwise Common Singular Spectrum Analysis or Horizontal Multi-channel Singular Spectrum Analysis?
3. Tim Lueger, Research Assistant, Darmstadt University of Technology, Germany. A VAR Evaluation of Classical Growth Theory.
4. Symeon Koumoutsaris, VP, Model Development, Guy Carpenter, UK. A Catastrophe Model for Insurance Losses due to Burst Pipes Resulting from Subfreezing Temperatures using Vine Copulas.

17:30-19:30 Roundtable Discussion

Session V (Room C-10th Floor): ATINER's 2018 Series of Academic Dialogues: A Symposium Discussion on Publishing and Researching for Professional Academic Development

Chairs: Gregory T. Papanikos, President, ATINER and Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.

1. Cleopatra Veloutsou, Head, Marketing Unit, ATINER, Editor, Journal of Product & Brand Management and Professor of Brand Management, University of Glasgow, UK. Main Trends in Publishing in Top Management Journals.
2. Codruta Simona Stoica, Head, Mathematics & Statistics Unit, ATINER & Professor and Vice-Rector, Aurel Vlaicu University of Arad, Romania. Implementing the Research Strategy within "Aurel Vlaicu" University of Arad in order to Enhance its International Prestige and Visibility.
3. Ampalavanar Nanthakumar, Academic Member, ATINER & Professor, State University of New York at Oswego, USA. Why Did I Engage Myself in Research?
4. Manoranjan Pal, Professor, Indian Statistical Institute, India. Publishing and Researching for Professional Academic Development: The Indian Experiences.
5. Can Liu, Professor, China National Forestry Economics and Development Research Center, China. How to Train Young Scientists for Researching of Forest Economics and Policy in China.
6. Rainer Przywara, President, Cooperative University Baden-Württemberg Heidenheim, Germany. Towards a Research Strategy for the Baden-Württemberg Cooperative State University (DHBW).

21:00-23:00 Greek Night and Dinner

Tuesday 3 July 2018

Tuesday 07:45-10:45

Session VI: An Educational Urban Walk in Modern and Ancient Athens

Chair: Gregory A. Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

Tuesday 11:00-12:30

Session VII (Room C-10th Floor): Mathematical and Quantitative Applications II

Chair: Diarmuid O'Driscoll, Head of Department of Mathematics, Mary Immaculate College, Ireland.

1. Stelios Georgiou, Senior Lecturer, RMIT University, Australia. A Step by Step Methodology for Designing Experiments.
2. Felicitas Nowak-Lehmann, Senior Researcher, University of Goettingen, Germany. Foreign Aid and its Impact on Investment in Developing Countries: Empirical Evidence.
3. Stella Stylianou, Senior lecturer, RMIT University, Australia. New 3-Level Designs for Full Second Order Models.
4. Paul Mpuga, Economic Affairs Officer, UNECA, Ethiopia. Do Business-Friendly Regulations Promote Entrepreneurship Growth? Analysis using African Data.
5. Luciana Bastos, Professor, University of the State of Paraná, Brazil, Janete Leige Lopes, Professor, University of the State of Paraná, Brazil, Jesus Crepaldi, Professor, University of the State of Paraná, Brazil & Badar Alam Iqbal, Professor, Aligarh Muslim University, India. Analysis of Statistics of Violence by Homicide in the Members Countries of Mercosur, during the Period Extending from 2000-2012.

Tuesday 12:30-14:00

Session VIII (Room C-10th Floor): Teaching-Learning-Education II

Chairs: Armine Shahoyan, Business Department Chair, University of Holy Cross and Professor, Tulane University, USA and Tim Lueger, Research Assistant, Darmstadt University of Technology, Germany.

1. Michael Gendron, Professor, Department Chair, Management Information Systems, Central Connecticut State University, USA, Jeffrey Peck, Adjunct Professor, Central Connecticut State University, USA & Tera Black, Professor, Central Connecticut State University, USA. Best Practices for Logistics Analytics.
2. Henry Morelli, Associate Professor, Central Connecticut State University, USA & Michael Gendron, Professor, Department Chair, Management Information Systems, Central Connecticut State University, USA. Transforming Industry Professionals into Effective Defined Term and Adjunct Faculty.
3. Gheorghita Faitar, Assistant Professor, D'Youville College, USA. Grit and Mathematics.
4. Matina Rassias, Senior Teaching Fellow, University College London, UK. Teaching Specialist versus non-Specialist Students in Statistics.

14:00-15:00 Lunch

Tuesday 15:00-16:30

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| Session IX (Room C-10th Floor): Mathematics |
| Chair: Chang Yu, Associate Professor, Vanderbilt University Medical Center, USA. |
| 1. Codruta Simona Stoica, Professor, Aurel Vlaicu University of Arad, Romania. On Stochastic Splitting Issues for Evolution Equations. |
| 2. Adama Diene, Associate Professor, United Arab Emirates University, UAE. Evaluation of Certain Sums of Polynomials Using the Arithmetic Divisor Functions. |

Tuesday 16:30-18:30

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| Session X (Room C-10th Floor): Special Topics |
| Chair: Samer Elhajjar, Assistant Professor, University of Balamand, Lebanon. |
| 1. <u>Timothy Young</u> , Professor, The University of Tennessee, USA, Nana Tian, Forest Economist, Texas Forest Service, USA & Yongke Sun, Southwest Forestry University, China. Improved Predictive Modeling of Wood Composite Products using Bayesian Additive Regression Trees (BART). |
| 2. Jan-Erik Lane, Professor, Public Policy Institute, Serbia. Socio-Economic Determinism and Climate Change. |
| 3. Enrique Vasquez, Professor / Visiting Research Fellow, Universidad del Pacífico / IBEL, Universitat Pompeu Fabra, Peru / Spain. Understanding the Business-Government Relationship in Chile under an Economic Booming and Social Unrest Scenario: 2000-2015. |
| 4. Jose Paulo Oliveira, Professor, Universidade Lusófona de Humanidades e Tecnologias, Portugal. Macroeconomic Impacts of Universal Basic Income Guarantee. |
| 5. <u>Abdulla Awadh</u> , Officer, Ministry of Interior - Sharjah Police, UAE & Hassan Saleh Al-Dhaafri, Assistant Professor, University of Dubai, UAE. The Effect of IT Management and Strategy Management on Organizational Performance of Sharjah Police. |

20:00- 21:30 Dinner

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| Wednesday 4 July 2018 Mycenae and Island of Poros Visit Educational Island Tour |
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| Thursday 5 July 2018 Delphi Visit |
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| Friday 6 July 2018 Ancient Corinth and Cape Sounion |
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Michael Aristidou

Associate Professor, American University of Kuwait, Kuwait

Is Mathematical Logic Really Necessary in Teaching Mathematical Proofs?

