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RISK 2022 SCHEDULE as of July 2022

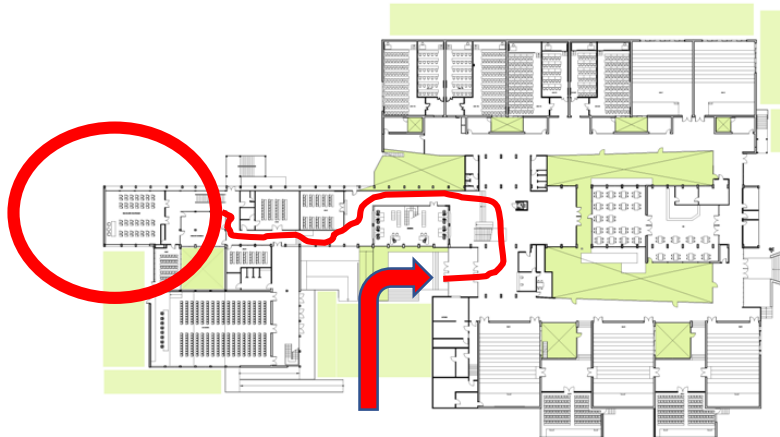
Schedule	Thursday	Friday
8:45-10:30	Registration (9:30) Welcome and Invited Talk	Session V1 (hybrid)
10:30-13:30	Session D1 (face)	Session V2 (face)
12:30-13:30	Lunch cocktail	Lunch cocktail
13:30-15:30	Session D2 (face)	Session V3 (hybrid) & Session E4 (in Spanish)
15:30-16:00	Coffee break	
16:00-18:00	Session D3 (face) & Session D4 (online)	

Registration Thursday 20, 9:00 to 9:30

Room 2019 696 Building
Facultat d'Economia i Empresa, Universitat de Barcelona
Av. Diagonal, 696, 08034 Barcelona



<https://goo.gl/maps/xd9o93Y4dgVFHf457>



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Welcome and Invited Talk (Thursday 20, 9:30 to 10:20)

Klein, Tony – “Non-Standard Errors”.

In statistics, samples are drawn from a population in a data-generating process (DGP). Standard errors measure the uncertainty in sample estimates of population parameters. In science, evidence is generated to test hypotheses in an evidence-generating process (EGP). We claim that EGP variation across researchers adds uncertainty: non-standard errors. To study them, we let 164 teams test six hypotheses on the same sample. We find that non-standard errors are sizeable, on par with standard errors. Their size (i) co-varies only weakly with team merits, reproducibility, or peer rating, (ii) declines significantly after peer-feedback, and (iii) is underestimated by participants.

IMPORTANT

Each presenter has a total **slot of 20 minutes**.

Prepare your slides for a presentation no longer than 15 minutes. The chair person will moderate Q&A, time allowing.

We would appreciate receiving your slides before the meeting. Please, send them to ubrisk2022@gmail.com and you will find them copied on the PC in the lecture room for those participating in person.

For online participants, the link to the corresponding session will be provided to you by Wednesday October 19. Make sure that your camera is on and that you can share your screen.

This meeting is hybrid, except for one session to be held in Spanish. All presentations will be recorded and offered live by streaming.

Send your enquiries to ubrisk2022@gmail.com.

D1 SESSION (Thursday 20, 10:30 to 12:30)

1. **Pavía, J.M.** & Lledó, J – “On the construction and use of quarterly life tables”.

Pavía and Lledó (2022) has just very recently proposed a new methodology, based on seasonal- ageing indexes (SAIs), for building from annual life tables sub-annual life tables that concurrently account for ageing and calendar fluctuations of demographic events. Their approach, however, requires dealing with large and detailed volumes of data to be applied. For instance, in their empirical example, they exploit a database of Spain composed of more than 186 million of microdata records. But, what happens when detailed microdata is not available? What’s more, given that (sub-annual) death risks and SAIs are not time stationary, what should we do to update SAIs even when data is available? Is it necessary to incur again in the great data management and computational charges that their approach entails? In this research, we assess whether an approximation could be taken. We suggest three different shortcuts, in which SAI estimates are obtained by dealing just with a small bunch of thousands of data records, and assess them using data from an actual life insurance portfolio of a Spanish company. Our analyses clearly indicate the shortcuts as proper practical approaches that can be used in real life insurance markets. Applying the new methodology, even only an approximation, is preferable to employing just the associated annual table.

Session	Language	Face-to-Face / Online	Room
D1	ENG	FACE	2019

2. Devolder, P. & **Zeddouk, F.** – “Longevity-linked securities pricing in the presence of population basis risk”.

Hedging the basis risk is a challenging issue for pension funds and insurers, who are increasingly resorting to longevity-linked securities to transfer their longevity risk. Generally, these derivatives are based on population data rather than their own policy data, which may lead to a potential loss due to data mismatch. This paper proposes different possibilities to hedge the basis risk, using financial instruments priced under the Cost of Capital approach and other classical pricing methods. We assess and analyze different hedging strategies for firms facing basis risk. In our framework we use the Hull and White process to provide different multipopulation models, by modifying the trend and/or the volatility and introducing correlation levels. We give different numerical examples to illustrate each possibility using data from the Belgian population.

Session	Language	Face-to-Face / Online	Room
D1	ENG	FACE	2019

3. **A. Debón** & Atance, D. – “Two multi-population mortality models: A comparison of the forecasting accuracy with resampling methods”.

Forecasting mortality usually serves practical needs because its improvements could have enormous social and financial implications. The main objective of this paper is to compare multi-population mortality models for projecting mortality rates in regional dynamic life tables. Our contribution consists of comparing different approaches for adjusting regional mortality rates using resampling methods. Using official data from the Spanish National Institute of Statistics (Instituto Nacional de Estadística, INE), we applied modifications of the Lee-Carter model to Spanish regions. Consequently, we propose a procedure that can be applied to the related life tables database that will allow us to choose the most appropriate model for any geographical area.

Session	Language	Face-to-Face / Online	Room
D1	ENG	FACE	2019

4. **Bernard, C.** Feliciangeli, M. & Vanduffel, S. – “Optimal risk sharing in an actuarially unfair tontine”.

A one-period tontine is a collective investment in which every participant enters with an initial contribution and only participants surviving at maturity share the total pool as a payout. A vast literature proposes different criteria to share the total pool among survivors using as main argument the actuarial fairness of the payout (i.e., fairness with respect to the expectation). We revisit this point and suggest alternative sharing rules that aim at being better suited to investors. Individuals with different risk aversion (heterogeneous preferences) and different mortality risk (heterogeneous mortality) may prefer actuarially unfair tontines. In particular, we discuss how to share mortality risk using a fairness criterion based on a utility aiming at ensuring that all participants have the same certainty equivalent.

Session	Language	Face-to-Face / Online	Room
D1	ENG	FACE	2019

5. **Fernández-Fontelo, A.**, Puig, P., Guillen, M. & Moriña, D. – “Modelling the impact of Covid-19 pandemics on health insurance associated services demand”.

