A. Frommherz, A. Hasler, H. Zimmermann
L. Jaeger
Department of Finance
Fall 2022

No 10202-01

Finanzmarkttheorie II
Derivative Markets and Option Pricing

Course Objective

Futures and options are traded actively on many exchanges. Forward contracts, swaps and many different types of (exotic) options are regularly traded outside exchanges by financial institutions, fund managers, and corporations in so-called over-the-counter markets. Derivatives also often form part of bond or stock issues and, of course, structured products and portfolio insurance strategies. The economic benefit of derivatives is emphasized as well as criticized, and the financial market turmoil offers a wide range of theoretical and practical issues to be analyzed.

This course provides an in-depth treatment of the major topics necessary for the analysis and applications of those derivatives commonly encountered in practice. But it also aims to provide a more general framework within which all derivative instruments can be valued and hedged. In addition to the pricing theory, risk management issues and institutional issues as well as the economic significance of derivatives markets are covered.

The emphasis of the first three parts of the lecture is put on equity or index related derivatives. Interest and credit derivatives are covered in part four.

Applications of the theory will be discussed in special exercise sessions. The course is offered as a block (8 daily sessions) before the Semester starts.

Organization

Dates and time:	Schedule:	09:15-12:00 (with 1 break 30') 13:15-16:00 (with 1 break 30')	
	Lecture 1:	Mo 05 September, 2022	HZI
	Lecture 2:	Tue 06 September, 2022	HZI
	Lecture 3*:	Thu 08 September, 2022	AHA
	Lecture 4*:	Fri 09 September, 2022	AHA
	Lecture 5:	Mo 12 September, 2022	HZI
	Lecture 6:	Tue 13 September, 2022	HZI
	Lecture 7:	Thu 15 September, 2022	AFR
	Lecture 8:	Fri 16 September, 2022	AFR
Location:	Look at course directory: https://vorlesungsverzeichnis.uni-bas.ch/en/home?id=262487&activeTab=room *by zoom; link provided a few days in advance		
Course language:	German		
Lecturers:	Dr. Anja Frommherz (AFR), Credit Suisse anja.frommherz@unibas.ch Dr. Andrea Hasler (AHA), George Washington University andrea.hasler@unibas.ch Prof. Dr. Heinz Zimmermann (HZI) heinz.zimmermann@unibas.ch		
Assistant:	Lukas Jaeger (LJA) l.jaeger@unibas.ch		
Offices:	Peter-Merian Weg 6, 4002 Basel. Office Hours: By appointment (by mail)		

For more information, news and further lecture notes please continuously check our website http://www.wwz.unibas.ch/finance/.

Prerequisites

Students should have a basic knowledge in finance, equivalent to the level of the course "Finanzmarkttheorie 1". Moreover, participants should be interested in and motivated for applying mathematical and statistical tools to financial problems. Handling excel-spreadsheets is inevitable.

Grading and Exam

6 ECTP
Grading is based on a written exam which is open book.
Exam date: to be defined

Handouts and Textbook Recommendations

We use no textbook. Handouts (ppt-Slides) which contain the relevant material are uploaded before the lectures.

Occasional material and spreadsheets are put on our website. Notice that the uploaded material does not substitute your own notes in the lectures.

All the material of Sections A, B and C (in in parts of Section D) can be found in

> **Y. Seiler Zimmermann & H. Zimmermann (SZ&Z):** "Finance Compact Plus", NZZ Libro, 2 Volumes, 1422 pages, 2021: Chapters 19 to 21

This is complimentary reading. The book costs 130 CHF and can be purchased at a 10% discount. The book also covers parts of the material of Finanzmarkttheorie I.

The following textbook is very complete and can be regarded as the international standard for an advanced study in the field of derivatives:

> **J. Hull**: "Options, Futures and Other Derivatives", 11th *Global* Edition, Prentice-Hall, 2021

A very useful book about implementation and volatility estimation which also includes program codes is

> **F. D. Rouah & G. Vainberg**: "Option pricing models and volatility", Wiley 2007

Weblinks

Links for free software downloads are:

http://www.hoadley.net/options/options.htm

http://www.global-derivatives.com/index.php/pricing-models-othermenu-41

Free material for Hull's book can be found at:

https://www-2.rotman.utoronto.ca/~hull/ofod/index.html

R: The RQuantLib package contains functions for simple and exotic options; the manual can be found at:

http://dirk.eddelbuettel.com/code/rquantlib/RQuantLib-manual.pdf

If you find other useful links, please let us and your fellow students know.

Course Outline

Date	No	Topic	Hull (11th)	SZ & Z (1st)
	A	**Foundations; futures contracts (HZI)**		
05.09.2022 HZI	1	**EINF** Introduction to Derivative Markets and Instruments (4h)	1, 10	19.1-19.4 19.7
		Exercise Session: Introduction (1h)		
	2	**FUTPR** Forward and Futures: Pricing (1h)	2, 3, 5, 34	19.5
06.09.2022 HZI		Discussion Exercise: Introduction (0.5h)		
	3	**FUTPR** Forward and Futures: Pricing (2.5h) **FUTHDG** Hedging with Futures (1h)	2, 3, 5, 34	19.10 21.2
		Exercise Session: Futures (1h)		
		Discussion Exercise: Futures / Summary (1h)		
	B	**Option pricing and arbitrage (AHA)**		
08.09.2022 AHA	4	**ARB** Distribution-free Arbitrage Restrictions (2h)	11, 12	
		Exercise Session: Distribution-free Arbitrage Restrictions (1h)		
	5	**BIN** Binomial Option Pricing (2h)	13	20.3-20.4
		Exercise Session: Binomial Option Pricing (1h)		
09.09.2022 AHA		Discussion Exercise: Binomial Option Pricing (0.5h)		
		BIN Binomial Option Pricing (1.5h)	13	
		Exercise Session: Binomial Option Pricing (1h)		
	6	**BINKONV** From Discrete to Continuous Time (2h)	14	
		Exercise Session: From Discrete to Continuous Time (1h)		
	C	**BS-Model and applications (HZI)**		
12.09.2022 HZI	7	**BS** Foundations and Derivation of the Black-Scholes Model (2h)	14, 15	20.5
		Exercise Session with Discussion: BS - Basics (1h)		
	8	**BS** Properties of BS Option Prices: Greeks, Volatility, RN Densities, etc. (2h)	15, 19, 20	20.6, 20.7

		Exercise Session with Discussion: BS – Portfolio Replication (1h)		
13.09.2022 HZI	9	**EXT** Extensions of the BS-Model (2h)	17, 18	20.8, 20.9
	10	**CRED** Applications of the BS-Model: Credit risk (1h)	24, 25	23.2, 23.3
		Exercise Session with Discussion: BS – Credit risk (1h)		
	11	**STRUK** Portfolio Insurance: Static and Dynamic (2h)	(19.13)	21.3-21.9
	D	**Interest rate and credit derivatives (AFR)**		
15.09.2022 AFR	12	**IR** Term Structure of Interest Rates and Swaps (1.5h)	4, 6, 7.1, 7.2,	6.4, 6.5
		IRD Interest Rate Derivatives (2h)	29	
		Exercise Session with Discussion – IR and IRD (1h)		
	13	**ALM** Interest Rate Risk and ALM (1.5h)		7.6
16.09.2022 AFR	14	**CR** Introduction to Credit Risk (2h)	24.1-24.4	6.7, 6.8
	15	**CRD** Credit Risk Derivatives (2h)	25.1-25.9	6.8
		Exercise Session with Discussion - Credit Risk (1h)		
		Summary and Q&A (1h)		