As it is already observed by mathematicians and educators, there is a discrepancy between the formal techniques of mathematical logic and the informal techniques of mathematics in regards to proof. We examine some of the reasons behind this discrepancy and to what degree it affects doing, teaching and learning mathematics in college. We also present some college students' opinions about proofs, and we briefly observe the situation in Greek and Greek-Cypriot high schools in which mathematical logic is part of the curriculum. Finally, we argue that even though mathematical logic is central in mathematics, its formal methods are not really necessary in doing and teaching mathematical proofs and the role of those formalities has been, in general, overestimated by some educators.

Abdulla Awadh

Officer, Ministry of Interior – Sharjah Police, UAE

&

Hassan Saleh Al-Dhaafri

Assistant Professor, University of Dubai, UAE

The Effect of IT Management and Strategy Management on Organizational Performance of Sharjah Police

The main purpose of this study is to investigate the effects of IT Management and Strategy Management on Organizational Performance. Based on a theoretical foundation and a wide review of the literature, the model of the research was proposed. To achieve the research purpose, this study has integrated different theories such as Resource Based View of the Firm (RBV), Knowledge Based View (KBV), and Innovation theories in order to analyze the effect of IT Management and Strategy Management on Organizational Performance. 341 Questionnaires were distributed among random selected sample of Sharjah Police departments in Sharjah city in Emirates. 245 questionnaires were returned and used in the analysis using the SPSS system. The results of this study demonstrate that including IT Management and Strategy Management have positive and significant effect on Organizational Performance in Sharjah Police. This study reflects the importance of the right implementation to the IT Management and Strategy Management to have successful performance. This study also supported the premises of the resource-based view theory by reaffirming the importance of the including Strategy Management and IT Management to enhance organizational performance.

Juan Barrios

Associate Professor, Universidad ORT Uruguay, Uruguay

&

Santiago Acerenza

Universidad ORT Uruguay, Uruguay

Feelings about Competition and Self-reported Trust: Evidence from the World Value Surveys

Drawing on individual data from the World Values Surveys, this paper estimates the relation between individual feelings about competition and self-reported horizontal trust. On average, Individuals who increasingly dislike competition report lower levels of trust towards others. But the association is not linear. This finding is different than and complements previous research which shows a positive or negative relation. The paper improves over previous research in that it approximates competitive environment by using individual-level measures while at the same time considering objectives measures of competition. We extend the analysis to other measures of trust. We conjecture about the potential negative effects on Trust and Social Capital of the declining appreciation of the benefits of competition.

Luciana Bastos

Professor, University of the State of Paraná, Brazil

Janete Leige Lopes

Professor, University of the State of Paraná, Brazil

Jesus Crepaldi

Professor, University of the State of Paraná, Brazil

&

Badar Alam Iqbal

Professor, Aligarh Muslim University, India

**Analysis of Statistics of Violence by Homicide in the
Members Countries of Mercosur, during the Period
Extending from 2000-2012**

The objective of this study is to perform an analysis of the statistics of violence by homicide in the member countries of Mercosur, between 1994 and 2015.

The work methodologies used will be: a bibliographical review to cover the theoretical basis of the work and descriptive statistics, used to collect, tabulate and analyze the homicide statistics in Mercosur member countries in this period. Results shows that there will be a similar pattern in absolute and relative terms for the growth of homicide rates in Mercosur members and that the growth of such rates is independent of the types of regimes of government to which each of these countries is subject.

Sujay Datta

Associate Professor, University of Akron, USA

Bayesian Network Structure Learning with Resampling- Based Confidence: Application to Genomics

In recent years, graphical and network models have become increasingly useful in certain areas of the bio-medical sciences including genomics, proteomics, genetic epidemiology and systems biology. This has been facilitated by a number of new developments in structure learning algorithms and their evolution from constraint-based to score-based and hybrid algorithms. Examples include Gaussian graphical models, multivariate Bernoulli graphical models, hypergraph models, Bayesian networks and dynamic Bayesian networks. However, until recently, not much had been done in terms of developing a 'confidence measure' for the 'point estimates' of networks provided by those algorithms. Here we introduce recently developed methods for parametric and bootstrap-based assessment of variability in the learned network structures, introducing the notion of 'confidence' to structure learning. We do it in the context of applying Bayesian networks to learn functional relationships among genes associated with differentiation potential of progenitor cells that generate muscle tissue, in order to assess the effect of aging on the heterogeneity in possible co-expression of differentiation pathways.

Adama Diene

Associate Professor, United Arab Emirates University, UAE

Evaluation of Certain Sums of Polynomials Using the Arithmetic Divisor Functions

We prove the polynomial analogue of some Liouville identities involving the arithmetic divisor functions from elementary number theory, and combine the results with known identities in the ring of polynomials over Finite Fields to evaluate several new sums of polynomials.

Gheorghita Faitar

Assistant Professor, D'Youville College, USA

Grit and Mathematics

The study analyzes the circumstances of success in a first year Learning Mathematics Skill-Mathematics 101 sequence for students involved with the experience of becoming professionals in health sciences occupations at a NY state college level. The Upper-NY state institution specializes in fields such as pharmacy, physical therapy, occupational therapy, nursing, biology, dietetics, and health analytics. The study describes through a case study descriptive method the student development in becoming prepared for the introductory Calculus after the classes had been taken. The case studies analysis explains the importance of grit and determination for the students involved in the study. The involved students in spite of them have all the odds to fail the learning skills-MAT 101 course sequence, managed to surpass the physical or learning challenging obstacles and succeeded at having passing/high grades for the courses taken.