Health insurance is one of the branches of insurance with the greatest penetration in the Spanish market; the same happens in many developed countries. The claim rate in health insurance has suffered the impact of the Covid-19 pandemic in 2020 and 2021, especially regarding consultations and medical events that could be postponed. Mobility restrictions led to a decline in the use of insurance by policyholders and a transformation of the interaction between patients and health workers with greater use of telephone consultation. This work aims to study how to determine if, (i) due to the effect of postponing visits or (ii) due to the consequences of having suffered the virus (persistent Covid or side effects), there will be an excess of claims and, where appropriate, when a claiming increase will occur.

Session	Language	Face-to-Face / Online	Decision
D1 + Covid	ENG	FACE	2019

6. **Calderín-Ojeda, E.** & Vázquez-Polo, F.J. – “Modeling time series of count with overdispersion and bimodality based on INAR(1) model with rBell innovations”.

In this work Poisson we introduced a novel first-order, non-negative, integer-valued autoregressive model INAR(1), with Short or rBell innovations based on the binomial thinning operator. Compared with other models, this model is not only simple but also suitable for time series of counts exhibiting overdispersion and bimodality. Some properties of the model are established here, such as the mean, variance, joint distribution functions, and multi-step-ahead conditional measures. An Expectation-Maximization algorithm is used for estimating parameters. As an application a univariate INAR(1) regression model with rBell innovations is proposed for modelling claim counts from an automobile insurance portfolio to show the performance of the proposed model compared with other competitive models in the literature is carried out. Finally, a bivariate INAR(1) regression model based on the Sarmanov distribution is proposed.

Session	Language	Face-to-Face / Online	Room
D1	ENG	FACE	2019

D2 SESSION (Thursday 20, 13:30 to 15:30)

1. **Nießner, T.** & Schumann, M. – “Analysis of consecutive financial statements concerning bankruptcy prediction”.

While classical bankruptcy prediction models focus on the analysis of financial ratios extracted from a balance sheet, there is a consensus in research that harnessing textual data from annual reports can optimize these models. Motivated by the expectations of researchers and analysts, we addressed the informative value of unstructured data by looking closely at period of a company's evolving bankruptcy over time. To this end, we used TD-IDF to analyze the cosine similarity of consecutive financial reports of 23 solvent and insolvent German companies over 5 years. Our results suggest that optimization of insolvency prediction models should not only depend on extracted key figures of individual annual reports text but should also consider the development of those within past years to arrive at a more accurate result. The changes are more revealing than the commonalities, especially concerning the analysis of textual data.

Session	Language	Face-to-Face / Online	Room
D2	ENG	FACE	2019

2. Durban, M. & **Gabarro, J.** – “Development of a dataFrame and a Bot to predict NFT-collection performance”.

There has been an enormous growth of blockchain technologies at the end of 2021. Particularly in one of its assets called NFTs. A NFT (Non Fungible Token) is a new form of digital scarcity. We aim to study this highly volatile market and develop a dataFrame and a bot, to predict the performance in the near future. It focuses on the NFT main marketplace Opensea and specifically the collections in the Ethereum ecosystem, which has the 80% of the market as of early 2022. Because of its novelty few applications and studies have been done on this field to date. But this hasn't stopped this new asset to rapidly rise in popularity from a small 10k users to more than 1.5M only in the last year. It is true that as interest grows more and more information and projects are being published, but none similar to this one.

Session	Language	Face-to-Face / Online	Room
D2	ENG	FACE	2019

3. Naveiro , R.,Rios Insua, D. & **Camacho, J.M** – “Computational adversarial risk analysis for general security games “.

In spite of their popularity, standard game-theoretic approaches face serious limitations when dealing with security games. Adversarial Risk Analysis (ARA) is an alternative modeling framework that mitigates such limitations, yet entails involved computations. In the talk, we present an augmented probability simulation scheme for using ARA to deal with general security games. We motivate the approach, which uses bi-agent influence diagrams as the underlying structure, through two simple cases, sequential and simultaneous defend-attack models. We next provide the general framework and illustrate it in handling risks in a cybersecurity setting.

Session	Language	Face-to-Face / Online	Room
D2	ENG	FACE	2019

4. **Agarwal, R.** – “Fraud Risk Awareness: A need of hour to control rising fraud in the organizations”.

Rising insurance fraud has been a consistent problem in the last few decades across developing and developed countries (Clarke 1990; Derrig 2002; Sparrow 2008; Agarwal 2018; Viaene and Dedene 2004). There are three aspects of the problem: how to (a) detect fraud, (b) investigate them cost-effectively, (c) and showcase the value to the decisionmakers including the Board. Previous work has either focused on causal approaches such as the fraud triangle (Cressey 1950, 1953) or on the technical aspects of data-driven approaches (Jans et al. 2010; Jans et al. 2014). Less attention is paid to methods of fraud risk awareness which is a significant issue in fraud control. My research intends to explore how three large insurance companies in India developed fraud risk awareness methods to communicate the need for fraud control in the organization. In its absence, the companies face serious resistance to change as detection, and investigation of fraud requires huge investment initially. It adds additional work across all levels. Further, fraud control poses serious delay in claim processing, issues in customer service and high litigation cost. Senior management may perceive its value in long term however, there is high resistance to change at the various levels of organization. Our findings revealed that five methods to create fraud risk awareness reduced the losses of these three companies significantly and one of the companies became profitable in the entire loss-making industry. Fraud Risk Awareness generated interest among junior, middle, and senior managers to understand the need to implement measures in these three organizations which overall supported the implementation. One of the limitations of this research is quantitative measurement of benefits of fraud risk awareness.

Session	Language	Face-to-Face / Online	Room
D2	ENG	FACE	2019

5. **Peláez, R., Cao, R. & Vilar, J.M.** – “Nonparametric default probability estimation and bootstrap bandwidth selection”.

The debts coming from clients with unpaid credits have an important impact in the solvency of banks and other credit institutions. One of the most crucial elements that influence the credit risk is the probability of default (PD). For a fixed time, t , and a horizon time, b , the PD can be defined as the probability that a credit that has been paid until time t , becomes unpaid not later than time $t + b$. The probability of default conditional on the credit scoring can be written as a transformation of the conditional survival function of the variable “time to default”. This property is used to propose PD estimators based on conditional survival function estimators. In Peláez et al. (2021a), a nonparametric estimator of the probability of default with double smoothing, both in the covariate and in the time variable, is proposed and studied. It is based on a smoothed version of the Beran conditional survival function estimator (Beran (1981)) proposed by Peláez et al. (2021b). Our work focuses on designing an automatic selector of the bivariate bandwidth involved in the smoothed Beran’s PD estimator. The issue of confidence regions for the probability of default function $PD(t|x)$ is also addressed. The resampling proposal is an obvious bootstrap method combined with a smoothed bootstrap for the covariate. The optimal smoothing parameter is considered as the bivariate bandwidth that minimises the mean integrated squared error. Then, the bootstrap bandwidth selector is the one that minimises some Monte Carlo approximation of the bootstrap MISE. The simulation study shows a good behaviour of the bootstrap selector. The bootstrap method is also used to obtain a confidence region that contains the curve $PD(t|x)$ for fixed $x \in I$ and t covering some interval I_T with probability $1 - \alpha$. The simulation study carried out over several scenarios concludes that the proposed method performs satisfactorily. The bandwidth selector is applied to the well-known German Credit data set to estimate and

analyse the probability of default conditional on the credit scoring. The confidence region for the function $PD(t|x)$ is also computed to illustrate the results.

