

Professor Dr. Heinz Zimmermann

Abteilung Finanzmarkttheorie/Finance
SS 2003



2535 Optionspreistheorie und Derivate Option Pricing Theory and Derivatives

Course Objective

In recent years, derivative instruments have become increasingly important in the world of finance. Nowadays, 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.

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, both institutional and practical issues as well as the economic significance and working of derivatives markets are discussed.

On the other hand, less weight is put on interest rate and credit risk derivatives. Interested students therefore may also attend the course 2572: Fortgeschrittene Optionspreistheorie (Advanced Option Pricing Theory).

Applications, further discussion of the theory (if necessary) and especially exercises are presented in additional exercise sessions. Homeworks are distributed and need to be handed in. During the exercise sessions, active participation is more than welcome.

Grading is based on the written final exam at the end of the course, but students are only permitted to write the final exam if they hand in the homeworks.

Prerequisites

An active interest in option pricing theory and derivatives will help students to get through suffering and pain...; some knowledge in financial mathematics would certainly be helpful but is not necessary.

Assessment and Exams/Credits

Credit Points: 9 CP. Grading is based on the written final exam at the end of the course, but students are only permitted to write this final exam if they hand in all homeworks (see below for more details). The exam is so-called open book, that means you are allowed to bring all printed readings and notes to the exam which you deem helpful.

Further Remarks

Attendance of this course is prerequisite for students planning to write their diploma thesis in the area of option pricing theory and derivatives. There is no need for course registration. Attendance at lectures is not compulsory but highly recommended if students wish to pass the course. Students should not forget to enroll for the final exam at the WWZ Prüfungssekretariat.

Organization

| | |
|---------------------------------|---|
| Dates: | Tuesday, 16-20 (Lectures) Thursday, 16-18 (Applications and Exercise Sessions) |
| First Lecture: | Tuesday, April 8, 16-20 |
| Location: | Zoologisches Institut Rheinsprung 9 Grosser Hörsaal |
| Lecturer: | Prof. Dr. Heinz Zimmermann heinz.zimmermann@unibas.ch |
| Responsible Assistants: | David Rey, lic. oec. HSG (Coordination) david.rey@unibas.ch Phone: 061 267 33 07 Christian Zenkner, lic. oec. HSG christian.zenkner@unibas.ch Phone: 061 267 33 21 |
| Office Hours & Contact Address: | Offices: Holbeinstrasse 12, 4051 Basel Office Hours: By appointment. |

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

Applications and Homeworks

Applications, further discussion of the theory (if necessary) and exercises will be presented in the Thursday sessions. In every session, your active participation is more than welcome!

Tasks and data for the homeworks will be made available on our website about one to two weeks in advance. Students are only permitted to write the final exam if they hand in and pass the following homeworks:

The **first** homework will be distributed around April 15, 2003, and has to be handed in at latest by **April 22, 2003**, at our department or in the respective Tuesday session.

The **second** homework will be distributed around May 6, 2003, and has to be handed in at latest by **May 13, 2003**, at our department or in the respective Tuesday session.

The **third** homework will be distributed around May 27, 2003, and has to be handed in at latest by **June 3, 2003**, at our department or in the respective Tuesday session.

The **fourth** homework will be distributed around June 17, 2003, and has to be handed in at latest by **June 24, 2003**, at our department or in the respective Tuesday session.

The content of both the exercises and applications sessions and the homeworks will depend on the topics discussed in the previous Tuesday session(s) (see outline below).

Students may work in groups of no more than four students. Each group hands in one typed (or at least a very well legible) copy of their answers. Please state your answers succinctly and be precise. Be sure to explain your logic. Never print entire spreadsheets, report only necessary results with proper legends and annotations.

