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Παγκύπρια Ημερίδα
Στατιστικής Επιστήμης]

ΠΕΡΙΛΗΨΕΙΣ ΕΡΓΑΣΙΩΝ

Τεχνολογικό Πανεπιστήμιο Κύπρου

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Polygenic risk score and its implication in breast cancer risk prediction.

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Breast cancer is the most common cancer in women worldwide. Several genetic variants have been identified to date that account for a fraction of the genetic susceptibility of the disease. A Polygenic Risk Score (PRS) is the additive combination of common genetic variants that result to an individual's genetic risk of developing the disease. Polygenic risk score, in combination with other risk factors, has the potential to be used in clinical practice and inform screening strategies but there is need for specific calibration in different populations. In this study we aimed to evaluate different parameters that influence the risk predictive ability of the PRS in women of European Ancestry from different countries in Europe.

Mediterranean diet as an eating pattern among US firefighters and its association with cardiometabolic outcomes.

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Cardiovascular disease is a common cause of on-duty mortality among firefighters with obesity being an important risk factor for it. However, little is known about what dietary patterns are characteristic in this population and how these patterns relate to cardio-metabolic outcomes. The aim was to identify the dietary patterns of US firefighters and assess how these are associated with cardio-metabolic outcomes. Participants (n=413) were recruited for a FEMA-sponsored Mediterranean diet intervention¹ study from Indiana Fire Departments. All participants underwent physical and medical examinations, routine laboratory tests, resting electrocardiograms, and maximal treadmill exercise testing. A comprehensive food frequency questionnaire was administered and dietary patterns were derived using Principle Component Analysis. The mean BMI was 30.0 ± 4.5 kg/m² and the percentage of body fat was $28.1 \pm 6.1\%$. Using principal component analysis, two dietary patterns were identified, namely a Mediterranean diet and a Standard American diet. The Mediterranean diet was positively associated with HDL cholesterol ($\beta=2.08$, $p=0.001$) in linear regression models, even after adjusting for gender, BMI, VO₂ max, max METS, age, and body fat percent. The Standard American diet was associated with a decrease in HDL cholesterol ($\beta=-4.82$, $p=0.002$) and an increase in both LDL cholesterol ($\beta=0.455$, $p=0.014$), and body fat percentage ($\beta=1.778$, $p=0.029$). In conclusion, the Mediterranean diet was associated with more favorable protective cardio-metabolic profiles, whereas the American Standard diet had the opposite associations. These findings could help provide suitable nutrition recommendations for US firefighters to improve their health.

Cohort study of intervened functionally univentricular heart in England and Wales (2000 2018)

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Objective: Given the paucity of long-term outcome data for complex congenital heart disease (CHD), we aimed to describe the treatment pathways and survival for patients who started interventions for functionally univentricular heart (FUH) conditions, excluding hypoplastic left heart syndrome. Methods: We performed a retrospective cohort study using all procedure records from the National Congenital Heart Diseases Audit for children born in 2000–2018. The primary outcome was mortality, ascertained from the Office for National Statistics in 2020. Results: Of 53 615 patients, 1557 had FUH: 55.9% were boys and 67.4% were of White ethnic groups. The largest diagnostic categories were tricuspid atresia (28.9%), double inlet left ventricle (21.0%) and unbalanced atrioventricular septal defect (AVSD) (15.2%). The ages at staged surgery were: initial palliation 11.5 (IQR 5.5–43.5) days, cavopulmonary shunt 9.2 (IQR 6.0–17.1) months and Fontan 56.2 (IQR 45.5–70.3) months. The median follow-up time was 10.8 (IQR 7.0–14.9) years and the 1, 5 and 10- year survival rates after initial palliation were 83.6% (95% CI 81.7% to 85.4%), 79.4% (95% CI 77.3% to 81.4%) and 77.2% (95% CI 75.0% to 79.2%), respectively. Higher hazards were present for unbalanced AVSD HR 2.75 (95% CI 1.82 to 4.17), atrial isomerism HR 1.75 (95% CI 1.14 to 2.70) and low weight HR 1.65 (95% CI 1.13 to 2.41), critical illness HR 2.30 (95% CI 1.67 to 3.18) or acquired comorbidities HR 2.71 (95% CI 1.82 to 4.04) at initial palliation. Conclusion: Although treatment pathways for FUH are complex and variable, nearly 8 out of 10 children survived to 10 years. Longer-term analyses of outcome based on diagnosis (rather than procedure) can inform parents, patients and clinicians, driving practice improvements for complex CHD.