Session	Language	Face-to-Face / Online	Room
D2	ENG	FACE	2019

6. **Anaya Luque, D.**, Bermúdez, L. & Belles Sampera, J. – “Predictive analytics for paid-ups in life insurance saving products”.

Life insurance companies are subject to several risks related to savings products. One of these risks emerges when policyholders exercise, at some point in time before maturity, the option of stopping the payment of the regular premiums initially agreed for the whole life of the policy. This risk is commonly known as paid-up risk. This paper contributes to the analysis of this particular risk in two ways: the treatment of unbalanced data, due to the existence of the risks previously identified and defined as rare events, and the comparison of five predictive models to guess the future state of policies in force regarding premium payment: paid-up or active. The models analysed belongs to the followign families: logistic regressions, classification decision trees, random forests, XGBoost and support vector machines. The results show that XGBoost and Random Forest models outperformed the other classification algorithms analysed in this study, but at the cost of consuming much more computational time. As a relevant contribution, each model is also evaluated from a decision-making perspective, in which the ability of each model for identifying client profiles that lead to reduce the overall paid-up probability is checked.

Session	Language	Face-to-Face / Online	Room
D2	ENG	ONLINE	2019

D3 SESSION (Thursday 20, 16:00 to 17:40)

1. Faroni, S., LeCourtois, O. & **Ostaszewski, K.** – “Equivalent Risk Indicators: VaR, TCE, and beyond”.

While a lot of research concentrates on the merits of Value at Risk (VaR) and Tail Conditional Expectation (TCE), which are the two most classic risk indicators used by financial institutions, little has been written on explaining why regulators favor the choice of VaR or TCE in their set of rules. Further, TCE, despite its merits, may not be the most accurate indicator to take into account the nature of probability distribution tails. In this paper, we introduce a new risk indicator that extends TCE to take into account higher order risks. We compare the quantiles of this indicator to the quantiles of VaR in a simple Pareto framework, and then in a generalized Pareto framework. We also examine equivalence results between the quantiles of high order TCEs.

Session	Language	Face-to-Face / Online	Room
D3	ENG	FACE	2019

2. **Vidal-Llana, X.**, Coia, V. & Guillen M. – “Alternative scoring function specifications for estimating Value at Risk and Conditional Tail Expectation”.

Choosing of a suitable scoring function to fit Conditional Tail Expectation (CTE) that depends on covariates has been in the discussion since the proposal of the general specification. We use a neural network-based model that can predict several VaR and CTE with non-crossing conditions in extreme quantile levels, I.e. 0.9, 0.95 and 0.99. We discuss alternative score function specifications and discuss what appears to be the best choice to the analyst. We discuss examples of implementation in the domain of risk analysis and, in particular in risk measurement for telematics driving data.

Session	Language	Face-to-Face / Online	Room
D3	ENG	FACE	2019

3. **Sarabia, J.M.** & Guillen, M. – “Aggregation of Dependent Risks: A Survey”.

In this talk we review some methodologies for the aggregation of dependent risks. The distribution of the sum of dependent risks is a relevant Session in actuarial sciences, risk management and in many branches of applied probability.

First, we review some models of risk aggregation when we have a portfolio of dependent risks modelled with a Farlie-Gumbel-Morgenstern copula (Cossette et al., 2013). Then, we consider some extensions of this model using the Sarmanov-Lee distribution (Hashorva and Ratovomirija, 2015; Vernic, 2016). Some additional results with other copulas are also provided.

Because the multivariate Pareto distributions seem to be an outstanding candidate to model dependent risks, we consider the model by Sarabia et al. (2016), which studies risk aggregation for this class of distributions. These authors have provided closed formulas for the individual risk model and for the collective risk model assuming different primary distributions. Some extensions of this model are also discussed.

Finally, we review the aggregation of dependent risks in mixtures of exponential distributions (Sarabia et al., 2018). The dependence structure of this model is Archimedean and we study in detail some specific multivariate models with claims of the type Pareto, Gamma, Weibull, inverse Gaussian mixture of exponentials and other parent distributions. Some extensions of

the basic multivariate model are studied. Other recent models based on copulas (Marri and Moutanabbir, 2022) are also discussed.

Session	Language	Face-to-Face / Online	Room
D3	ENG	FACE	2019

4. **Martos, A.** & Bolancé, C. – “Maximum dependence limits between frequency and severity using exponential kernels in Sarmanov distribution”.

The multivariate Sarmanov is a flexible distribution which allows us to model the dependence structure between variables with different distributions, including continuous or discrete random variables. This dependency can take any value restricted to a limited interval, which its minimum and maximum can be found using kernels and the parameters of the discrete and continuous random variables. Although it may seem simple, it is not. The use of exponential kernels can help us to relax these limits. Each kernel depends on the Laplace transform of the marginal distributions and thus we study the values of the frequency parameter of these transforms which maximise the dependence interval width. The study is carried out in the context of the collective risk model and assuming dependence between claim frequency and severity. We assume that severity is Gamma distributed and frequency is Poisson or Negative Binomial distributed, although the same study can easily be generalized for other distributions.

Session	Language	Face-to-Face / Online	Room
D3	ENG	FACE	2019

5. Belles-Sampera, J. & **Santolino, M.** – “Quantile capital allocation and dependence structure of risks”.

Capital allocation problems arise when a total risk amount associated with the aggregate losses has to be distributed across the multiple units of risk that make up these total risk losses. The risk capital allocation problem can be interpreted as an optimization problem in which the weighted sum of measures for the deviations of the risk unit’s losses from their respective allocated capitals is minimized (Dhaene et al., 2012). Given that the total amount to allocate is computed as the α -quantile of the sum of risks, the quantile allocation principle allocates to each risk the same probability level p -quantile amount such that the full allocation requirement is satisfied. This means that a constant proportional reduction (or increase) is applied on the probability level of the individual risk quantiles, i.e. $p = f \cdot \alpha$ being $f > 0$ the multiplier to reduce (or increase) α . Dhaene et al. (2003), and later generalized by Cai and Wang (2021), showed that the p -quantile allocation rule derived from the sum of comonotonic risks is the solution of the optimization problem based on the absolute deviation criterion. In this article we discuss the key role that the dependence structure plays on the distance between α and p probability levels, given the marginal distributions of the loss variables. The scale of the loss variables has also impact on the distance between the probability levels, particularly when one random loss is much larger than the others. A set of examples is provided to illustrate how the distance between α and p probability levels is affected by the dependence structure and scale of random variables.

Session	Language	Face-to-Face / Online	Room
D3	ENG	FACE	2019

D4 PARALLEL ONLINE SESSION (Thursday 20, 16:00 to 18:20)

1. **Muromachi, Y.** – “Pricing and Risk Evaluation of Interest Rate Risk and Credit Risk under Regime-Switching Environment”.

Long term historical data of interest rates and credit spreads imply that there exist some different regimes; a calm regime with lower default risk and volatility, and a stressed regime with higher default risk and volatility.