Michael Gendron

Professor, Department Chair, Management Information Systems, Central Connecticut State University, USA

Jeffrey Peck

Adjunct Professor, Central Connecticut State University, USA

&

Tera Black

Professor, Central Connecticut State University, USA

Best Practices for Logistics Analytics

Analytics and the supply chain are paramount topics important to every organization. How to get optimal value from the supply chain drives decisions across organizations both large and small. Within supply chains, logistics enables goods to move through distribution and reach the end consumer. Being such a widely used process motivates the researchers to examine the logistics portion of the supply chain from an analytical perspective and attempt to determine best practices for gaining optimal value. Transformative analytics techniques, such as multivariate regression modeling should enable logistics managers, researchers, and others to better understand the factors that go into the cost of logistics services, and thus impact decisions made to enhance value through the supply chain. In a world where logistics managers rely heavily on “gut feel”, utilizing business intelligence and analytics can better enable decision making.

Stelios Georgiou

Senior Lecturer, RMIT University, Australia

A Step by Step Methodology for Designing Experiments

Design of experiments can be particularly useful in any field of science. A suitable experimental design could result in performing the needed experiments in an efficient way and collect data that will be useful for the particular problem of interest.

The fundamental principles of experimental designs will be presented and discussed. The methodology and the procedure we need to follow when describing experiments from the scratch need to be setup and fixed at the beginning of each experiment.

Here, a step by step approach will be sketched down and the methodology of how to design and perform an experiment will be deployed. All the parameters of design of experiments will be discussed and the major aspects of the methodology will be structured and explained so that it will be easy to follow. The choice of the response in an experiment is crucial. The selection of the factors and the variables of interest is very important. Levels and ranges of those factors to be study need to be arranged in appropriate levels before we start the experiments. The choice of the design matrix for the experiment is one of the main aim of experimental design theory because it can really make a difference in the outcome of our data.

The analysis of the collected data is highly correlated to the methodology of collection, thus with the design of the experiment. Following the steps of design methodology, choosing the correct design of experiment and applied all the needed steps will linked to the needed statistical analysis and the results will be trusted and efficient.

Lukanda Kalobo

Lecturer, Central University of Technology Free State, South Africa

The Use of Principles of Learning Statistics to Promote the Teaching and Learning of Statistics at High School in South Africa

Several studies on methods of improving students' general mathematical competence have relevance for teaching statistics. Many of these studies help to reinforce and extend the research on statistical teaching and learning. Based on these studies in the context of constructivist approach, the general principles of learning statistics have been formulated. In South Africa, the Grade 10-12 Mathematics Curriculum seems not to mention any theory or principle on how to teach and learn statistics, but provides teachers with specific aims and abilities to be developed. Despite this provision, many teachers may not be aware of the growing body of research related to teaching and learning of statistics. This is an exploratory study that sought to explore the use of principles of learning statistics to promote the teaching and learning of Statistics in high school. The sample of 66 Grade 12 Mathematics teachers (58 females and 42 males) were randomly selected to respond to 26-item of the 5 Likert Scale questionnaire on using the general principles of teaching and learning statistics. Teachers' responses were reported descriptively in the frequencies and percentages. The results lead to the conclusion that teacher training institutions need to support and spread the teaching and learning of statistics by using different methodologies such as, principles of learning statistics.

GiSeung Kim

Professor, Pusan National University, South Korea

&

Hongye Sun

Pusan National University, South Korea

Unobserved Heterogeneous Bias and Wage Effects of Educational Mismatches across 20 OECD Countries

This paper aims to exploit the causal relationship between wage effects and educational mismatches. The average educational attainment has been steadily increasing in recent decades, particular for industrialized countries. The imbalance between supply and demand brings about high probability that mis-allocates workers to mismatched occupations. Using Programme for the International Assessment of Adult Competencies (PIAAC) dataset, the wage effects of under- and overeducation are explored. The estimated results suggest that the negative returns to dummy of overeducation can be found in most OECD countries. However, the wage reward of educational deficiency is weak both in statistical significance and magnitude. That is, the wage penalty of overeducation is prevalent rather than the wage reward of undereducation. In addition, propensity score matching (PSM) is applied to identify the applicable comparison of samples between mismatched and well-matched groups. The findings indicate the differences of estimated parameters between OLS and PSM vary across countries. Notwithstanding, both in signs and significance, the estimates of PSM present virtually consistent results in contrast to OLS.

Symeon Koumoutsaris

VP, Model Development, Guy Carpenter, UK

A Catastrophe Model for Insurance Losses due to Burst Pipes Resulting from Subfreezing Temperatures using Vine Copulas

Extended periods of extreme cold weather can cause severe disruptions in human societies and can also lead to important economic losses. Of particular interest for the UK insurance industry are the economic losses as a result of bursting water pipes. During the winter of 2010/11 for example, the losses from burst pipes have exceeded £300 million in the UK making it the peril with the largest losses that year. Catastrophe models are important tools in the insurance industry to help determine the likelihood of occurrence of similar and even more extreme events. Their main goal is to estimate the full spectrum of probability of loss for a portfolio of insurance risks. This requires to consider not only each risk separately but also, and more importantly, how all risks relate to each other and their potential synergy to create catastrophic losses. However, the high dimensionality of the problem poses a big challenge for multivariate copula methods. Vine copulas provide a flexible solution to this problem based on a pairwise decomposition of a multivariate model into bivariate copulas. This approach is very flexible, as the bivariate copulas can be selected independently for each pair, from a wide range of parametric families, which enables to model a wide range of complex dependencies. The vine copula methodology is used in this paper to develop the first catastrophe model on insurance losses due to pipe bursts resulting from freeze events in the United Kingdom.

Jan-Erik Lane

Professor, Public Policy Institute, Serbia

Socio-Economic Determinism and Climate Change

The global warming problematic is in reality decided not by the UNFCCC or IPCC with its mastodon meetings. The decisive players are the states of the following BIG polluters of CO₂: China, India, Indonesia, Brazil, Russia Mexico, South Korea, Canada, Australia and the US, despite the fact that its present government already has defected from the common pool regime, set up in Paris 2017, These countries together with international shipping and aviation are putting out more than 50% of the CO₂s. However, they are little interested, because they emphasize the policy-making of socio-economic development, either economic growth with rich countries or the “catch-up” strategy with poor or emerging economies. *Resilience* will decide which countries can support the consequences of climate change.