Contents

| | Topic | Hull | HZI | Other |
|----|---|-----------------|------------------|-------------------------|
| 0 | Introduction and Overview | | 1, 11 | |
| 1 | Derivative Instruments and Payoffs | 1* | | |
| 2 | Forward and Futures Prices | 2*, 3* | | |
| 3 | Hedging with Futures | 4* | | |
| 4 | Interest Rate Markets and Swaps: Overview | 5, 6 | 1 | |
| 5 | Options Markets | 7* | | |
| 6 | Trading Strategies and Distribution-free Arbitrage Restrictions | 8*, 9* | 1 | |
| 7 | Binomial Option Pricing | 10 | 3* | |
| 8 | Risk-neutral Valuation, Complete Markets, and Preferences | | 5* | |
| 9 | Stochastic Basics: Behaviour of Stock Prices | 11 | 3* | |
| 10 | The Black-Scholes-Merton Model | 12 | 3* | |
| 11 | The Greek Letters | 14 | 3* | |
| 12 | Options on Stock Indices, Currencies, and Futures | 13* | | |
| 13 | Exotic Options | 19, 20 | | |
| 14 | Volatility and VaR | 15, 16, 17* | | |
| 15 | Preferences and Option Pricing | | 5* | |
| 16 | Limits and Extensions to the Standard B/S/M-Model | 18, 20 | 3* | |
| 17 | Generalized Option Pricing: The Martingale Approach | 21, 29* | 6* | |
| 18 | Interest Rate Derivatives: Introduction | 22*, 23, 24, 25 | | |
| 19 | Pricing Credit Risk | 26, 27 | | |
| 20 | Corporate Securities | | | Cox/Rubinstein, 7.3*,** |
| 21 | Real Options | 28 | | Dixit/Pindyck, 2*,** |
| 22 | Static Portfolio Insurance and Structured Products | 14.12 | <i>SVC-Modul</i> | |
| 23 | Dynamic Portfolio Insurance | 13.12 | | |
| 24 | Information Aggregation and Derivative Markets | | 10 | |
| 25 | Derivatives Disasters and Regulation | 30* | | |

The Lecture Notes of H. Zimmermann (HZI) can be downloaded from our website.

* Compulsory reading. ** Copies distributed in class.

Outline

| | Date (Tue) | Tuesday 16-20 (Lectures) | Thursday 16-18 (Exercises & Applications) |
|----|-----------------------|--|--|
| 1 | 08.04. | 0. Introduction and Overview 1. Derivative Instruments and Payoffs | - |
| 2 | 15.04. | 2. Forward and Futures Prices 3. Hedging with Futures 4. Interest Rate Markets and Swaps: Overview | - |
| 3 | 22.04. | 5. Options Markets 6. Trading Strategies and Distribution-free Arbitrage Restrictions | Discussion Homework I |
| 4 | 29.04. | 7. Binomial Option Pricing 8. Risk-neutral Valuation, Complete Markets, and Preferences | - |
| 5 | 06.05. | 9. Stochastic Basics: Behaviour of Stock Prices 10. The Black-Scholes-Merton Model | Application/ Exercises |
| 6 | 13.05. | 10. The Black-Scholes-Merton Model (continued) | Discussion Homework II |
| 7 | 20.05. | 11. The Greek Letters 12. Options on Stock Indices, Currencies, and Futures | Application/ Exercises |
| 8 | 27.05. | 13. Exotic Options 14. Volatility and VaR | - |
| 9 | 03.06. | 15. Preferences and Option Pricing 16. Limits and Extensions to the Standard B/S/M-Model 17. Generalized Option Pricing: The Martingale Approach | Discussion Homework III |
| 10 | 10.06. | 18. Interest Rate Derivatives: Introduction 19. Pricing Credit Risk | Application/ Exercises |
| 11 | 17.06. | 20. Corporate Securities 21. Real Options | Application/ Exercises |
| 12 | 24.06. | 22. Static Portfolio Insurance and Structured Products 23. Dynamic Portfolio Insurance (SVC-Modul) | Discussion Homework IV |
| 13 | 01.07. | 24. Information Aggregation and Derivative Markets 25. Derivatives Disasters and Regulation | Q/A |
| 14 | 08.07. | <i>Exam</i> | - |

Textbooks

Most of the material will be extensively treated in class. However, it will be necessary to work with the following textbooks to which we will regularly refer to:

J. Hull: "Options, Futures and Other Derivatives", 5th edition, Prentice-Hall, 2003. [**Hull**]

This is the main textbook and therefore compulsory reading. It is available at Karger Libri and in the WWZ-Library. Approx. price: 100 CHF.