In this article, we propose a pricing and risk evaluation model of interest rate risk and credit risk with Markovian regime-switching property.

We discuss the dynamics of regime, interest rate and default intensity under the physical probability and the change of measure to an equivalent martingale one, and we propose a simple tractable model.

In our model, the default-free interest rate and the default intensity are dependent through the regime, and the dependence affects the price of the defaultable bond. We calculate distributions of a bond portfolio's price at a risk horizon, which reflects the actual default loss up to the horizon and the decrease of market prices due to the transition to a stressed regime. Numerical examples show that the price distribution has a short right tail and a long left tail, and that the distribution depends strongly on the present regime. Such results would be applicable to the financial risk management, especially on the stress tests.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

2. **Pacchiarotti, B.** – “Large deviations and ruin problems for grey Gaussian processes”.

In this paper, we introduce a new class of multidimensional processes, the grey Gaussian processes, which generalizes the grey Brownian motion. For this class of processes, we get a pathwise large deviations principle and, as an application, we deduce some asymptotic estimates of level cross probabilities. In particular, we consider two multi-dimensional ruin problems where the surplus processes modeled by a particular grey Gaussian process. For both models, we consider exit probabilities from a halfspace and a quadrant, and in both cases, we obtain an explicit asymptotic estimate.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

3. **Ungolo, F.** & van den Heuvel, E. R. – “A Dirichlet Process Mixture model for the analysis of competing risks”.

We develop a regression model for the analysis of competing risks which account for the dependence among causes of decrement. The joint distribution of the time to events is characterized by a non-parametric frailty component which explains their variability whereas unexplained by available covariates. The model is analysed in a fully Bayesian setting, yielding a flexible Dirichlet Process Mixture model for the joint distribution of the time to competing events. The modelling approach allows to easily derive the crude and the net hazard from first principles. An efficient MCMC sampler is provided for inference in order to deal with large datasets and large parameter spaces. The approach is applied to the analysis of the lapse risk for the life-insurance dataset used in Milhaud and Dutang (2018).

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

4. **Cebrián-Hernández, A.** & Jiménez-Rodríguez, E. – “Deep Learning for bitcoin volatility forecasting with recurrent Neural Networks. DeepAR Architecture”.

The main objective of the research is the implementation of Deep Learning in the area of cryptocurrency volatility prediction, in particular BITCOIN. Within this machine learning model, we focus on architectures based on Recurrent Neural Networks (LSTM). The structure of the paper is divided into two parts, the first consists of an empirical comparison of the volatility predictions produced by traditional Multivariate Econometric Models (M-GARCH) composed of economic-financial variables that correlate well with the volatility of BITCOIN and those released through simple Neural Network Models trained with the same variables. The second part of the paper will be the implementation of the DeepAR algorithm, created by AMAZON on our data. This methodology is used to produce accurate probabilistic forecasts, based on training an autoregressive recurrent network model on a large number of related time series. Below are the first numerical results of the comparison of M-GARCH VCC and the Recurrent Neural Networks. These first results indicate a better fit in the DEEP LEARNIG Model (MAE% 2.637) compared to the fit of the M-GARCH Model (MAE% 3.2890). The fact of achieving better results in the Neural Network Model with a simple model, advances that by improving the training of this model with the DeepARarchitecture, better results will be achieved in the predictions.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

5. **Balmaseda, V.,** Coronado, M. & Cadenas-Santiago, G. – “Prediction of systemic risk contagion based on network models using deep graph learning”.

Network theory and traditional Machine Learning are two important tools used for systemic risk analysis in financial networks. However, they are both unable to use all the available information. In particular, network models focus on the network structure, not taking advantage of node or edge feature information. In contrast, traditional Machine Learning can take advantage of high volumes of data but fail to consider the network structure. This work proposes the application of Graph Neural Networks (GNNs) for systemic risk analysis and, more generally, to solve tasks in financial networks (not only banks but also Non Bank Financial Institutions – NBFIs). GNNs are a flexible architecture that combines both Network theory and Machine Learning and, thus, can use all the available information, both network structure, and node, edge and graph feature information. We present a classification task where a percentage of the nodes have been labeled by systemic importance classes and show that GNNs achieve better results than traditional Machine Learning in two differently distributed networks and using different percentages of pre-labeled nodes. We also present an approach that allows using a percentage of the nodes, pre-labeled into a small number of systemic importance classes, to predict the systemic importance percentiles of the rest of the nodes, thus increasing the granularity and precision of the predictions. More importantly, these techniques are flexible and can take advantage of the available information to solve node-level, edge-level or graph-level supervised and unsupervised tasks related to all kinds of financial networks, including NBFIs.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

6. Chuliá, H., **Muñoz-Mendoza, J.A.** & Uribe, J.M. – “Energy firms in emerging markets: systemic risk and diversification opportunities”.

We analyze the connectedness between 219 energy firms from 27 emerging countries. We use weekly data between January 13, 2010 and March 24, 2021. The three-step approach proposed by Fan et al. (2021), and the spillovers analysis based LASSO-VAR model suggested by Demirer et al. (2018) are used to study the connectedness between energy stock markets. Our results reveal that energy stock markets are closely integrated across emerging countries. Principal component adjustments reveal that non-idiosyncratic factors in energy stock returns are relevant in financial contagion mechanisms and integration degree between them. Energy stock markets in Mongolia, Sri Lanka, Bosnia-Herzegovina, South Korea, Thailand, Taiwan, Vietnam, the Philippines, Pakistan, Argentina, Brazil and Peru show a low level of connectedness in relation to the other emerging markets. The results are robust because the Granger and partial autocorrelation networks showed that the dynamic and contemporaneous connectedness between energy stock returns was concentrated in the same markets. This fact opens relevant spaces for international diversification and attenuates the risks transmission between these markets. These results have important implications for investment decision-making and policymakers.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

7. Gómez-Puig, M., Pieterse-Bloem, M. & **Sosvilla-Rivero, S.** – “Dynamic connectedness between credit risk and liquidity in EMU sovereign debt markets”.

We examine the dynamic interconnection between sovereign credit and liquidity risk in ten euro area countries with high-frequency data from MTS that cover the period January 2008-December 2018 using the extension of the time-varying parameter vector autoregressive (TVP-VAR) connectedness approach of Antonakakis *et al.* (2020). Our results indicate that for most periods net connectedness is from credit risk to liquidity risk, but this indicator is time-dependent, detecting some episodes where it goes from liquidity to credit risk. We then set up an event study and determine that the later episodes can be related to several unconventional monetary policy measures and announcements of the ECB. Finally, when studying the drivers of the evolution of the net connectedness indicator by means of a Probit model, our estimations suggest that the ECB’s unconventional monetary policy surprises diminish the net risk of propagation from credit to liquidity. Furthermore, we uncover global funding liquidity, tensions in financial and sovereign bond markets, and surprises in inflation and GDP as factors that reduce the probability of risk transmission from liquidity to credit, while monetary policy shocks and economic policy uncertainty are found to increase such probability.