Tim Lueger

Research Assistant, Darmstadt University of Technology, Germany

A VAR Evaluation of Classical Growth Theory

Over the past two decades, there have been numerous attempts in economic theory to model the historical regime of a Malthusian trap as well as the transition to growth in one coherent framework, or in other words, a unified growth theory. However, in most of these models, an important effect suggested by Malthus has been frequently omitted. By including what he had called "the great preventive check" in the traditional Malthusian model which is based on the principle of population, the principle of diminishing returns and the principle of labor division, the transition can be modelled in a very simple dynamic macroeconomic framework. The aim of this paper is to first construct and calibrate the suggested classical model and to eventually employ a conventional VAR-Method to provide evidence of the above principles using country-specific annual historical data on crude birth rate, crude death rate and GDP per capita growth rate. As a result, it is argued that emerging economies follow a universal macroeconomic pattern of development. A decreasing death rate is succeeded by a decreasing birth rate which at the same time induces GDP per capita to rise sustainably. The correspondingly advanced microeconomic theory suggests that increasing life expectancy tends to create a demographic structure that is much less prone to overpopulation.

Henry Morelli

Associate Professor, Central Connecticut State University, USA

&

Michael Gendron

Professor, Department Chair, Management Information Systems, Central
Connecticut State University, USA

Transforming Industry Professionals into Effective Defined Term and Adjunct Faculty

Business Schools are increasing the number of defined term and adjunct faculty due to the demands of increasing student populations and the realities of budgetary/hiring constraints. There are many factors driving the trend of filling vacancies with non-tenure track appointments, including economic and budgetary considerations. There is also a trend (especially in the more technical fields) to hire adjunct and non-tenure track full-time clinical faculty to teach these courses. Taken together, these trends are resulting in the appointment of non-tenure track faculty at an increasingly faster rate than seen in the previous decades. This necessitates that the academy needs to develop translational programs to assist new non-tenure track faculty as they move from industry to faculty roles.

The economic downturn has also impacted the demographics of student populations in the public and private universities in the U.S. Those students who could minimally afford attending a private university prior to the economic downturn, are now finding that they cannot afford private university tuition and are turning to the public universities to complete their degrees, increasing the student population in the public university systems.¹ In addition, unemployment due to the economy has resulted in laid off employees seeking additional education to make themselves more marketable.² This increase in student population along with changes in hiring practices will lead to larger class sizes and additional course loads, resulting in more full-time tenured faculty choosing to retire.³

Based on all the factors cited above, it appears that for the foreseeable future the student population in the public universities will increase, while at the same time the current population of tenure-track professors will decline. Therefore, public university systems globally will have to increase the number of non-tenure track appointments to teach a larger number of course sections needed to accommodate the current and future population of students.

Many higher education institutions do not have a formal program to assist new non-tenure track faculty into the world of academia. This paper proposes a process designed to orient those new faculty into their new profession of teaching. In addition, a continuous improvement process will also be introduced that is designed to measure new faculty performance and

will outline the resources needed for these new faculty members to succeed. The program's objectives are designed to successfully translate these new non-tenure track defined term faculty into the academy, as well as maximize the university's return on investment.

Paul Mpuga

Economic Affairs Officer, UNECA, Ethiopia

Do Business-Friendly Regulations Promote Entrepreneurship Growth? Analysis using African Data

Despite the strong growth potential, many challenges to business and entrepreneurship remain, including numerous and costly regulations. Using the *Doing Business* data, *governance* and *social economic indicators* this study examines the impact of business registration regulations on entrepreneurship growth in Africa over the period 2003-2016. We examine whether business-friendly business start-up regulations, as measured using the *Starting a Business Distance to Frontier* as well as its components, number of procedures, time (in days), cost and capital required to register a business promote entrepreneurship growth.

The findings confirm all the four hypotheses. Numerous business regulations that are implemented over several days and at high costs, adversely impact entrepreneurship. Holding other factors constant, improvements in the Starting a Business Distance to Frontier by 1 percent increases *new business entry* by 0.02 percent. Eliminating 1 business registration procedure increases *new business entry* by about 0.14 percent. Reducing the time required to register a company by one day leads to a 0.01 percentage point increase in *new business entry*. Reducing the cost and the minimum capital by one unit (each as a ratio of income per capita) required to register a business by 1 percent leads to 0.04 percent and 0.06 percent increase in *new business entry*, respectively. However, the coefficients of time, cost and minimum capital required to start a business are weakly significant

Reforms to Africa's business environment are required to promote entrepreneurship, which is key to stimulating employment creation, innovation and overall economic growth. Governments should review existing the procedures, time required and cost of registering companies to eliminate any unnecessary ones, reduce the time and cost required to register firms.

Ampalavanar Nanthakumar

Professor, State University of New York at Oswego, USA

A Comparison of Gaussian and Skew-Gaussian Copula

Here, we try to compare the performance of Gaussian Copula and the Skew-Gaussian Copula. The detailed results will be presented at the forthcoming ATINER conference in Statistics during July 2-5, 2018.

Gaussian Copula:

$$C(u_1, u_2) = \Phi_2(\Phi^{-1}(u_1), \Phi^{-1}(u_2))$$

where $\Phi_2(x, y)$ represents the bivariate standard normal cumulative distribution function and $\Phi^{-1}(\cdot)$ represents the functional inverse for the standard normal cumulative distribution function.

Construction of Skew-Gaussian Copula:

Skew Normal:

Let U and V be two independent standard normal variables and δ_1 be a constant such that $-1 < \delta_1 < 1$.

Then, $Z_1 = \delta_1|U| + \sqrt{1 - \delta_1^2} \cdot V$ follows a skew normal distribution.

