2024

University of Piraeus
Department of Statistics and Insurance Science

http://unipi.gr/stat/actuarial2024

"Advances in Actuarial Science and Finance"
A conference in Honour of Prof. Takis Papaioannou

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Invited Speakers

- **Alex Karagrigoriou (President of ESI-STAT)**
- **Takis Papaioannou (University of Piraeus)**
- **Athanasios Yannacopoulos (AUEB)**
- **Georgios Skoulakis (University of Piraeus)**
- **Friedrich Hubalek (TU Wien)**
- **Austin Riis-Due (University of Waterloo)**
- **Ioannis Chatzivasiloglou (Bank of Greece)**
- **Apostolos Papachristos (Allianz Eur. Reliance)**
- **Nicholas Berketis (Frederick University)**
- **Georgios Papayiannis (University of Piraeus)**
- **Spyridon Tzaninis (University of Piraeus)**
- **Lazaros Kanellopoulos (University of Piraeus)**
- **Veronica Vigna (University of Chieti-Pescara)**
- **Jacob-David Economides (University of Piraeus)**

Venue: University of Piraeus Conference Room

Dates: May 27-28 2024

Opening Time:

Monday 12:00
Tuesday 9:30

Free Admission

Front-desk Registration

Conference Room

Sponsored by
The University of Piraeus Research Center

Organizing Committee
Georgios Pitselis (University of Piraeus), Chairman
Apostolos Bozikas (University Sof Piraeus), Co-Chairman
Veronica Vigna (University of Chieti-Pescara)

University of Piraeus | 80 Karaoli & Dimitriou Str.

UNIVERSITY OF PIRAEUS
DEPARTMENT OF STATISTICS AND INSURANCE SCIENCE

"Advances in Actuarial Science and Finance"
A Conference in Honour of Prof. Takis Papaioannou

Date: Monday May 27, 2024
Entrance: University of Piraeus, 80, Karaoli & Dimitriou str.
Venue: University of Piraeus Conference Room (Orange Amphitheater)
Registration time: 12:00

PROGRAMME
Monday May 27

**Opening Ceremony*: 12:45 - 13:30*

Alex Karagrigoriou
President of the Greek Statistical Institute

Takis Papaioannou
University of Piraeus
A Talk by Heart

Yannacopoulos Athanasios
Athens University of Economics and Business
Model uncertainty in actuarial science and finance

Model uncertainty play an important role in many problems in actuarial science and finance. In this talk we present some aspects of the theory of model uncertainty and its connection with variational utilities, stochastic differential games and robust control, with an emphasis on applications in pension fund modelling and risk quantification.

Skoulakis Georgios
University of Piraeus
Economic significance of stock predictability: low R-squares and high Sharpe ratios

Statistical measures, such as R-squared, are typically used in empirical analyses to evaluate the strength of relations between variables of interest and support the significance of the results. Following others in the literature, we argue that the use of such measures cannot be universal in the sense that judging values of such measures as too low could be misleading for certain applications. We extend the results by Campbell and Thompson (Review of Financial Studies, 2008) to illustrate the economic significance of stock return predictability, in terms of Sharpe ratios of simple regression-based trading strategies, even though values of R-squared appear low by conventional standards.

Hubalek Friedrich
Joint work with Stefan Gerhold
TU Wien
The effect of policy cancellation on the risk of an insurance portfolio

We investigate a quantitative justification of the surrender value of an insurance contract by studying the increased risk of the average loss of an insurance portfolio when a policy is cancelled. The question is motivated by recent jurisdiction of the Supreme Court of Justice in Austria and an ongoing discussion in the German actuarial community. An asymptotic analysis of Value-at-Risk is connected to the classical Cornish-Fisher expansion, and leads to a new generalization for Expected Shortfall, and possibly, to other coherent measures of risk. Our main results apply to losses from the domain of attraction of the normal distribution. We also discuss the problem for non-Gaussian stable distributions when results look different and depend on the index of stability.