Session	Language	Face-to-Face / Online	Room
D4	ENG	ONLINE	2019

V1 SESSION (Friday 21, 8:50 to 10:30)

1. **Tolentino, M.**, Gento Marhuenda, P. & Navas Ureña, J. – “Alternative methods with which to estimate the Term Structure of Interest Rates: Some evidence from the Spanish market”.

The development, in recent years, of sophisticated prediction and modelling techniques supported by statistical learning or Machine Learning that has taken place in recent years, has led to the application of these algorithms in various fields, including finance. This paper provides a description of two methodologies that combine statistical learning techniques, i.e. Support Vector Regression and local regression, with the recursive or bootstrapping method in order to obtain the term structure of interest rates of the Spanish public debt market in 2020. These estimates are subsequently compared with those provided by the Nelson-Siegel model by calculating the theoretical price of the bonds comprising the sample.

Session	Language	Fce-to-Face / Online	Room
V1	ENG	ONLINE (Friday)	2019

2. Arató, M. & **Tóth-Lakits, D.** – “Modeling Negative Rates”.

The economic world today is rather different from what we have seen before in history. Negative nominal rates for long-term maturities spread over large parts of the world. The well-proven mathematical models either do not perform well or do not perform at all in the negative range.

Therefore the goal of our research is to find appropriate models which describe the current state of the world well. There are several extensions to the most used models (e.g. free boundary SABR-LMM, shifted SABR-LMM, Black model) that can be used to model negative rates, but in this research we used Gaussian random fields to model these forward rates which can be considered as a quite new approach. This term-structure model, proposed by Kennedy (1978), naturally produces negative rates. We can also get back the popular Heath-Jarrow-Morton framework as a special case of these Kennedy fields.

The aim of our research is to be able to properly model and calibrate the negative interest rates as quickly and accurately as possible. Since the calibration is a multidimensional, nonlinear problem, therefore it is extremely complex. To solve this problem we want to build a model based on machine learning techniques. Because financial data is extremely volatile, recalibrating a model at any time would be a big waste of time, so it matters a lot how fast the models, we want to teach, run and how they adapt to the changes in the market environment.

The maximum likelihood estimations and the estimations with probability 1 of the parameters in the Kennedy fields have already been derived. Also, we simulated the Kennedy fields using Python program, where we paid great attention to ensuring that the data generation took place in the shortest possible time. We have implemented the analytical estimations and want to build a machine learning model to calibrate the data.

In our research our primary goal is to compare the statistical estimations and the parameters obtained by the model based on artificial intelligence, and to get a model that is easy to apply and faithfully describes reality.

Session	Language	Face-to-Face / Online	Room
V1	ENG	FACE	2019

3. **Ahmad, J.** & Bladt, M. – “Phase-type representations of stochastic interest rates with applications to life insurance”.

In this talk, we consider a stochastic interest following a time-inhomogeneous Markov jump process on a finite state-space, as introduced by Norberg (2003). We show that the price of zero-coupon bonds can be represented as the survival function of a time-inhomogeneous phase-type Distribution (IPH), cf. Albrecher & Bladt (2019), which allows for calibration of the model using observed bond prices and the EM algorithm known for estimation in these kinds of models, see e.g. Asmussen et al. (1996) and Albrecher et al.,(2022). We show applicability of our model by calibrating to observed bond prices provided by the Danish FSA. Furthermore, we show how this approach can be applied to life insurance valuations with stochastic interest rates, by providing matrix representations of quantities studied in Norberg (1995).

Session	Language	Face-to-Face / Online	Room
V1	ENG	FACE	2019

4. **Junike, G.** & Pankrashkin, K. (2021). “Precise option pricing by the COS method – How to choose the truncation range”.

The Fourier cosine expansion (COS) method is used for pricing European options numerically very fast. To apply the COS method, a truncation range for the density of the log-returns need to be provided. Using Markov’s inequality, we derive a new formula to obtain the truncation range and prove that the range is large enough to ensure convergence of the COS method within a predefined error tolerance. We also show by several examples that the classical approach to determine the truncation range by cumulants may lead to serious mispricing. Usually, the computational time of the COS method is of similar magnitude in both cases.

Session	Language	Face-to-Face / Online	Room
V1	ENG	FACE	2019

5. Chuliá, H., **Garrón, I.** & Uribe, J.M. – “Daily Growth at Risk: financial or real drivers? The answer is not always the same”.

We estimate Growth-at-Risk (GaR) statistics for the US economy using daily regressors. We show that the relative importance, in terms of forecasting power, of financial and real variables is time-varying. Indeed, the optimal forecasting weights of these types of variables were clearly different during the Global Financial Crisis and the recent Covid-19 crisis, which reflects the dissimilar nature of the two crises. We introduce the LASSO and the Elastic Net into the family of mixed data sampling models used to estimate GaR and show that these methods outperform past candidates explored in the literature. The role of the VXO and ADS indicators was found to be very relevant, especially in out-of-sample exercises and during crisis episodes. Overall, our results show that daily information for both real and financial variables is key for producing accurate point and tail risk nowcasts and forecasts of economic activity.

Session	Language	Face-to-Face / Online	Room
V1	ENG	FACE	2019

V2 SESSION (Friday 21, 10:30 to 12:30)

1. Jiménez, I., Mora-Valencia, M. & **Perote, J.** – “Has the interaction between skewness and kurtosis of asset returns information content for risk forecasting? ”.

This paper introduces the effect of the crossed products of Hermite polynomials on Gram-Charlier densities. This allows to capture the impact of the interaction between skewness and kurtosis and evaluate this new parameter as an additional source of information for risk management. We show that our modified Gram-Charlier density presents an improved accuracy, especially at distribution tails. Risk assessment is assessed for S&P500 losses with backtesting procedures for Value-at-Risk and Median Shortfall.

Session	Language	Face-to-Face / Online	Room
V1	ENG	FACE	2019

2. Fernández-Pérez, A., **Gomez-Puig, M.** & Sosvilla-Rivero, S. – “Consumer and business sentiments in the euro area: A tale of two crisis”.

In this paper we analyse the interconnection and propagation of consumer and business sentiments in the euro area during the period November 1987 to February 2022, applying both the connectedness framework and the Time-Varying Parameter Vector Autoregressive connectedness approach. We successively examine static and dynamic spillovers (both within the euro area and within central and peripheral countries) between consumer confidence indicators, business confidence indicators and consumer and business confidence indicators, for progressively shedding light on the emitters and receivers of stability or instability, with a particular focus on the Great Financial Crisis and the Covid-19 induced Great Lockdown.

Session	Language	Face-to-Face / Online	Room
V2+Covid	ENG	FACE	2019

3. Rokicki, B. & **Ostaszewski, K.** – “Actuarial credibility approach in adjusting initial cost estimates of transport infrastructure projects”.

Cost overruns use to be considered as the biggest problem related to the major infrastructure investment and transport infrastructure investment in particular. In accordance with the existing literature, in most of the cases, the misinformation about the final project costs results from the inadequate initial costs estimates. As a consequence, the decisions concerning the implementation of particular investment projects are taken without the precise information about the exact costs and benefits. This, in turn, may lead to a misallocation of public funds. This paper presents a novel methodology that allows to adjust initial cost estimates by accounting for the risk/uncertainty factor. We borrow from actuarial science and apply modified actuarial credibility approach to estimate final cost of major transport investment projects. We show that such a tool can significantly improve project planning, if used by policy makers. We prove that actuarial credibility is both much more simple and provides more accurate results as compared to complex methods such as neural networks.