H. Zimmermann: "Lecture Notes zur Theorie der Derivativen Finanzinstrumente", 2002. [**Zimmermann**]

The chapter drafts can be downloaded from our website.

In addition, we would like to recommend the following textbooks as complementary readings:

J. Hull: "Solutions Manual to: Options, Futures and Other Derivatives", Prentice-Hall, related to the 5th edition, 2003.

The main textbook includes a large set of exercises. It is available at Karger Libri and in the WWZ-Library.

P. Wilmott: "Derivatives – The Theory and Practice of Financial Engineering", Wiley, 1998 (new edition was published under the title "Paul Wilmott on Quantitative Finance", 2000). [**Wilmott**]

H. Zimmermann: "State Preference Theorie und Asset Pricing: Eine Einführung", Physica-Verlag, 1998.

S. Figlewski, M. Subrahmanyam, and W. Silber: "Financial Options", Irwin, 1990.

S. Benninga: "Financial modelling", 2nd edition, MIT-Press, Cambridge MA, 2000.

D. Duffie: "Futures Markets", Prentice-Hall, 1989.

J.-P. Danthine and J.B. Donaldson: "Intermediate Financial Theory", Prentice-Hall, 2001.

P. Wilmott, J. Dewynne, and S. Howison: "The mathematics of financial derivatives", Cambridge University Press, 1995.

L. Galitz: "Financial Engineering", Financial Times/Pitman Publishing, 1995.

H.P. Steinbrenner: "Optionsrechte in der Praxis", Ueberreuter, 2000.

E.G. Haug: "The Complete Guide to Option Pricing Formulas", McGraw-Hill, 1997.

Reading List

0. Introduction and Overview

Wilmott, Chapter 1.

Zimmermann, Chapter 1, 2, and 11.

Smith/Smithson/Wilford (1990), "Managing financial risk", Harper & Row, Chapter 1 and 2.

Rubinstein (1987), "Derivative asset analysis", Journal of Economic Perspectives 1, pp. 73-93.

Zimmermann (1994), "Optionsgeschäfte", Handwörterbuch des Bank- und Finanzwesens (Eds. Gerke/Steiner), pp. 1487-1502.

Bernstein (1992), "Capital Ideas", Free Press, Chapter 11 and 14.

1. Derivative Instruments and Payoffs

***Hull**, Chapter 1.

Wilmott, Chapter 2.

Zimmermann, Chapter 1.

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 2.

Smith/Smithson/Wilford (1990), "Managing financial risk", Harper & Row, Chapter 3.

2. Forward and Futures Prices

***Hull**, Chapter 2 and 3.

Duffie (1989), "Futures Markets", Prentice-Hall, Chapter 5 to 7.

Cox/Ingersoll/Ross (1981), "The relation between forward prices and futures prices", Journal of Financial Economics 9, pp. 321-346.

Grünbichler/Longstaff/Schwartz (1994), "Electronic screen trading and the transmission of information: an empirical examination", Journal of Financial Intermediation 3, pp. 166-187.

Zimmermann/Zogg (1997), "Arbitrage und dynamische Preisbeziehungen am schweizerischen SMI Futuresmarkt", Schweizerische Zeitschrift für Volkswirtschaft und Statistik (eine zweiteilige Kurzversion ist erschienen in: Bankarchiv, 1997, Nr. 1/ Nr. 2-3).

3. Hedging with Futures

***Hull**, Chapter 4.

Smith/Smithson/Wilford (1990), "Managing financial risk", Harper & Row, (Chapter 4 and 5), Chapter 6 to 8.

4. Interest Rate Markets and Swaps

Hull, Chapter 5 and 6.

Zimmermann, Chapter 1.