Session B: 15:30 - 17:30

Riis-Due Austin
University of Waterloo
Applications of reinforcement learning to credibility selection for insurance claims

Actuarial Credibility has evolved from the early 1900s as a method of determining how much confidence an actuary has in a particular collection of data. It is critical to the pricing assumptions underpinning new lines of business that initially contain little information in their emerging experience. Over time, it has become commonplace to use the so-called square root rule, which assigns this weight solely based upon the number of points of data recorded. While this simple idea works in practice, we are able to show that reinforcement learning based approaches, including both Recurrent PPO and DQN, are able to outperform this traditional weighting scheme using data generated by multiple models, having similar performance to Bayesian methods despite being restricted to a subclass of estimators and without the need for a Bayesian prior. Our findings demonstrate a significant improvement in accuracy and adaptability in actuarial credibility assessment using reinforcement learning methods compared to practicing methodology.

This work is a joint partnership with a Regional North American Insurance Carrier.

Chatzivasiloglou Ioannis
Bank of Greece
The role of the actuary in the era of technological innovation, climate change and increased consumer power

Actuaries are professionals who develop and communicate solutions for complex financial issues. This definition remains relevant over time as it is quite broad. However, the actuarial science has evolved significantly since its origin, to reflect the changing conditions. This is so, from designing life expectancy tables based on London "bills of mortality" by John Graunt (1620-1674) to making multi-year stochastic projections of asset and liabilities of insurance carriers, as per Solvency II requirements.

Despite the big changes of the actuarial science all the previous years, winds of change blow now even harder, as the current external forces are impacting the cultural, financial, and economic status quo. For example, Insurtech initiatives are emerging with growing number and they tend to disrupt the insurance value chain models as currently shaped by incumbent insurers; extremely large data

sets are collected and analyzed using advanced computational methods to reveal trends, patterns, and associations; sustainability concerns related to environmental, social and employee matters are at the top of the priority of our society; advances in psychology challenge the underlying assumptions of financial models i.e., that the economic agents are making rational choices, even when it comes to the selection of their personal investments.

All the above pose significant challenges to the actuarial profession. With Insurtech, actuarial assessments based on internal historical result or even industry benchmarks may no longer be appropriate. Use of big data raises ethical concerns related to the proliferation of unwanted, but deeply embedded to our society, biases and demands the actuarial models to overlook statistical evidence, with a view to remain bias free. Climate change risk management techniques need to reflect in multi-year ALM projections future possible climate related governmental policy trajectories, beyond normal business cycle timeframes, coupled with double materiality risk assessments. Actuarial models need to adapt in order to anticipate the (at times irrational) behavior of economic agents and to reflect value-for-money demands of the consumers of insurance products.

In this perspective, the presentation will elaborate on the current challenges the actuaries face to remain relevant to the society and to keep up performing their work in a professional manner. Furthermore, it will outline the new paradigm that is emerging and is expected to shape the future of actuarial science.

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Papachristos Apostolos
Allianz European Reliance
Discount rate curves for IFRS 17 insurance contracts liabilities

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The new accounting standard IFRS 17 requires that the discount rates used to calculate the present value of liabilities should reflect the timing, amount, currency and the liquidity of liabilities cashflows. Under IFRS 17, a principle-based approach is adopted and the discount rates can be estimated using a 'bottom-up' or a 'top-down' approach. One of the main challenges in setting IFRS 17 discount rates is that the effect of credit risk must be removed from the (actual or reference) bond portfolio yield. The bond-related credit risk includes both expected and unexpected credit losses. The similarities and differences between Solvency II and IFRS 17 discount rated are also highlighted.

Berketis Nicholas
Frederick University
Red sea attacks

Yemen's Houthis, an armed Zaydi Shia group that controls a significant portion of northern Yemen, have carried out over 40 attacks on merchant vessels along the Suez Canal-Red Sea route. This shipping route plays a crucial role in global trade, accounting for approximately 12% of all worldwide trade. As a result of these attacks, major shipping companies such as Maersk (Denmark) and Hapag-Lloyd (Germany) decided to avoid sailing through the Suez Canal altogether and are opting for alternative routes instead. The disruption caused by this conflict is not only impacting global supply chains but is also anticipated to increase insurance risk premia for charterers, freight forwarders and shipping companies. Consequently, negotiations with Insurers regarding coverage will likely be necessary. However, unless the military conflict escalates further, it is expected that any impact on claims and inflation will remain minimal.