Session	Language	Face-to-Face / Online	Room
V2	ENG	FACE	2019

4. **Vega Baquero, J.D.** & Santolino, M. – “Capital flows in integrated capital markets: the MILA case”.

The Feldstein and Horioka (1980) study on investment flows through the correlation of domestic saving and investment concluded that liberalization of capital markets does not necessarily lead to a movement of capital looking for a better allocation of resources, as classical theory would suggest. Ever since, literature has been prolific regarding this “puzzle”, with arguments for and against this conclusion. This paper aims to analyze the issue from a different perspective. In recent years, the stock markets of Chile, Colombia, Mexico and Peru joined the Latin American Integrated Market (MILA) through an agreement that allows investors in any of the participating markets to invest in the others as if they were investing locally. Traditional multivariate and compositional methods are used to assess the hypothesis of a potential flow of capital between markets generated by the creation of the joint market. Vector autoregressive models are estimated and tested for structural breaks. As a result, it was not possible to find a change in the composition of the investment in the four markets produced by the creation of the joint market.

Session	Language	Face-to-Face / Online	Room
V2	ENG	FACE	2019

5. **Krysiak, Z.**, Krysiak, U., Markiewicz, A. & Malczewski, K. – “Modeling and forecasting time series of CO2 emission prices on the European Union Emissions Trading System”.

European Union Emissions Trading System (EU ETS) creates the platform of quoted prices of certificates, which are going to stimulate investment. On the one hand, high prices of the certificates should motivate companies operating in the energy industry for the investments leading to declining the quantity of pollution due to CO2 emission, but on the other hand too high prices of certificates will increase cost of energy and decline the profit margins, what reduce the company’s potential for the new investments. From that perspective it is important to find the golden principle to balance between these two perspectives.

The undertaken research problem relates to the determination of the equilibrium point between the level of the cost of CO2 emission and the cost of energy production, so-as to maximally stimulate low-emission investments. The energy transformation requires huge investment outlays, which is crucial in the process of reducing CO2 emissions, therefore, first-of- all, it is necessary to increase the capital potential of economic entities, which will enable investments to be made to produce the so-called "Clean energy". There are many opinions that EU ETS does not reflect adequate cost of the pollution due to the emission of CO2, because the financial institutions develop the speculative trading on the prices of CO2 certificates. Hence, we want to look-into the relationship between the stock prices of companies from the energy industry and the ETS prices.

The major focus of this paper is put on the modeling and forecasting time series of CO2 emission prices on the EU ETS. In the process of the research study the directional the auxiliary hypothesis was assumed as following: The shaping of the price for CO2 emissions should, on the one hand, reflect the damage caused to the natural environment, and, on the other hand, not overburden energy production costs, so that the company can accumulate the capital needed for low-emission investments.

In the presented study, to analyze and forecast the time series of CO2 emission certificates prices, among others, the GARCH model (1,1) was used. The modelling of time series of the prices of CO2 certificates led us to answer the question, what type of adjustments are to be made, so that the traded prices of CO2 certificates are consistent with the level of stock prices of the producers of energy and consistent with the statement expressed in the auxiliary hypothesis.

Session	Language	Face-to-Face / Online	Room
V2	ENG	FACE	2019

6. Ayuso Gutiérrez, M. & Céspedes Coimbra, L.E. – “Passenger injuries severity according to age and crash location”.

Introduction: This article analyzes some potential determinants of passenger car passenger injuries, with a focus on occupants between 65 and 75 years old as well as those older than 75. Also, we pay special attention to the geographical location where the accident takes places, with a focus on the comparison between rural and urban areas. *Method:* Drawing from data from the Spanish Traffic Authority for crashes in 2016, we use a multinomial regression logistic model to investigate the effects of a set potential risk factors on different severity bodily injury damages for passengers in a vehicle. *Results:* Passengers over 75 years old are significantly more likely to die than passengers below 65 years old when involved in a crash. Besides crashes in towns and rural areas are less likely to produce non-serious injuries in passengers compared to those that took place in cities; the reverse relationship holds for serious injuries. By gender, women passengers are more likely to suffer non-serious injuries.

Session	Language	Face-to-Face / Online	Room
V2	ENG	FACE	2019

V3 SESSION (Friday 21, 13:30 to 15:30)

1. Ruggeri, F., **Sánchez-Sánchez, M.**, Sordo, M.A. & Suárez-Llorens, A. – “A Bayesian sensitivity analysis from a multivariate point of view with application in premium principles”.

This paper deals with a novel methodology that allows introducing uncertainty in the Bayesian framework by defining classes of a priori distributions. We verify that these classes lead us to obtain upper and lower bounds for the Bayesian premiums or a posteriori premiums. It should be noted that this new methodology is based on the properties of the premium principles to preserve the order of the prior and posterior distributions through multivariate stochastic orderings, where we will use weighted densities to induce uncertainty on the prior information. Finally, this methodology has applications in Bayesian sensitivity analysis and in Bonus-Malus pricing systems.

Session	Language	Face-to-Face / Online	Room
V3	ENG	ONLINE	2019

2. **Badescu, A.** – “Simple Estimations of IBNR reserves with Logit-weighted Reduced Mixture of Experts”.

The Logit-weighted Reduced Mixture of Experts model (LRMoE) is a flexible yet analytically tractable non-linear regression model. In this talk, we present an extension of the Expectation-Conditional-Maximization (ECM) algorithm that efficiently fits the LRMoE to random censored and random truncated regression data. Using real automobile insurance data sets, the usefulness and importance of the proposed algorithm are demonstrated via simple estimations of the IBNR reserve.

Session	Language	Face-to-Face / Online	Room
V3	ENG	FACE	2019

3. **Yanez, J. S.** – “Parametric outstanding claim payment count modelling through a dynamic claim score”

By modelling reserves with micro-level models, individual claims information is better preserved and can be more easily handled in the fitting process. Some of the claim information is available immediately at the report date and remains known until the closure of the claim. However, other useful information changes unpredictably as claims develop, for example, the previously observed number of payments. In this paper, we seek to model payment counts in a discrete manner based on past information both in terms of claim characteristics and previous payment counts. We use a dynamic score that weighs the risk of the claim based on previous claim behaviour and that gets updated at the end of each discrete interval. In this paper's model we will also distinguish between the different types of payments. We evaluate our model by fitting it into a data set from a major Canadian insurance company. We will also discuss estimation procedures, make predictions, and compare the results with other models.

Session	Language	Face-to-Face / Online	Room
V3	ENG	FACE	2019

4. Gómez-Déniz, E. & **Calderín-Ojeda, E.** – “Introducing a non-linear regression model in an excess-of-loss reinsurance context”.