Wilmott, Chapter 32.

Galitz (1995), "Financial Engineering", Financial Times/Pitman Publishing, Chapter 7 to 9.

Miron/Swanell (1995), "Pricing and hedging swaps", Euromoney Books.

5. Options Markets

***Hull**, Chapter 7.

6. Trading Strategies and Distribution-free Arbitrage Restrictions

***Hull**, Chapter 8 and 9.

Wilmott, Chapter 2.

Zimmermann, Chapter 1.

Merton (1973): "Theory of rational option pricing", Bell Journal of Economics.

Cox/Rubinstein (1985), "Options markets", Prentice-Hall, Chapter 4.

7. Binomial Option Pricing

Hull, Chapter 10.

Wilmott, Chapter 12.

***Zimmermann**, Chapter 3 (Option Pricing Primer).

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 3.

Cox/Ross/Rubinstein (1979), "Option Pricing - A simplified Approach", Journal of Financial Economics.

8. Risk-neutral Valuation, Complete Markets, and Preferences

***Zimmermann**, Chapter 5.

Zimmermann (1998): "State Preference Theorie und Asset Pricing: Eine Einführung", Physica, Chapter 1, 2, 3 and 4.1.

Copeland/Weston (1992), "Financial Theory and Corporate Policy", Addison-Wesley, Chapter 5 (Appendix).

Ingersoll (1987), "Theory of Financial Decision Making", Rowman & Littlefield, Chapter 4.

Ross (1976), "Options and efficiency", Quarterly Journal of Economics 90.

Cox/Ross (1976), "The pricing of options for alternative stochastic processes", Journal of Financial Economics 3.

Brennan (1977), "The pricing of contingent claims in continuous time models", Journal of Finance 34.

Arrow (1953), "Le rôle des valeurs boursières pour la répartition la meilleure des risques", 1953, English translation in: Review of Economic Studies 31, 1963.

9. Stochastic Basics: Behaviour of Stock Prices

Hull, Chapter 11.

Wilmott, Chapter 3, 4 and 6.

***Zimmermann**, Chapter 3 (Option Pricing Primer) [and 4].

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Appendix Chapter 3.

Ingersoll (1987), "Theory of Financial Decision Making", Rowman & Littlefield, Chapter 16.

Merton (1990), "Continuous time finance", Blackwell, Chapter 3.

Bachelier (1900), "Théorie de la spéculation", Gauthier-Villars, Paris.

10. The Black-Scholes-Merton Model

Hull, Chapter 12.

Wilmott, Chapter 5, 8, and 9.

***Zimmermann**, Chapter 3 (Option Pricing Primer) [and 4].

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 3 (Rest).

Merton (1973): "Theory of rational option pricing", Bell Journal of Economics.

Black/Scholes (1973), "The pricing of options and corporate liabilities", Journal of Political Economy.

Smithson (1991), "Wonderful life", Risk 4 (October), pp. 37-44, Continuation in Risk 8 (October, 1995).

Black (1989), "How we came up with the option formula", Journal of Portfolio Management (Winter), pp. 4-8.

Bernstein (1992), "Capital Ideas", Free Press, Chapter 11.

11. The Greek Letters

Hull, Chapter 14.

Wilmott, Chapter 7.

***Zimmermann**, Chapter 3 (Option Pricing Primer) [and 4].

Cox/Rubinstein (1985), "Options markets", Prentice-Hall, Chapter 5.8 and 6.

Black (1974), "Facts and fantasy in the use of options", Financial Analysts Journal.

Figlewski (1989), "What does an option pricing model tell us about option prices", Financial Analysts Journal (September/October), pp. 12-15.

Rubinstein (1984), "A simple formula for the expected rate of return of an option over a finite holding period", Journal of Finance 39.

12. Options on Stock Indices, Currencies, and Futures

***Hull**, Chapter 13.

Wilmott, Chapter 8 and 11.

Garman/Kohlhagen (1983), "Foreign currency option values", Journal of International Money and Finance 2.