Questions:

- Was the world shocked with these developments, although the threat was known at least since February 2020?
- What conclusions are drawn following recent attacks?

Methodology:

We collected data on all attacks that occurred between November 19th, 2023, and February 6th, 2024. Based on this data, we developed a simple model.

PROGRAMME
Tuesday May 28

Session C: 10:00 - 11:30

Papayiannis Georgios
University of Piraeus
Risk quantification under model ambiguity and applications

In modern actuarial and financial applications, model ambiguity is a common problem that requires a careful treatment. An appropriate risk quantification framework relying on the class of convex risk measures and employing quantitative tools from the optimal transport theory will be presented. Moreover, this framework is implemented to some standard applications in actuarial science and finance.

Tzaninis Spyridon
Joint work with Apostolos Bozikas
University of Piraeus
Extensions of Panjer's recursion for mixed compound distributions

Let S be the aggregate claims amount induced by the claim size process $X:=\{X_n\}n\in N$ and the claim number N. We consider the mixed counterpart of the original Panjer class of claim number distributions and their corresponding compound distributions by allowing the claim size process X to be conditionally i.i.d. and conditionally mutually independent of N given Θ, where Θ is a d-dimensional random vector representing an inhomogeneous portfolio under consideration. Under the above assumptions, we provide a simple recursive formula for the computation of P_S in the case that P_X is concentrated on N_0.

Kanellopoulos Lazaros
Joint work with Konstadinos Politis
University of Piraeus
Some approximation results for ruin probabilities in the classical risk model

We study the problem of continuity in risk models. In the classical risk model with Poisson arrivals, we use a simple technique for continuity estimation for ruin probability and the defective tail of the deficit at ruin. Continuity inequalities are derived, which are expressed in terms of various probabilistic metrics. We also give some numerical illustrations to investigate the accuracy of the approximations.

Session D: 12:00 - 13:00

Vigna Veronica
Joint work with Guglielmo D'Amico and Ricardo De Blasis
University of Chieti-Pescara
Advertising investments on television: real option estimation through Markov chains

We propose the valuation of a real option in the telecommunications industry. According to the probabilistic present worth approach, we estimate the value of a contract between a television network and a company willing to advertise its business on this network. We assume that the value of the contract depends on a time-dependent variable, i.e., the number of viewers tuned into the network, which behaves like a Markov process. After discretizing and converting this number into a monetary value through a specific function, we compute the nth-order moment of the total discounted earnings. The knowledge of the moments, and the application of the maximum-entropy approach, allows to find the probability distribution of the payoff function and the consequential pricing of the real option. Finally, we apply the proposed model to the real television audience data.

Economides Jacob-David
Joint work with Michael Boutsikas
University of Piraeus
Perpetual american options in a double-exponential jump-diffusion model under Poissonian observations

We investigate the problem of pricing Perpetual American put and call options, considering the exercise opportunity occurring under Poissonian inspection. Employing an exponential Levy model, we specifically examine a jump diffusion with two-sided jumps. We present key identities to express the option payoff and exercise probability in terms of undershoot/overshoot for put/call scenarios. Additionally, we derive explicit formulas for option payoff, exercise probability, and optimal boundary under two conditions: i) linear Brownian motion, and ii) double exponential jump diffusion process. Valuation under the risk-neutral probability measure is provided for both cases, along with asymptotic formulas yielding well-established results from continuous time models. Our numerical examples illustrate the impact of inspection intensity sensitivity on pricing outcomes for both scenarios.

Front-desk Registration (Δεν χρειάζεται δήλωση συμμετοχής)

Free Admission (Είσοδος Ελεύθερη)