Note that,

$$\begin{aligned} P(Z_1 \leq z_1) &= \int_0^{\infty} P(\sqrt{1 - \delta_1^2} \cdot V \leq z_1 - \delta_1 \cdot u \mid |U| = u) P(|U| = u) du \\ &= 2 \int_0^{\infty} P(\sqrt{1 - \delta_1^2} \cdot V \leq z_1 - \delta_1 \cdot u) \phi(u) du \\ &= 2 \int_0^{\infty} P\left(V \leq \frac{z_1}{\sqrt{1 - \delta_1^2}} - \frac{\delta_1 \cdot u}{\sqrt{1 - \delta_1^2}}\right) \cdot \phi(u) du \\ &= 2 \int_0^{\infty} P\left(V \leq \frac{z_1 - a_1 \cdot u}{b_1}\right) \phi(u) du \end{aligned}$$

$$F(z_1) = 2 \int_0^{\infty} \Phi\left(\frac{z_1 - a_1 \cdot u}{b_1}\right) \phi(u) du$$

where $a_1 = \delta_1$ and $b_1 = \sqrt{1 - \delta_1^2}$.

Next, we will investigate the skew normal density function.

By differentiating with respect to z_1 we get,

$$f(z_1) = \frac{2}{b_1} \int_0^{\infty} \phi\left(\frac{z_1 - a_1 \cdot u}{b_1}\right) \phi(u) du$$

$$\begin{aligned}
 &= \frac{2}{b_1} \int_0^{\infty} \frac{1}{2\pi} \cdot e^{-\frac{1}{2} \left(\frac{z_1 - a_1 \cdot u}{b_1} \right)^2 - \frac{1}{2} u^2} \cdot du \\
 &= \frac{2}{b_1 \cdot 2\pi} \int_0^{\infty} e^{-\frac{1}{2} z_1^2} \cdot e^{-\frac{1}{2} \left(\frac{u - a_1 \cdot z_1}{b_1} \right)^2} \cdot du \\
 &= 2 \cdot \phi(z_1) \cdot \left(1 - \Phi \left(\frac{-a_1 \cdot z_1}{b_1} \right) \right)
 \end{aligned}$$

Bivariate Skew-Normal:

Let U, V be two independent standard normal variables and U, W be two other independent standard normal variables along with constants δ_1, δ_2 such that $-1 < \delta_1, \delta_2 < 1$.

$$\text{Let } Z_1 = \delta_1 \cdot |U| + \sqrt{1 - \delta_1^2} \cdot V$$

$$Z_2 = \delta_2 \cdot |U| + \sqrt{1 - \delta_2^2} \cdot W$$

Then, (Z_1, Z_2) follows a bivariate skew-normal distribution.

In order to derive the joint cumulative distribution $F(z_1, z_2)$, consider

$$\begin{aligned}
 &P(\delta_1 \cdot |U| + \sqrt{1 - \delta_1^2} \cdot V \leq z_1, \delta_2 \cdot |U| + \sqrt{1 - \delta_2^2} \cdot W \leq z_2) \\
 &= \int_0^{\infty} P(\sqrt{1 - \delta_1^2} \cdot V \leq z_1 - \delta_1 \cdot u, \sqrt{1 - \delta_2^2} \cdot W \leq z_2 - \delta_2 \cdot u \mid |U| = u) P(|U| = u) du \\
 &= 2 \cdot \int_0^{\infty} P(\sqrt{1 - \delta_1^2} \cdot V \leq z_1 - \delta_1 \cdot u, \sqrt{1 - \delta_2^2} \cdot W \leq z_2 - \delta_2 \cdot u) \phi(u) du
 \end{aligned}$$

This means, joint cumulative skew normal distribution is

$$F(z_1, z_2) = 2 \cdot \int_0^{\infty} \Phi_2 \left(\frac{z_1 - a_1 \cdot u}{b_1}, \frac{z_2 - a_2 \cdot u}{b_2} \right) \cdot \phi(u) du$$

where,

$$a_1 = \delta_1, \quad b_1 = \sqrt{1 - \delta_1^2}$$

and

$$a_2 = \delta_2, \quad b_2 = \sqrt{1 - \delta_2^2}.$$

Note that the bivariate skew normal density is given by

$$\begin{aligned}
 f(z_1, z_2) &= \frac{\partial^2 F(z_1, z_2)}{\partial z_1 \cdot \partial z_2} \\
 &= 2 \cdot \int_0^{\infty} \frac{1}{b_1 \cdot b_2} \cdot \phi_2 \left(\frac{z_1 - a_1 \cdot u}{b_1}, \frac{z_2 - a_2 \cdot u}{b_2} \right) \cdot \phi(u) du
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{2}{b_1 b_2} \int_0^\infty \frac{1}{2\pi\sqrt{1-\rho^2}} \cdot e^{-\frac{1}{2(1-\rho^2)} \left\{ \left(\frac{z_1 - a_1 u}{b_1} \right)^2 + \left(\frac{z_2 - a_2 u}{b_2} \right)^2 - 2\rho \left(\frac{z_1 - a_1 u}{b_1} \right) \left(\frac{z_2 - a_2 u}{b_2} \right) \right\}} \cdot \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{1}{2} u^2} \cdot du \\
 &= 2 \cdot \phi_2(z_1, z_2) \cdot \Phi \left(\frac{(a_1 b_2^2 - \rho a_2 b_1 b_2) z_1 + (a_2 b_1^2 - \rho a_1 b_1 b_2) z_2}{\sqrt{(1-\rho^2) b_1^2 b_2^2 \cdot \sqrt{a_1^2 b_2^2 + a_2^2 b_1^2 + b_1^2 b_2^2 (1-\rho^2)} - 2\rho b_1 b_2 a_1^2 a_2^2}} \right) \\
 &\quad \cdot e^{\frac{1}{2(1-\rho^2)} \left\{ \left[z_1^2 - \left(\frac{z_1}{b_1} \right)^2 \right] + \left[z_2^2 - \left(\frac{z_2}{b_2} \right)^2 \right] - 2\rho \left[z_1 z_2 - \left(\frac{z_1 z_2}{b_1 b_2} \right) \right] \right\}} \\
 &\quad \cdot e^{\frac{1}{2(1-\rho^2) b_1^2 b_2^2} \left\{ (a_1 b_2^2 - \rho a_2 b_1 b_2) z_1 + (a_2 b_1^2 - \rho a_1 b_1 b_2) z_2 \right\}} \\
 &= 2 \cdot \Phi \left(\frac{(a_1 b_2^2 - \rho a_2 b_1 b_2) z_1 + (a_2 b_1^2 - \rho a_1 b_1 b_2) z_2}{\sqrt{(1-\rho^2) b_1^2 b_2^2 \cdot \sqrt{a_1^2 b_2^2 + a_2^2 b_1^2 + b_1^2 b_2^2 (1-\rho^2)} - 2\rho b_1 b_2 a_1^2 a_2^2}} \right) \\
 &\quad \cdot e^{\frac{1}{2(1-\rho^2) b_1^2 b_2^2} \left\{ (a_1 b_2^2 - \rho a_2 b_1 b_2) z_1 + (a_2 b_1^2 - \rho a_1 b_1 b_2) z_2 \right\}} \\
 &\quad \cdot e^{-\frac{1}{2(1-\rho^2)} \left\{ \left(\frac{z_1}{b_1} \right)^2 + \left(\frac{z_2}{b_2} \right)^2 - 2\rho \left(\frac{z_1}{b_1} \right) \left(\frac{z_2}{b_2} \right) \right\}}
 \end{aligned}$$