Black (1976), "The pricing of commodity options", Journal of Financial Economics.

Stoll/Whaley (1986), "New options instruments: Arbitrageable links and valuation", Advances in Futures and Options Resaearch 1, Part A, pp. 25-62.

13. Exotic Options

Hull, Chapter 19 and 20.

Wilmott, Chapter 13 to 18.

Zimmermann, Chapter 1.

Zhang (1995), "An introduction to exotic options", *European Financial Management* 1, pp. 87-95.

Nelken (1996), "Exotic options", Irwin.

Jarrow (1995), "Over the rainbow. Developments in exotic options and complex swaps", Risk Publications.

Galitz (1995), "Financial Engineering", *Financial Times/Pitman Publishing*, Chapter 11.

Gemmill (1993), "Option pricing", McGraw Hill, Chapter 14.

14. Volatility and VaR

***Hull**, Chapter [15, 16, and] 17.

Wilmott, Chapter 24, 42, 45 to 50.

Wilmott/Dewynne/Howison (1993), "Option Pricing – Mathematical Models and Computation", Oxford Financial Press.

Clewlow/Strickland (1998), "Implementing Derivatives Models", Wiley.

Jorion (1996), "Value at Risk", Irwin.

Dowd (1998), "Beyond Value at Risk", Wiley.

Canina/Figlewski (1993), "The informational content of implied volatility", *Review of Financial Studies*.

Greene/Figlewski (1999), "Market Risk and Model Risk for a Financial Institution Writing Options", *Journal of Finance*, August, pp. 1465-1501.

Rubinstein (1994), "Implied binomial trees", *Journal of Finance*.

Jackwerth (1999), "Option-Implied Risk-Neutral Distributions and Implied Binomial Trees: A Literature Review", *Journal of Derivatives*, Vol. 7, No. 2.

Duffie/Pan (1997), "An Overview of Value at Risk", *Journal of Derivatives*, Spring, pp. 7-49.

Beder (1996), "VaR: Seductive but dangerous", *Financial Analysts Journal* (September/October).

Schulte-Mattler/Traber (1995), "Marktrisiko und Eigenkapital", Gabler.

Marshall/Siegel (1997), "Value at Risk: Implementing a risk measurement standard", *Journal of Derivatives*, Spring, pp. 91-111.

15. Preferences and Option Pricing

***Zimmermann**, Chapter 5 [and 6].

Breeden/Litzenberger (1978), "Prices of statecontingent claims implicit in options prices", *Journal of Business*.

Banz/Miller (1978), "Prices for state-contingent claims: Some estimates and applications", *Journal of Business* 51.

Black (1974), "The pricing of complex options and liabilities", Manuscript, Chicago.

Zimmermann (1998), "State Preference Theorie und Asset Pricing: Eine Einführung", *Physica-Verlag*, Chapter 6.

Franke/Stapleton/Subrahmanyam (1999), "Why are options expensive?", *European Finance Review*.

Pirkner (1999), "Option Pricing: Modelling and Extracting State-Price Densities", Haupt.

16. Limits and Extensions to the Standard B/S/M-Model

Hull, Chapter 18 and 20.

***Zimmermann**, Chapter 3 (Option Pricing Primer).

Wilmott, Chapter 8, 9 and 19 to 21, and 22 to 27.

Black (1989), "How to use the holes in Black&Scholes", *Journal of Applied Corporate Finance* 1.

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", *Irwin*, Chapter 4.

Leland (1985), "Option pricing and replication with transactions costs", *Journal of Finance* 40.

Merton (1976), "Option pricing when the underlying returns are discontinuous", *Journal of Financial Economics* 3, pp. 125-144.

Heston (1993), "A closed form solution for options with stochastic volatility with applications to bond and currency options", *Review of Financial Studies* 6.

17. Generalized Option Pricing: The Martingale Approach

***Hull**, Chapter [21 and] 29.

***Zimmermann**, Chapter [5 and] 6.

Benninga/Björk/Wiener (2002), "On the Use of Numeraires in Option Pricing", *The Journal of Derivatives*, Winter 2002.