Forecasting and Predicting Service Demand for PASYKAF

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The development of PASYKAF has been observed over the years, with focus on the type and frequency of the services provided to patients. In order to facilitate the organisation in providing improved services, historical data have been analysed, with the main aim of the analysis being forecasting of service demand. Frequent pattern mining and SARIMA models were utilized among other methodologies. The results of the analysis were communicated to PASYKAF and will be exploited for strategic planning purposes.

Impact Of Cognitive Biases On Forecasting U.S. Gross Domestic Product

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The impact of cognitive biases on the U.S. Bureau of Economic Analysis' monthly forecasts of the nation's quarterly nominal and real gross national product (GDP) growth rates and their implicit price deflator are examined using a flexible two-piece generalized distribution framework. The analysis of the forecast errors reveals that the forecasts are not rational and, instead exhibit pessimism with the direction and accuracy of the forecast. Real GDP is less biased than nominal GDP as a result of the because of the offsetting bias contained in the price deflator forecast. There is some evidence of using past forecasts as benchmarks for subsequent forecasts.

A Chain-Ladder Analysis of P&I Claims – 2021

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P. & I. claims cause concern to both Shipowners / Shipmanagers as well as to Insurance Brokers. The objective of a reserving exercise is to forecast the future claims development. Eventually all claims for a given origin period will be settled, but it is not always obvious to judge how many years or even decades it will take. Hence, we establish chain-ladder analysis, in order reach interesting results.

Actuarial-Financial Mathematics using Semi-Markov Processes

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An innovative approach of loss ratio forecasting is developed using a special type of semi-Markov processes. Three levels of loss ratio are considered as the states of a semi-Markov process, and semi-Markov process methodology is employed for estimating transition probabilities of loss ratio levels transit from a predefined level to another one.

IFRS9: The model behind Expected Credit Losses

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Following the Great Financial Crisis of 2007-2009, a new Accounting Standard - the IFRS9, has been established aiming to improve loan loss provisioning standards and practices. Under the new framework, banks must provision against expected credit losses from the time a loan is originated. The Expected Credit Loss (ECL) measurement approach employs a weighted probability model, based on the probability of a financial instrument defaulting on its contractual obligations, the loss relative to the total exposure in the event of default, and the exposure amount at default of the financial instruments. The focus of this talk is the methodology employed by credit institutions in calculating their Expected Credit Losses under the IFRS9 Standard.

The Lifestyle Profile of Individuals with Cardiovascular and Endocrine Diseases in Cyprus: A Hierarchical, Classification Analysis

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The study aims to explore the lifestyle profile of adult individuals with cardiovascular and endocrine diseases in Cyprus. Age and sex-specific analyses were applied. A representative sample of the general adult population was recruited during 2018–2019 using stratified sampling among the five government-controlled municipalities of the Republic of Cyprus. Data on Mediterranean diet adherence, quality of sleep, smoking status, physical activity, Body Mass Index, and the presence of cardiovascular and endocrine diseases were collected using a validated questionnaire. Diseases were classified according to the International Classification of Diseases, Tenth Revision (ICD-10). A total of 1140 men and women over 18 years old (range: 18–94) participated in the study. The prevalence of cardiovascular and endocrine diseases among the adult general population of Cyprus was 24.8% and 17.2%, respectively, with a higher prevalence of cardiovascular diseases in men, and a higher prevalence of endocrine diseases in women. Among individuals with cardiovascular disease, 23.3% were aged between 18–44 years old, while the corresponding percentage among endocrine disease individuals was 48%. The prevalence of smoking, physical activity, a low adherence to the Mediterranean diet, poor quality of sleep and obesity among the study population was 35.5%, 48.0%, 32.9%, 39.0% and 13.6%, respectively. Individuals with cardiovascular and endocrine diseases were characterized by poor quality of sleep, inadequate physical activity, and a higher BMI. This is the first study in Cyprus exploring the profile of individuals with cardiovascular and endocrine diseases in Cyprus. Health promotion and educational programs focusing on the importance of sleep quality, healthier dietary habits, physical activity, and lower BMIs among people with cardiovascular and endocrine diseases should be developed.

