



## Course and Examination Fact Sheet: Spring Semester 2018

### 8,163: Insurance-Linked Securities

ECTS credits: 4

#### Overview examination/s

(binding regulations see below)

Decentral - Written examination (100%, 90 mins.)

#### Attached courses

Timetable -- Language -- Lecturer

[8,163,1.00 Insurance-Linked Securities](#) -- Englisch -- [Braun Alexander](#)

#### Course information

#### Course prerequisites

Students should have completed the courses "Financial Markets" and "Quantitative Methods".

#### Course content

The increasing convergence of insurance and capital markets throughout the last two decades has led to the development of substitutes for traditional reinsurance contracts which are known under the term alternative risk transfer (ART). Insurance-linked securities (ILS), the most successful of these new tools, are financial instruments that allow sponsoring (re)insurance companies to hedge natural disaster or mortality/longevity exposure and offer investors an attractive source of yield paired with a low return volatility and very little correlation to other asset classes such as stocks, government and corporate debt, real estate, or commodities.

Students will be introduced to the topic of insurance risk securitization through a review of conventional insurance and reinsurance products. The course then provides a comprehensive overview of the most important types of ILS and insurance derivatives, with a focus on the catastrophe (cat) bond universe. Depending on the pace of the lecture, there may also be time to discuss selected advanced topics such as model implementation in R, a powerful free programming language/environment for statistical computing.

#### Course structure

##### 1) Introduction

- Insurance markets and insurance risks
- Alternative Risk Transfer (ART)
- Introduction to securitization and Insurance-Linked Securities (ILS)
- Review of relevant mathematical and statistical concepts

##### 2) Insurance and Reinsurance

- Risk transfer and insurability of risks
- Insurance contract types and deductibles



- Insurance pricing and risk pooling
- Reinsurance contract types

### 3) Catastrophe Bonds I

- Perils, territories, and trigger types
- Typical structure and market overview
- Tranching and rating
- Trends and outlook

### 4) Catastrophe Risk Modelling (Guest-Speaker I)

- Purpose of catastrophe risk models
- Anatomy of catastrophe risk models
- Challenges in catastrophe modeling
- Catastrophe risk models for new perils

### 5) Catastrophe Bonds II

- Probability distributions of insured losses
- Exceedance probability and expected loss
- Overview of pricing approaches
- Actuarial pricing/econometric pricing

### 6) Catastrophe Bonds III

- Risk-neutral valuation approaches
- One-period model
- Binomial model
- Reduced-form pricing model

### 7) Catastrophe Derivatives

- Industry loss indices and parametric indices
- The failure of exchange-traded catastrophe derivatives
- Industry Loss Warranties (ILWs) and Natural Catastrophe Swaps
- Binomial and reduced-form pricing models

### 8) Mortality & Longevity Markets

- Mortality tables and life expectancy
- Extreme mortality bonds
- Mortality risk modeling
- Longevity swaps

### 9) Insurance-Linked Investments (Guest-Speaker II)

- First-hand insights from an ILS fund
- Current state of the industry
- Investment process and portfolio decisions
- Latest developments in the market

### 10) ILS from the Investor Perspective

- Cat bond indices and cat bond funds
- Risk-return and correlation profile
- Factor models and exotic beta
- Constructing and managing ILS portfolios

### 11) Wrap-Up and Selected Advanced Topics



## Course literature

Barrieu, P. and Albertini, L. (2009): Handbook of Insurance-Linked Securities, 1st Edition, John Wiley & Sons.

Bhuyan, V. B. (2009): Life Markets: Trading Mortality and Longevity Risk with Life Settlements and Linked Securities, 1st Edition, John Wiley & Sons.

Krutov, A. (2010): Investing in Insurance Risk, 1st Edition, Risk Books.

Additional literature (mainly academic papers) will be assigned during the lectures.

## Additional course information

--

## Examination information

### Examination sub part/s

#### 1. Examination sub part (1/1)

##### Examination time and form

Decentral - Written examination (100%, 90 mins.)

##### Remark

--

##### Examination-aid rule

Extended Closed Book

The use of aids is limited; any additional aids permitted are exhaustively listed under "Supplementary aids". Basically, the following is applicable:

- At such examinations, all the pocket calculators of the Texas Instruments TI-30 series and mono- or bilingual dictionaries (no subject-specific dictionaries) without hand-written notes are admissible. Any other pocket calculator models and any electronic dictionaries are inadmissible.
- In addition, any type of communication, as well as any electronic devices that can be programmed and are capable of communication such as notebooks, tablets, PDAs, mobile telephones and others, are inadmissible.
- Students are themselves responsible for the procurement of examination aids.

##### Supplementary aids

-

##### Examination languages

Question language: English

Answer language: English

---

## Examination content

All course contents/topics as defined above and treated in class.



## Examination relevant literature

Lecture notes.

### Please note

We would like to point out to you that this fact sheet has absolute priority over other information such as StudyNet, faculty members' personal databases, information provided in lectures, etc.

When will the fact sheets become binding?

- Information about courses and examination time (central/decentral and grading form): from the start of the bidding process on 25 January 2018
- Information about decentral examinations (examination-aid rule, examination content, examination relevant literature): after the 4th semester week on 19 March 2018
- Information about central examinations (examination-aid rule, examination content, examination relevant literature): from the start of the enrolment period for the examinations on 09 April 2018

Please look at the fact sheet once more after these deadlines have expired.