This work deals with excess-of-loss reinsurance, focusing on the reinsurer's position. Under an excess-of-loss reinsurance arrangement, a claim is shared only between the insurer and the reinsurer if the claim exceeds a fixed amount, usually known as the excess or the retention level. We introduce parametric models for calculating the excess-of-loss distribution, examining how covariates may be incorporated into the model and how these covariates may affect the expected payment. We use data from a real motor vehicle insurance portfolio considering continuous and indicator covariates.

The results obtained allow us to conclude that the decision of the retention level has an essential impact on some of the considered covariates. This methodology might, without doubt, help the insurer's risk and insurance management department to improve the claims processing. Finally, since claim size often increases over time due to inflation, it is also worthy to investigate how this procedure benefits the reinsurer to calculate fair reinsurance premiums.

Session	Language	Face-to-Face / Online	Room
V3	ENG	FACE	2019

5. **Barranco-Chamorro, I.** – “Hypothesis tests and Bayesian Methods to Deal with Off-Diagonal Elements in Confusion Matrices”.

Confusion matrices are a standard way of summarizing the performance of a classification method. This issue is of crucial interest in a variety of applied scientific disciplines, such as Geostatistics, mining data, mining text, Economy, Biomedicine or Bioinformatics, to cite only a few. A confusion matrix is obtained as the result of applying a control sampling on a dataset to which a classifier has been applied. Provided that the qualitative response to be predicted has $r \geq 2$ categories, the confusion matrix will be a $r \times r$ matrix, where the rows represent the actual or reference classes and the columns the predicted classes (or vice versa). So the diagonal elements correspond to the items properly classified, and the off-diagonal to the wrong ones. Most papers dealing with confusion matrices focus on the assessment of the overall accuracy of the classification process, such as kappa coefficient, and methods to improve these measurements, see for instance Grandini et al. (2020) and references therein. However, a scarce number of papers consider the study of the off-diagonal cells in a confusion matrix. In this paper it is shown that this Session is of interest for a better definition of classes and the improvement of the global process of classification.

Based on the results given in Barranco-Chamorro and Carrillo-García (2021), the problem of classification bias is introduced. This is a kind of systematic error, which happens between categories in a specific direction. If a classifier is fair or unbiased, then the errors of classification between two given categories A and B must happen randomly, that is, it is expected that they occur approximately with the same relative frequency in every direction. Quite often, this is not the case, and a kind of systematic error or bias occurs in a given direction. The classification bias can be due to deficiencies in the method of classification. For instance, it is well known, Goin (1984), that an inappropriate choice of k in the k -nearest neighbor (k -nn) classifier may produce this effect. In case of being detected, the method of selection of k must be revised. On the other hand, the classification bias may be caused by the existence of a unidirectional confusion between two or more categories, that is, the classes under consideration are not well separated.

Anyway, in case of being detected this problem, the process of classification should be improved. To identify this problem in a global way, first marginal homogeneity tests are proposed. The tests are based on Stuart–Maxwell test, (Black and Gonen, 1997), and Bhapkar test, (Sun and Yang, 2009). If the marginal homogeneity is rejected, a One versus All methodology is proposed, in which Mc-Nemar tests, (McNemar, 1947), are carried out for every pair of classes. Second a Bayesian method based on the Dirichlet-Multinomial

distribution is developed to estimate the probabilities of confusion between the classes previously detected. So it can be assessed in a formal way, if certain classes suffer from a problem of overprediction or underprediction. To illustrate the use of our proposal, real applications of interest in Economics are considered. As computational tools, we highlight that the R Software and R packages are used.

Session	Language	Face-to-Face / Online	Room
V3	ENG	FACE	2019

6. **Bermúdez, L.** & Karlis, D. – “Modelling unobserved heterogeneity based on finite mixture of regressions and a classification rule”.

A natural way to deal with unobserved heterogeneity in ratemaking is to consider k-finite mixtures of some typical regression models. This approach allows for overdispersion and the zero-inflated model represents a special case and, simultaneously, allows for an interesting interpretation of the subgroups derived from the typical clustering application of finite mixture models. However, current approaches are limited by the fact that the models are not fully usable for prediction since the observed number of claim counts is not known a priori and, hence, it is rather impossible to classify new clients into subgroups. In this paper, we tackle this problem using a classification rule to classify new clients to one of the k subgroups of risks. Our approach is applicable to any finite mixture of regressions problems of any dimension. We discuss practical issues about this with a real data set. The main finding is that the k subgroups of risks defined by the finite mixture exhibit different regression structures, which provides much better fit and predictive accuracy.

Session	Language	Face-to-Face / Online	Room
V3	ENG	FACE	2019

E4 PARALLEL SESSION [IN SPANISH] (Friday 21, 13:30 to 15:30)
Room 2020, 696 Building

1. Castaño-Martínez, A., **Pigueiras**, G., Sordo, M.A. & Ramos, C.D. – “Comparación de riesgos elevados en la teoría dual de Yaari”.

En el contexto de la Teoría de la Utilidad, Yaari (1987) propuso una teoría dual de elección bajo riesgo según la cual, la aversión al riesgo viene caracterizada por una función (llamada distorsión) que modifica la probabilidad del riesgo de cola. Bajo esta propuesta, Wang y Young (1998) obtienen una clase de órdenes parciales para la valoración de riesgos, la cual caracterizan a través de una clase de distorsiones. Sin embargo, bajo este enfoque, dados dos riesgos X e Y tales que X es menos arriesgado que Y, entonces sus valores medios siempre están ordenados en la misma dirección. Este hecho puede ser inadecuado cuando la aseguradora está más preocupada por los riesgos más altos que por los riesgos medios ya que, si bien los eventos de cola son raros, pueden tener importantes consecuencias negativas. En este trabajo se obtiene una clase de órdenes más débiles de valoración de riesgos, que caracterizan la aversión a los riesgos más elevados y bajo los cuales, los riesgos medios no tienen por qué estar necesariamente ordenados en la misma dirección.

Session	Language	Face-to-Face / Online	Room
E1	ESP	FACE	2020

2. **Bello, A.J.**, Mulero, J., Sordo, M.A. & Suárez-Llorens, A. – “Orden en valores en riesgo de cola sobre p_0 ”.

El valor en riesgo de cola a un determinado nivel p , donde p toma valores en el intervalo $(0,1)$, es una popular medida de riesgo que captura el riesgo de cola de las distribuciones de las pérdidas y los retornos de activos más allá del correspondiente cuantil p . Dadas dos distribuciones, se puede considerar el valor en riesgo de cola para decidir cuál de las anteriores distribuciones resulta ser la más arriesgada. Cuando los valores en riesgo de cola de dos distribuciones quedan ordenados, en la misma dirección, para todos los niveles de probabilidad p del intervalo $(0,1)$, se tiene que una de las distribuciones es más arriesgada que la otra y, entonces, se dice que las distribuciones quedan ordenadas en términos del orden creciente convexo. Sin embargo, el coste de precisar una condición tan exigente es que pueda darse el caso de que al considerar dos distribuciones, no sea posible compararlas, incluso cuando nuestra intuición nos indica con claridad que una de ellas es menos arriesgada que la otra. En este trabajo, se presentará una familia de órdenes estocásticos indexados por un nivel de confianza p_0 , con p_0 en el intervalo $(0,1)$, que solo requiere que se mantenga el orden de los valores en riesgo de cola para todos los niveles p que quedan por encima de p_0 . También se presentarán sus principales propiedades y se comparará la familia con otras familias de órdenes estocásticos que han sido propuestas, en la literatura, para comparar el riesgo de cola. Por último, los resultados presentados se ilustrarán mediante un ejemplo con datos reales.