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Determinants of COVID-19 vaccine uptake among health care workers and the general population in Cyprus: the importance of vaccination knowledge and trust in healthcare system.

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Vaccination is a critical intervention in the fight against the coronavirus disease 2019 (COVID-19) pandemic. Various levels of COVID-19 vaccination acceptance have been observed around the world. However, a high percentage of the general population and health care professionals (HCPs), refuse the COVID-19 vaccination. This study aims to examine the factors influencing COVID-19 vaccine uptake among HCPs and the general population in Cyprus. An online cross-sectional study was conducted (November 2021-January 2022), using a self-administered, anonymous questionnaire to collect information covering a wide range of potential determinants including sociodemographic and health related characteristics, trust in the healthcare system, satisfaction with it, utilization of preventive healthcare services, COVID-19 vaccination information, and general vaccination knowledge. A total of 2582 participants completed the survey. Overall, 53.5% of individuals in the general population, and 70.0% of the HCPs received the COVID-19 vaccination. We found that as the age increases by one year among the general population, the odds of being vaccinated against COVID-19 increase by 1.02 units (95% CI: 1.00, 1.03, p-value=0.035). In addition, individuals in the general population with increased trust in national healthcare authorities' guidelines (OR=3.96, 95% CI: 3.41, 4.61), and increased vaccination knowledge scores (OR=1.11, 95% CI: 1.05, 1.18) were significantly more likely to be vaccinated, while those who had underage children living in the household were significantly less likely to be vaccinated against COVID-19 (OR=0.68, 95% CI: 0.50, 0.91). Furthermore, male HCPs (OR=1.91, 95% CI: 1.01, 3.59), and those who reported increased trust in national healthcare authorities' guidelines (OR=5.38, 95% CI: 3.65, 7.95) were significantly more likely to be vaccinated. Public health policymakers can use national campaigns and long-term planning to build public trust in national healthcare authorities and educate and raise awareness about the benefits of vaccination. Such strategies could pave the way for adequate vaccine uptake and prepare the public for unfavorable scenarios, such as future pandemics.

The impact of the COVID-19 pandemic on the academic community.

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The Covid-19 pandemic has resulted in repeated and alternate periods of lockdowns and restrictions worldwide. The present study examines the impact of lockdowns on University students and faculty in Cyprus and Greece, especially due to the shift to online education. The changes in the daily habits, physical and mental health and general quality of life of the academic community are presented.

Περιλήψεις Ομιλιών

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Έρευνα για θέματα υγείας και ασφάλειας στο σύγχρονο χώρο εργασίας, κατά τη διάρκεια του Covid-19.

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Το μέλλον μιας επιτυχημένης Στρατηγικής Διοίκησης ενός οργανισμού είναι η ευημερία των εργαζομένων και πως αυτή προωθείται, εφαρμόζεται και οικειοποιείται ως εταιρική κουλτούρα, μέσω των πρακτικών της εκάστοτε διοίκησης. Η πανδημία του Covid-19 ήρθε να αλλάξει τα δεδομένα στην εργασιακή πραγματικότητα, θέτοντας την «εξ αποστάσεως» εργασία ως την νέα «νόρμα» ενώ παράλληλα να αναπτύσσονται πρακτικές, εργαλεία και νέες δυναμικές στις παραδοσιακές εργασιακές δομές. Σε αυτήν την υπόθεση βασίζεται η εκπόνηση της συγκεκριμένης έρευνας και ανάλυσης που αποβλέπει στην αποκωδικοποίηση της έννοιας της ευημερίας στον εργασιακό τομέα, στις θεωρητικές έννοιες που την διέπουν και στις εκάστοτε πρακτικές που εφαρμόζονται με στόχο τη διαφύλαξη της υγείας και ασφάλειας των εργαζομένων σε ένα δυναμικό και συνεχώς εξελισσόμενο εργασιακό περιβάλλον. Θα διαπραγματευτεί το θέμα της Ευημερίας των εργαζομένων στο περιβάλλον Εργασίας, θέτοντας σε τροχιά δυο βασικές περιμέτρους. Στο πρώτο μέρος της μελέτης θα επιχειρήσουμε να προσεγγίσουμε πως αποτυπώνεται το θεωρητικό πλαίσιο των βασικών εννοιών που συνθέτουν τον όρο εργασιακή «ευτυχία» μέσα από την επιστημονική βιβλιογραφία καθώς και τις πρακτικές που την ενδυναμώνουν. Σε δεύτερο επίπεδο θα διατυπωθούν τα ερευνητικά ερωτήματα που τέθηκαν προς διερεύνηση του προβλήματος όπως αυτό αποτυπώνεται από νέα εργασιακά δεδομένα που προέκυψαν μετά την πανδημία. Η ανάλυση της έρευνας θα καλύψει το τρίτο μέρος της μελέτης με αναλυτική περιγραφή και εξαγωγής συμπερασμάτων.