Geman/El Karoui/Rochet (1995), "Change of Numeraire, Changes of Probability Measures and Pricing of Options", *Journal of Applied Probability* 32, pp. 443-458.

Garman (1976), "A general theory of asset valuation under diffusion state processes", Manuscript, UC Berkeley.

Cox/Ingersoll/Ross (1985), "An intertemporal general equilibrium model of asset prices", *Econometrica* 53.

Baxter/Rennie (1996), "Financial calculus. An introduction to derivative pricing", Cambridge University Press.

Margrabe (1978), "The value of an option to exchange one asset for another", *Journal of Finance* 33.

Zimmermann (1998), "State Preference Theorie und Asset Pricing: Eine Einführung", Physica-Verlag, Chapter 4 and 5.5-5.8.

Jovic/Jaeger/Zimmermann (2001), "Bedeutung, Bewertung und Einsatz von Wetterderivaten", in: *Aspekte der Schweizerischen Wirtschaftspolitik*, Festschrift für Franz Jaeger (Hrsg. Jürg Furrer und Bruno Gehrig), Rüegger, pp. 221-254.

18. Interest Rate Derivatives: Introduction

***Hull**, Chapter 22 [23, 24, and 25].

Wilmott, Chapter 33 to 35, 37 to 40.

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 6.

Zimmermann (1998), "State Preference Theorie und Asset Pricing: Eine Einführung", Physica-Verlag, Chapter 5.17.

Leithner (1991), "Eine Einführung in die präferenzfreie Bewertung zinsabhängiger Finanzinstrumente", *Finanzmarkt und Portfolio Management* 5, pp. 305-320.

Bühler (1994), "Bewertung, Preischarakteristika und Risikomanagement von zinsderivativen Wertpapieren im Rahmen eines Einfaktormodells", *Finanzmarkt und Portfolio Management* 8.

Heath/Jarrow/Morton (1992), "Bond pricing and the term structure of interest rates: A new methodology for contingent claims valuation", *Econometrica* 60.

Brennan/Schwartz (1979), "A continuous-time approach to the pricing of bonds", *Journal of Banking and Finance* 3, pp. 133-155.

Hull/White (1990), "Pricing interest-rate-derivative securities", *Review of Financial Studies* 3, pp. 573-592.

Cox/Ingersoll/Ross (1985), "A theory of the term structure of interest rates", *Econometrica* 53.

19. Credit Risk and Derivatives: Overview

Hull, Chapter 26 and 27.

Wilmott, Chapter 43 and 44.

Merton (1974), "On the Pricing of Corporate Debt: the Risk Structure of Interest Rates", *Journal of Finance* 29, pp 449-470.

Cossin (1997), "Credit Risk Pricing: A Literatur Survey", *Finanzmarkt und Portfolio Management*, Vol. 11, No. 4.

Jarrow/Turnbull (1995), "Pricing derivatives on financial securities subject to credit risk", *Journal of Finance* 50.

Hull/White (1995), "The impact of default risk on the prices of options and other derivative securities", *Journal of Banking and Finance* 19.

Das (1995), "Credit risk derivatives", *Journal of Derivatives* 2, No. 3.

20. Corporate Securities

***Cox/Rubinstein** (1985), "Options Markets", Prentice-Hall, Chapter 7.3.

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 9.

Merton (1974), "On the pricing of corporate debt: The risk structure of interest rates", *Journal of Finance* 29.

Merton (1977), "On the valuation of contingent claims and the Modigliani-Miller theorem", *Journal of Financial Economics*.

Kritzman (1987), "Incentive fees: Some problems and some solutions", *Financial Analysts Journal* (January/February), pp. 21-26 (or: **Zimmermann/Jaeger/Rudolf/Zogg** (1996), "Moderne Performance-Messung", Haupt, Chapter 5).

Johnson (1987), "Options on the maximum or the minimum of several assets", *Journal of Financial and Quantitative Analysis* 22, pp. 277-283.