Felicitas Nowak-Lehmann

Senior Researcher, University of Goettingen, Germany

Foreign Aid and its Impact on Investment in Developing Countries: Empirical Evidence

This paper analyzes the effectiveness of aid to stimulate investment using different measures of aid. Most importantly, it investigates whether certain environments are more prone to stimulate or impede aid effectiveness. We estimate the aid-investment relationship using a fixed effects approach that actively controls for endogeneity and autocorrelation and that works with standard errors that take heteroscedasticity and cross-sectional correlation of the residuals into account. The estimates show that there is extreme heterogeneity in aid effectiveness across countries but on average a mostly positive and statistically significant relationship between aid and investment can be found. However, the results depend on whether countries exhibit favorable or unfavorable (time-invariant) country characteristics and whether they are exposed to better or poorer institutional environments. The influence of the amount of aid received is also found to be relevant for aid effectiveness. Our specific empirical results show that there is evidence that aid is not effective in countries with unfavorable time-invariant country characteristics. Second, we find aid to be more effective in countries that receive above average amounts of aid and in countries with relatively good institutions. Third, the empirics show that aid enhances investment in (Sub-Saharan) Africa and low-income countries. Moreover, aid is not found to be effective in Latin America, Asia nor upper middle-income countries. Fourth, investment-related aid is effective but non-investment related aid does seem to be effective as well. Aid targeted to physical infrastructure works as expected but aid given to improve institutions does not.

Diarmuid O'Driscoll

Head of Department of Mathematics, Mary Immaculate College, Ireland

Teaching Ridge Regression in Polynomial Data Fitting

The standard linear regression model can be written as $Y=X\beta+\varepsilon$ with uncorrelated zero mean and homoscedastic errors. Here X is a full rank $n \times p$ matrix containing the explanatory variables and the response vector y is $n \times 1$ consisting of the observed data. The Ordinary Least Squared (OLS) estimators are given by $\tilde{\beta}_L = (X'X)^{-1}X'y$ and the Gauss-Markov Theorem states that $\tilde{\beta}_L$ is the best linear unbiased estimator. However, the OLS solutions require that $(X'X)^{-1}$ be accurately computed. If we try to fit a polynomial of too high a degree to a data set, containing noise, using OLS, then $(X'X)^{-1}$ will be numerically difficult to calculate and can lead to very unstable solutions. This paper will use the surrogate estimators of Jensen, D.R. and Ramirez, D.E. (2008) to 'control' the complexity of the model and prevent the polynomial from fitting the noise in the data.

Jose Paulo Oliveira

Professor, Universidade Lusófona de Humanidades e Tecnologias,
Portugal

Macroeconomic Impacts of Universal Basic Income Guarantee

The purpose of this work is to study the macroeconomic impacts of Universal Basic Income Guarantee, namely in inflation and imports, not forgetting to consider inequality tackling from basic income and economic development results from making basic income a reality, through lump-sum transfers.

Employment is increasingly insecure, once economy is now being shaped by increasing rates of technological change that create a new reality. Robotics and Artificial Intelligence may foster the substitution of humans as labor force. A large part of the work now done by humans can be taken over by robots. Therefore, jobs will be lost and it's not clear how many new jobs will be created in this new scenario.

This work assumes that there is an increasingly unequal distribution of wealth. During last years, Capital earnings grew more than Labour earnings, as result of Globalization process and productivity growth, contributing to high unemployment and rising levels of underemployment.

Basic Income will empower people, irrespective of gender, age and preconditions. It will make it easier for people to live according to their own principles, wishes and norms. Not everyone will take advantage of these opportunities, but at least the options are open to everybody. I focus on equilibrium with dynamics in an open economy and the level of transfers and marginal tax rate to study basic income effects, particularly at macroeconomic level. Basic Income reconciles economic efficiency and social security. This work "findings" suggest that macroeconomic impacts of basic income are a powerful social protection tool in fighting poverty and inequality towards a new and rebuilt welfare state. Opponents of basic income proposals dispute its economic, political and social feasibility, question its capacity to address the structural causes of poverty and inequality, and fear that it may entail disincentives to work, reducing the value of each dollar and essentially creating a new zero produce goods and services in the domestic economy in response to aggregate demand arising from consumption and the other forms of expenditure, excess demand for goods would be increasingly met via imports with consequential effects for the exchange rate and the domestic price level, which accentuate the inflationary pressure.

The aim of this work relies on IS/LM impact of expanded C (Consume) and Gross Domestic Product multiplier as consequence of basic income, instead of M monetary offer impact, like those of Quantitative Easing policies impacting LM curve.

So, Consumption multiplier contributes decisively for economic growth, as model testing shows, within this study, it's possible to conclude that Goods and Services market will enter expansionist cycle under basic income distribution policy settled within a monetary zone, once the possibility to make adjustments using Monetary Policy is essential.

Manoranjan Pal

Professor, Indian Statistical Institute, India

C. S. Biswas

Indian Statistical Institute, India

S. Bannerjee

Indian Statistical Institute, India

A. Ghosh

Indian Statistical Institute, India

S. Chakraborti

Indian Statistical Institute, India

S. Guha

Indian Statistical Institute, India

&

P. Bharati

Indian Statistical Institute, India

Style of Question Matters: An Experiment with Questions on “Family Related” and “Social” Views on Gender Violence

A perception survey was carried out to find out how people understand or feel about the present situation of gender violence in the two States, namely West Bengal and Meghalaya, in India. The questions were related to ‘family related’ as well as ‘social’ views on gender violence.