New maximal inequalities for Reverse Demimartingales and Reverse Demisubmartingales

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We introduce the concept of a reverse demimartingale and a reverse demisubmartingale as a generalization of the notion of reverse (backward) martingales and reverse submartingales. We establish a Chow type maximal inequality and a Doob's maximal inequality for reverse demisubmartingales. This type of inequalities are also obtained for reverse demimartingales.

Adaptive rates of contraction for spatially inhomogeneous unknowns.

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We consider Bayesian approaches to non-parametric models. In particular, we use p-exponential priors, which are priors constructed via random series expansions using distributions with tails between Gaussian and exponential. We will study the frequentist asymptotic performance of the posterior distribution in the infinitely informative data limit, in terms of posterior contraction rates. Priors with exponential rather than Gaussian tails have been shown to be more suitable for modeling spatially inhomogeneous unknown functions, that is functions that are regular in some part and irregular in some other part of their domain. We will design procedures which give rise to posteriors contracting at rates which are adaptive in the minimax sense, for (Besov) classes of spatially inhomogeneous unknown functions. Specifically, we study p-exponential priors with scaling and regularity hyper-parameters, using empirical Bayes and hierarchical Bayes methods of choosing the hyper-parameters.

Spatial reconstruction of daily precipitation using compound Poisson gamma effective distributions.

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Precipitation is a key component of the hydrological cycle. It is particularly important for the health of the ecosystems and the well being of human societies since it helps to recharge aquifers and surface water bodies. However, modelling precipitation is not an easy task. Features such as the intensity and duration of precipitation vary greatly with geographic location, local geography and time of the year. Additionally at certain time windows precipitation also exhibits intermittency, i.e zeros that correspond to days with no precipitation. The compound Poisson gamma distribution arises as a sum of independent gamma distributed random variables, where the number of terms in the sum is also random and follows the Poisson distribution. Compound Poisson gamma distributions are used to model daily precipitation data at a fixed location. Then, an "effective field" approach is proposed which replaces the joint probability density by a product of univariate compound Poisson gamma density functions. The univariate effective distributions involve spatially variable parameters, which introduce dependence between the effective densities at different locations. We also propose a sequential simulation approach for generating multiple field realisations.

Some Convergence Results on Generalized Oppenheim Expansions.

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In this talk we present results for the asymptotic behavior of weighted partial sums of a particular class of random variables related to Oppenheim series expansions. Particularly, we obtain convergence in probability as well as almost sure convergence without assuming any dependence structure or the existence of means. Moreover, we provide an asymptotic result, that under some conditions related to the distributions involved, is valid for any Oppenheim expansion, extending a classical result proven for denominators of the Lüroth expansion.

Are unmotivated Cypriot examinees in the PISA test to blame for the low country rankings?

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Test scores reflect achievement and performance, assuming that examinees took the test with sufficient motivation and effort. International assessments like PISA, are low-stakes for examinees. In Cyprus (and elsewhere) PISA results are often criticized as invalid indicators of effectiveness of the educational system because students are not motivated to try hard and engage with the test. Thus, they underperform, driving their country score downwards. In this presentation we identified rapid guessers in the 2015 computerized PISA test across 56 countries with two approaches: a fixed 5-second threshold and a normative item-specific threshold. After filtering out the rapid guessers, we re-estimated the country scores and ranks. Overall, country scores in Mathematics increased slightly, but the impact on country ranks was minor. The Cyprus rank under various conditions changed by at most one position; for the Reading assessment, the change in the Cyprus rank was at most two positions.