Session	Language	Face-to-Face / Online	Room
E1	ESP	FACE	2020

3. **Prieto Mendoza, F.**, Sarabia, J.M. & Jordá, V. – “El riesgo de perder el empleo en empresas de reciente creación”.

En este trabajo, se lleva a cabo un análisis del riesgo de perder el empleo de los trabajadores que forman parte de empresas que se encuentran en sus primeros cinco años de vida. Para ello, utilizamos datos de empresas de Estados Unidos, en el periodo 1978-2019, publicados por el United States Census Bureau. Para dicho estudio, consideramos el establecimiento como unidad de análisis, con el objetivo de cuantificar dicho riesgo en términos de un

trabajador que se incorpore a un nuevo establecimiento, forme parte dicho establecimiento de una empresa ya existente o que dicho establecimiento constituya una empresa de nueva creación. Consideramos que los resultados del presente análisis son de utilidad en diversos campos, entre los que destacar su utilidad como guía en la toma de decisiones de trabajadores que opten por un nuevo empleo o de empresas de reciente creación que estén en proceso de contratación, así como de interés para entidades financieras y aseguradoras que comercialicen un seguro de protección de pagos.

Session	Language	Face-to-Face / Online	Room
E1	ESP	FACE	2020

4. **Devesa Carpio, J.E.**, Devesa Carpio, M., Domínguez Fabián, I., Encinas Goenechea, B. & Meneu Gaya, R. – “La reforma del cálculo de la Base Reguladora en el sistema de pensiones español”.

El sistema de pensiones español comenzó una nueva reforma en 2021, quedando parte de ella postergada a 2022. Uno de los elementos más importantes de esta reforma va a ser la modificación del cálculo de la Base Reguladora; que es, junto al porcentaje por años cotizados, los dos factores que permiten calcular la pensión inicial de jubilación.

El objetivo de esta ponencia es cuantificar el impacto sobre la pensión inicial de las distintas alternativas para determinar la nueva Base Reguladora. Se pueden resumir en los siguientes puntos:

- Ampliar de 25 a 35 el número de años para el cálculo de la Base Reguladora, de forma similar a como se hace actualmente.
- Ampliar a 35 años el periodo de cómputo, pero eligiendo, de entre esos 35, un número determinado de años.
- Modificar la integración de las lagunas de cotización. Actualmente, las 48 primeras lagunas mensuales se integran por el 100% de la Base Mínima, y las restantes por el 50% de esa misma base. Es posible que se pase a integrar todas las lagunas por el 100% de la base mínima.

El resultado final va a depender de cómo se lleve a cabo esta modificación, pudiendo variar entre una disminución de la pensión inicial de casi un 9% hasta un aumento de casi un 6%. También se contemplará la posibilidad de que el efecto sea neutral, mediante la combinación de los distintos puntos planteados.

La valoración de las medidas se realizará teniendo en cuenta sus efectos sobre la adecuación de las pensiones; sobre la sostenibilidad, tanto en términos de caja como actuariales; y sobre la equidad contributiva y actuarial.

Session	Language	Face-to-Face / Online	Room
E1	ESP	FACE	2020

5. **Carracedo, P.** & Debón, A. – “Modelización de la mortalidad europea a la edad de jubilación: un análisis espacio-temporal”.

Durante el siglo XX, las aseguradoras y administraciones de la Seguridad Social han centrado su atención en la disminución de la mortalidad en Europa, y más aún, con el exceso de sobremortalidad producido por la pandemia del COVID-19. Específicamente, la modelización de mortalidad tanto en el campo demográfico (pronóstico) como actuarial (tarificación y reserva) se realiza utilizando datos de países. Gracias a esta modelización se captura la variación de la mortalidad entre unidades espaciales. El objetivo de este estudio es complementar esta información utilizando modelos de datos de panel por medio de los softwares MATLAB y R. El valor añadido de estos modelos es que tienen en cuenta la dependencia temporal y espacial de la mortalidad e identifican las variables que influyen en

ella. Se establece una comparación entre ambos software, detallando las implementaciones de los modelos de datos de panel espaciotemporales. El caso de estudio utilizado se refiere a la mortalidad masculina y femenina en edad de jubilación europea que se cuantifica con la *Comparative Mortality Figure*. Los resultados de este artículo confirman la dependencia espacial entre los 26 países europeos y sus vecinos durante el período 1995-2012. Por último, detallamos tanto las similitudes como las diferencias encontradas al utilizar ambos softwares y, adicionalmente, las ventajas y desventajas de utilizar cada uno de ellos.

[This work is published in the book in English as “*Modeling European mortality at retirement age: A spatio-temporal analysis*”.]

Session	Language	Face-to-Face / Online	Room
E1	ESP	FACE	2020

6. **Alcañiz, M.,** Estévez, M. & Santolino, M. – “La demanda hospitalaria por Covid-19: relación a corto y largo plazo con la incidencia registrada”.

La pandemia de SARS-CoV-2 ha supuesto un punto de inflexión para la planificación sanitaria en todo el mundo. La elevada demanda imprevista de atención hospitalaria, sumada a la limitación de los recursos disponibles y a la necesidad de seguir atendiendo otras patologías, ha provocado situaciones cercanas al colapso en los momentos de mayor propagación del virus. Ello ha obligado a aumentar la disponibilidad de camas hospitalarias sin tiempo para realizar una correcta planificación. El objetivo de este trabajo es modelizar la relación a largo plazo entre el número de casos positivos por Covid-19 y el número de pacientes hospitalizados debido a la enfermedad a partir de datos españoles. Para ello se usarán los registros diarios del Centro Nacional de Epidemiología entre el 11 de mayo de 2020 y el 20 de marzo de 2022. Se tendrá en cuenta el momento de aparición de la variante Ómicron, caracterizada por una menor gravedad, y susceptible, por tanto, de tener impacto en la modelización. Así mismo, esta incluirá el porcentaje de población vacunada con dosis completa en cada momento. Los resultados muestran que la tendencia estocástica común que se observa entre el número de casos detectados por Covid-19 y el número de ingresos hospitalarios es consistente con la hipótesis de cointegración. Así, se propone un modelo de corrección del error para introducir la dinámica de corto plazo y corregir las desviaciones que puedan observarse en el largo plazo. Se presta especial atención a la estimación del parámetro de cointegración, que puede interpretarse como la velocidad a la que la relación a largo plazo regresa a su equilibrio tras un cambio en la incidencia del coronavirus. También se realiza este análisis para los distintos grupos de edad que componen la población. Se espera mejorar así el conocimiento de la compleja interacción entre la incidencia, la gravedad de la infección y la capacidad inmunizante de la vacunación completa, que puede presentar características diversas en función de la etapa vital de los individuos.

Session	Language	Face-to-Face / Online	Room
E1 + Covid	ESP	FACE	2020