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WWZ Universität Basel
Abteilung Finanzmarkttheorie
Fall 2021



No 10202-01

Finanzmarkttheorie II

Derivative Markets and Option Pricing

The lecture is given online at the indicated time slots, and will be recorded. The zoom-link is forwarded the day before each class. - Please check the Adam Space regularly for more information and the course material.

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 30 August, 2021 HZI Lecture 2: Tue 31 August, 2021 HZI Lecture 3: Thu 02 September, 2021 AHA Lecture 4: Fri 03 September, 2021 AHA Lecture 5: Mo 06 September, 2021 HZI Lecture 6: Tue 07 September, 2021 HZI Lecture 7: Thu 09 September, 2021 AFR Lecture 8: Fri 10 September, 2021 AFR
Location:	Look at course directory: https://vorlesungsverzeichnis-unibas.ch/en/home?id=262487&activeTab=room
Course language:	German
Lecturers:	Dr. Anja Frommherz (AFR) anja.frommherz@unibas.ch Dr. Andrea Hasler (AHA) 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.wvz.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: October 25, 2021, 1615-1800

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.

Part of the material 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", 9th global edition, Prentice-Hall, 2018. (Notice that there is already a 11th non-global edition)

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 (9 th)	SZ & Z (1 st)
	A	Foundations; futures contracts (HZI)		
30.08.2021 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
31.08.2021 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)		
02.09.2021 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)		
03.09.2021 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)		
06.09.2021 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)		

07.09.2021 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)		
09.09.2021 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
10.09.2021 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)		