Using Complier Average Causal Effect Estimation to Determine the Effectiveness of School-Based Interventions

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Although variability in the implementation of school-based interventions is inevitable, most randomized trials in education rely on intent-to-treat (ITT) analyses, which assume complete compliance among those allocated to the intervention group. However, the estimation of intervention effects can be biased unless everyone complies with the intervention. Complier average causal effect (CACE) estimation overcomes this limitation by using data from compliers and noncompliers across the intervention and control arms of a trial. While the application of CACE is commonplace in other fields, it has received less attention within education, and even less so within a multilevel framework. Using multilevel mixture modelling with robust maximum likelihood the current study explored the impact of a Social Emotional Learning cluster randomized trial on students' (N = 5,218) quality of life outcomes. Multilevel ITT analysis, after controlling for key student-level and school-level covariates, indicated a small, statistically significant improvement in students' psychological wellbeing. No such effects were observed for peer social support and school connectedness. When compliance (as assessed through dosage) was taken into account through multilevel CACE the intervention effect size for psychological wellbeing increased, and statistically significant medium to large effects were observed for peer social support and school connectedness.

Regression Tree Method: Predicting teaching practices using educational large-scale data

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Regression Tree Method has been applied in Educational research at some extent, despite of being a traditional approach in Machine Learning. This study investigated the extent to which key teacher, and school characteristics explain teaching practices and the emphasis of developing students' digital (CIL) and computational thinking (CT) skills in classrooms. Utilizing large-scale data from ICILS 2018, the study takes an international perspective on the teaching with technology. The main method of the study was the multilevel structural equation modeling; however, we further substantiated the prediction of the teaching practices and the emphasis on CIL and CT and the importance of the predictors by examining the extent to which the teacher- and school-level predictors partitioned the data. Given that the present data were hierarchically structured which is particularly common in psychological research, linear mixed-effects tree modelling was performed with recursive partitioning and restricted maximum-likelihood estimation in the R package 'glmertree'.

Contemplating the Opposition: Does a Personal Touch Matter?

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Is it important to hear positions opposing one's own from others who genuinely believe them? We examine whether the thinking of those who engage in discourse with peers who hold an opposing view benefit by hearing arguments favoring the opposing position expressed by individuals known to hold this position. We report on 131 adolescents who engaged in dialogs. In the experimental classroom, electronic dialogs were conducted with a series of peers who held an opposing view; in the control classroom, dialogs were confined to same-side peers. A generalized linear mixed model (GLMM) using the Poisson probability distribution showed a difference between conditions over time in mean frequencies of usage of functional evidence in arguments in a non-intervention topic, favoring the experimental group. Extension of the study longitudinally to a second year with a new topic showed continued gains and condition differences, supporting this interpretation, with the experimental group surpassing the control group.

Advancements in Indirect Questioning Techniques

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Sensitive issues related to one's life cannot be investigated using ordinary survey methodology approaches. People do not like to participate in surveys dealing with matters of privacy. Even in cases they agree to respond to questions related to sensitive or stigmatizing issues, often they provide false or misleading answers. As a result, the conclusions of such a survey cannot be taken seriously. Indirect Questioning Techniques are designed so that reliable estimates can be produced and at the same time the privacy of the participants is protected to a great extent. Although most of the techniques fall in the category of Randomized Response, one approach, the Item Count Technique (ICT) is an alternative. The original version of the technique, due to Raghavarao and Federer (1979), Miller (1984) and Miller et al. (1986), does not fully protect the privacy of the participants and in some cases the response provided reveals that the participant belongs to the stigmatizing group. In this presentation we propose revised versions of the technique and in some cases, we discuss the related measures of the protection of privacy. Also, we wish to check whether the results received using various Indirect Questioning Techniques (i.e. Warner's technique, Unrelated Question Model, ICT, Crosswise and Triangular Model) versus the direct questioning method are more accurate or not. For each technique, we build a scenario and we assume that we have a sample of size n drawn with replacement from the population and each participant provides a direct response for the sensitive item and an indirect response. For Warner's method, Unrelated Question Model and ICT we present some simulation results which were generated in R and for Crosswise and Triangular Models we present the results given using some available data collected by the University of Calabria. From the results generated we can easily conclude that the Indirect Questioning Techniques are worth applying.