Assuming that response to a question depends on the style of question or how the question is framed, we used a novel technique. Two sets of questions on gender violence – Positive and Negative – were prepared and canvassed.

A clear picture emerges from the analysis of data. The respondents hesitate to disagree with a statement even if it is not acceptable to them. Out of 23 questions we got 17 cases with significant difference between believing and expressing. Accordingly, a model is developed to find out the correct proportion of people who think that the statement is acceptable.

The findings, after correcting the bias, were interesting, e.g., 97.2% people were of the opinion that “Women have the right to express their opinion if they disagree with their partner”, and 57.6% thinks that “Physical violence between couples is a private matter and should be handled within the family”. The corresponding values were 94.6% and 63.8% for males and 100% and 53.3% for females respectively. This also shows that there were considerable differences between the acceptability of the statements between males and females.

The designing of questionnaires and conducting the survey, thus, call for a thorough revision. Instead of a single set of questionnaires we should make two sets – one positive and one negative and canvass the two sets to

two independent samples in the population. The model, devised in this paper, can then be used to estimate the exact proportion of persons who accept the statement.

Matina Rassias

Senior Teaching Fellow, University College London, UK

Teaching Specialist versus non-Specialist Students in Statistics

It is the educators' responsibility to have a significant impact in shaping the forward thinking not only of the specialist but also of the non-specialist students in a discipline. Experience suggests that dependent on the students' background different teaching methods should be applied. We investigate the main differences among students who study Statistics at an introductory level under different degree programmes. We, however, identify also the specific similarities in students' attitudes towards learning as this is reflected via motivation towards the subject and achievement.

One of our aims is to identify how potentially teaching service courses in Statistics can positively improve the educational processes in teaching specialist courses in Statistics and vice-versa. Among others we need to address some of the notable challenges related to teaching and learning Statistics to non-specialists and to explore the ways to introduce and gradually develop a statistical oriented mind-set. Can these ways also enhance the specialist students' educational experience? Can furthermore educational technologies improve the experiences of both educators and students and assist towards communication beyond the narrow classroom borders? These will be some of the questions we aim to address.

Valeria Sambucini

Professor, Sapienza - University of Rome, Italy

A Predictive Approach for Monitoring Multiple Outcomes in Phase II Clinical Trials

Most phase II trials are designed as one-arm studies based on a binary endpoint of interest, that represents treatment efficacy. Monitoring strategies can be adopted to perform interim evaluations before data collection has been completed. The essential aim is to ensure early termination of the trial if the experimental treatment is unlikely to provide the desired level of efficacy.

Although phase II trials are mainly focused on evaluation of efficacy, many authors consider more ethical and informative to gather also information about toxicity during this phase.

In this paper, we present Bayesian monitoring rules for single-arm phase II trials based on posterior predictive probabilities, that jointly consider both binary efficacy and toxicity endpoints. At any interim stage, given the current data and the prior distribution, the Dirichlet-Multinomial distribution provides the predictive probability of each possible combination of future efficacy and toxicity outcomes. It is exploited to compute the predictive probability that the trial will yield a positive outcome, if it continues to the planned end. Stopping rules based on this predictive probability are examined as the critical boundaries vary and under different scenarios.

Armine Shahoyan

Business Department Chair, University of Holy Cross and Professor,
Tulane University, USA

Teaching Principles of Economics On-Line: Structured Course vs. Self-Paced Mode. An Empirical Study

There are many issues and challenges associated with online Principles of Macroeconomics and Principle of Microeconomics courses. One of them is a choice between self-paced and structured delivery modes. It is well known that distance learning is popular among working adults who try to overcome time constraints by making their learning experience as individualized as it possible. From this perspective, students are expected to prefer self-paced delivery option. However, some distinctive features of the Principles courses suggest that for the better student learning outcomes the structured approach could be more effective and desirable. During 2012-2017, an empirical study has been conducted among the student population of the Greater New Orleans Area. The findings of that study are detailed and discussed in this paper.

Codruta Simona Stoica

Professor, Aurel Vlaicu University of Arad, Romania

On Stochastic Splitting Issues for Evolution Equations

In many cases, the modeling of the real world phenomena by means of evolution equations has to combine the classic deterministic study with stochastic methods. Approaching the evolution equations by means of stochastic cocycles allows obtaining answers to many issues by involving techniques of stochastic analysis.

This paper aims to define a general framework for the exponential splitting in mean square for stochastic cocycles that includes, as a particular case, the exponential dichotomy. We study the problem of how to generalize the notion of exponential dichotomy to evolution equations with solutions only assumed to exist in forward time. We consider general splitting behaviors that consist in assuming the existence of decomposition into invariant subspaces where the norms of the evolution trajectories are bounded by functions depending on the initial and final times.

Stella Stylianou

Senior lecturer, RMIT University, Australia

New 3-Level Designs for Full Second Order Models

Design of experiments is a big field of statistical science and has many applications in a number of different areas. Design of experiments is often used in social sciences. Traditional designs have been developed many years ago and still have applications in gathering data and selecting the sample space. In a first stage of experimentation a researcher is usually looking to screen out the dominant factors that may influence a process or a response. This approach is well known as screening process and the designs that are used are called screening designs. The main aim of screening designs is to optimize the cost of the experiment and to improve the quality of the model that will be fitted in a second stage. Screening designs can be very useful in conducting the needed experiments in psychological setups. Screening experiments require follow up experiments and further experimentation to build a better, more complicated statistical model for our data.

In this work we briefly introduced some traditional screening designs and present their properties. In the sequence we present new designs, approaches and methodologies (such as the definitive screening designs) that were developed the last few years and have additional good fitting properties for building good statistical models for our data. Advantages and disadvantages of the new designs are presented and discussed.