An introduction to R Markdown

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R Markdown provides a unified authoring framework for data science. In the context of literate programming, R markdown produces documents that combine code, its results, and the author's commentary, hence supporting reproducibility. Moreover, it supports Open Science as it enables us to record and distribute code and analyses in more readable formats. R Markdown documents are fully reproducible and support dozens of output formats, like HTML, PDF, Word, slideshows, books, websites, dashboards and more. This talk will be a presentation on what is R markdown, the benefits of using R Markdown, and its applications in research, data science, report writing, and collaboration. A short demonstration (live coding) of the use of Rmarkdown for generating documents in HTML, PDF, and MS Word, and interactive dashboards. Also, several resources - tutorials, books, and blog posts- to help get started with working with R markdown documents, are presented.

Estimation of Peer Effects Using Large Scale Educational Data: Addressing Measurement Error Bias

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Our study applies the methodological approach of recent studies in the field of quantitative education (multilevel latent variable models; see Dicke et al., 2018; Televantou et al., 2015, 2021) to investigate effects of average mathematics achievement at the school- and the class-level on students' subsequent mathematics achievement ("the peer spill-over effect") and mathematics self-concept ("the big-fishlittle- pond-effect; bflpe"), controlling for individual differences in mathematics prior achievement. We use a historical dataset , namely the Second International Mathematics Study (SIMS80), that was released by the International Association for the Evaluation of Educational Achievement in 1980s. We analyse data from three distinct educational systems: Canada (Ontario), USA, and New Zealand and demonstrate a positive bias in the estimated peer effects, one that can be attributed to the presence of measurement error in the data. Once more appropriate models are incorporated, peer spillover effects become less positive, or disappear altogether, while negative BFLPEs become more negative. Importantly, revisiting research questions originally raised by older studies based on this database (Zimmer et al., 2000) we show how conclusions are changed when multilevel latent variable models are used – instead of the conventional approach at that time. Our findings are in line with those of past and current literature investigating peer effects in educational settings, and highlight the importance of using correct statistical methodology in applied educational and social science research if we are to trust the validity of the derived findings.

Περιλήψεις Ομιλιών

3^η Παγκύπρια Ημερίδα Στατιστικής Επιστήμης – 6 Μαΐου 2022

Σχηματοποίηση ενός πλαισίου ανάλυσης, πρόβλεψης και ελέγχου των Οικονομικών και Πολιτικών εξελίξεων στην Κυπριακή Οικονομία σε βάθος χρόνου: Μερικά Αποτελέσματα Στοχαστικών Πειραματισμών.

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Οι πρόσφατες εξελίξεις με αφορμή τον πόλεμο στην Ουκρανία θα είναι καθοριστικές και σίγουρα θα αλλάξουν τους υφιστάμενους οικονομικούς αλλά και πολιτικούς σχηματισμούς. Αναμφίβολα και ο ρόλος της Κύπρου σε αυτούς τους σχηματισμούς θα δοκιμασθεί. Πατροπαράδοτες και ιστορικές συμμαχίες θα αναδιαμορφωθούν και στην καλύτερη περίπτωση θα τεθούν σε νέες βάσεις. Σε βάσεις που θα δοκιμασθούν για τις πολιτικές και οικονομικές τους αντοχές σε ένα μακροχρόνιο ορίζοντα. Ως ακολούθως, θα πρέπει να ληφθούν πολύ σύντομα αποφάσεις που θα ασφαλίσουν την πολιτική και οικονομική ευημερία της Κύπρου σε μια μακροχρόνια βάση. Ένα τέτοιο πλαίσιο θα δοκιμάσουμε να σχηματοποιήσουμε κατ' αρχάς αξιοποιώντας τεχνικές στοχαστικής εξομοίωσης και σε επόμενο στάδιο να αξιοποιήσουμε ανάλογα στοιχεία. Η 'καρδιά' αυτού 'πλαισίου' θα είναι ένα δοκιμασμένο στον χρόνο 'παίγνιο'. Ένα παίγνιο όπου οι 'παίκτες' του θα επιλεγούν με βάση μια πληθώρα από κριτήρια αλλά και τις προδιαγραφόμενες οικονομικές τους προοπτικές. Η διάρθρωση αυτού του πλαισίου θα έχει έναν εμπεριεχόμενο (nested) χαρακτήρα με μια πληθώρα από επιμέρους εφαρμογές αριστοποίησης αν και το ίδιο το παίγνιο είναι μια διαδικασία αριστοποίησης από μόνη της.