Enrique Vasquez

Professor / Visiting Research Fellow, Universidad del Pacífico / IBEL,
Universitat Pompeu Fabra, Peru / Spain

Understanding the Business-Government Relationship in Chile under an Economic Booming and Social Unrest Scenario: 2000-2015

According to the World Bank, Chile showed a good economic performance between 2000 and 2015, with an average annual rate of GDP growth of 3.92% (World Bank, 2015). Factors like the 1980 Constitution, trade liberalization, structural reorganization of the state and privatizations were fundamental in the economic booming of the Latin American country.

Economic growth contributed to a reduction of the unemployment, which turned from 9.20% in 2000 to 6.40% in 2015 (World Bank, 2015). There was a slight improvement in social indicators, such as a reduction in the poverty incidence rate of 2.09% per year during the period 2000-2013. However, by 2015, inequality continued to be one of the major social problems of Chile (World Bank, 2015). Chile showed an excess of wealth concentration within the Metropolitan Region of Santiago de Chile (Atienza & Aroca, 2012) which represented 45.62% of the Chilean GDP in 2015 (Banco Central de Chile, 2013). However, how did this growth translate into employment? Its industrial structure showed a trend towards more developed sectors such as services or commerce, which generated expectations of higher wages for workers. However, Chile "[was] far from achieving the reality of decent work as a national standard" (Gerlach Mora, 2010).

Social conflicts continued despite the economic booming. On one hand, there was a high school student movement called "*Los Pinguinos*" which demanded for a more inclusive and better education. On the other hand, a social movement "*No más AFP*" led by senior citizens who requested for a more dignified pension system. According to Garretón & Garretón, "Chile [was] facing an incomplete democracy". This paradoxical situation of managing economic growth under social unrest could be explained for the particular business-government relationship in Chile.

This paper argues that the business-government relationship in Chile during 2000-2015 was unable to reinvent itself. This is because the legacies of the past weighed strongly in the structure and *modus operandi* of the bureaucracy and private sector which impeded to take advantage of the economic booming in order to carry out public and business sectors reforms during 2000-2015 (Vásquez, 2017). On the one hand, the structure of the public administration and business sector were unable to close the social gaps (Bitar, 2016). On the other hand, the *modus operandi* of the public administration and business sector showed a lack of public-private

coordination among the different levels of government and within the different hierarchies (NU.CEPAL, ILPES, 2013). The outcome of these shortages of the business-government relationship and cases of corruption (Ferreira & Martins, 2014) disappointed citizens and mainly to the poorest. Thus the business-government relationship was unable to reinvent an effective state (Bebbington, 2013; Hickey, 2013) and set up a sustainable and inclusive development as it was intended in other regions (Yanguas, 2017).

Helena Viljoen

Senior Lecturer, Stellenbosch University, South Africa

Forecasting Time Series using Stepwise Common Singular Spectrum Analysis or Horizontal Multi-channel Singular Spectrum Analysis?

Two multivariate extensions of Singular Spectrum Analysis (SSA) were considered in terms of the forecast error namely, Horizontal Multi-channel SSA (H-MSSA) and Stepwise Common SSA (Stepwise CSSA). The recurrent forecasting procedure was used for both methods. In a simulation study different signal structures, defined in terms of trend, period, amplitude and phase, were investigated. The largest difference between the methods were found when different trends were considered. Horizontal MSSA was outperformed in these cases. A practical example is discussed.

Timothy Young

Professor, The University of Tennessee, USA

Nana Tian

Forest Economist, Texas Forest Service, USA

&

Yongke Sun

Southwest Forestry University, China

Improved Predictive Modeling of Wood Composite Products using Bayesian Additive Regression Trees (BART)

This study presents an ensemble of predictive models with a focus on the predictive capabilities of Bayesian Additive Regression Trees (BART). Predictions are made for Modulus of Rupture (MOR) and Tensile Strength (IB or Internal Bond) from a wood composites manufacturing process for three product types. Given the large number of predictor variables from the process, variable preselection was used prior to model development. Several regression methods including multiple linear regression, partial least squares regression, neural networks, regression trees, boosted trees, and bootstrap forest are compared with BART. BART had the best predictive performance in validation unanimously for both MOR and IB for all three products examined. Bootstrap forest validation results were very similar to BART for one of the products. BART validation results of MOR were promising for the nominal product type of 19.05 mm with an 0.89 for 10-fold cross validation with root mean square error of prediction (NRMSEP) of 10.26%. BART validation results for IB had an average 0.84 for 10-fold cross-validation with a NRMSEP = 10.82%. The high predictive ability of BART may be useful for manufacturers and researchers in applying analytical techniques for process improvement leading to less rework (order reruns due to failing properties) and reject. Predictive modeling techniques like the ones explored in this study may be very important to companies seeking competitive advantage in today's business world that is focused on advanced analytics and data mining.

Chang Yu

Associate Professor, Vanderbilt University Medical Center, USA

Estimating the Proportion from the Null using a Distribution for p-Values in Massive Testing

Microarray studies generate a large number of p-values from many gene expression comparisons. The estimate of the proportion of the p-values sampled from the null hypothesis draws a broad interest. The two-component mixture model is often used to estimate this proportion. If the data are generated under the null hypothesis, the p-values follow the uniform distribution. What is the distribution of p-values when data are sampled from the alternative hypothesis? This work derives this distribution for the chi-squared test. We then use this distribution to estimate the proportion of p-values sampled from the null hypothesis in a parametric framework.

Simulation studies are conducted to evaluate its performance in comparison with five recent methods. Even in scenarios with clusters of correlated p-values and a multicomponent mixture or a continuous mixture in the alternative, our method performs robustly. We demonstrate our method on a real microarray dataset.

Nizar Zaarour

Assistant Teaching Professor, Northeastern University, USA

&

Emanuel Melachrinoudis

Professor, Northeastern University, USA

The “Not so Simple” Interpretation of R^2 , for Relatively Small Sample Sizes

There are several misconceptions when interpreting the values of the coefficient of determination, R^2 , in simple linear regression. R^2 is heavily dependent on the sample size n and it becomes insignificant when analyzing very large sample sizes. In this paper, we comment on these observations and develop a relationship between the R^2 , n , and the level of significance α , for relatively small sample sizes. This relationship will serve as a way to provide consistent results with the hypothesis testing of the slope, using the F statistic. Computational results will be performed. The focus of the paper is on the simple linear regression.