Whaley (1993), "Derivatives on market volatility", *Journal of Derivatives* 1 (Fall), pp. 71-84.

21. Real Options

***Pixit/Pindyck** (1994), "Investment under Uncertainty", Princeton, Chapter 2.

Hull, Chapter 28.

Brennan/Schwartz (1985), "Evaluating natural resource investments", *Journal of Business* 58, pp. 135-157.

Dixit/Pindyck (1993), "Investment under uncertainty", Princeton University Press.

Trigeorgis (1996), "Real options", MIT-Press.

Loderer (1996), "Rethinking project valuation", *Finanzmarkt und Portfolio Management* 10, pp. 133-147.

22. Static Portfolio Insurance and Structured Products

Hull, Chapter 14.12.

Zimmermann, Chapter 8 and 9.

Benninga/Blume (1985), "On the optimality of portfolio insurance", *Journal of Finance* 40.

Leland (1980), "Who should buy portfolio insurance", *Journal of Finance* 35.

Cavaleri/Planta (1992), "GROI, CLOU, IGLU: Strukturierte Produkte oder Zauberei?", *Finanzmarkt und Portfolio Management* 6, pp. 118-126.

Zimmermann (1996), "Das Management von Aktienkursrisiken mit Derivaten", Gabler, Chapter 1 bis 3.

Zimmermann (1996), "Constant return participating (CRP) portfolio insurance strategies", *Journal of Derivatives* 4.

23. Dynamic Portfolio Insurance

Hull, Chapter 13.12.

Zimmermann, Chapter 8 and 9.

Rubinstein/Leland (1980), "Replicating options with positions in stocks and cash", *Financial Analysts Journal*.

Bernstein (1992), "Capital Ideas", Free Press, Chapter 14.

Figlewski/Subrahmanyam/Silber (1990), "Financial Options", Irwin, Chapter 11.

Sharpe/Perold (1988), "Dynamic strategies for asset allocation", *Financial Analysts Journal*.

Benninga (1990), "Comparing portfolio insurance strategies", *Finanzmarkt und Portfolio Management* 4.

Grossman (1988), "Insurance seen and unseen. The impact on markets", *Journal of Portfolio Management*.

Grossman/Zhou (1996), "Equilibrium analysis of portfolio insurance", *Journal of Finance* 51, pp. 1379-1403.

24. Information Aggregation and Derivatives Markets

Danthine/Donaldson (2001), "Intermediate Financial Theory", Prentice-Hall, Chapter 14.

Zimmermann, Chapter 10.

Duffie (1989), "Futures Markets", Prentice-Hall, Chapter 4.

Anderson/Danthine (1981), "Cross Hedging", *Journal of Political Economy*.

Anderson/Danthine (1983), "Hedger diversity in futures markets", *Economic Journal* 93, pp. 370-389.

Newbery/Stiglitz (1981), "The theory of commodity price stabilization", Clarendon Press.

Breeden (1984), "Futures markets and commodity options: Hedging and optimality in incomplete markets", *Journal of Economic Theory*, pp. 275-300.

25. Innovation, Regulation, Financial System

***Hull**, Chapter 30.

Wilmott, Chapter 45.

Zimmermann, Chapter 11, 13 and 14.

M. H. Miller (1997), "Merton Miller on Derivatives", Wiley.

Rubinstein (1988), "Portfolio insurance and the market crash", *Financial Analysts Journal*.

Miller (1991), "Financial innovations and market volatility", Blackwell, Chapter 8 to 13.

New York Stock Exchange (1990), "Market volatility and investor confidence", NYSE, June 7.

Spremann/Zimmermann (1991), "Information und neue Finanzkontrakte", *NZZ* 3.1.1991.

Zimmermann (1991), "Liquidität ist wichtiger als Vielfalt", *SHZ*, 3.10. 1991.

Zimmermann (1992), "Börsenstrukturen der Zukunft aus ökonomischer Sicht", *NZZ* 18.9.1992.

Zimmermann (1993), "Derivative Instrumente und Marktliquidität", 26.10.1993.

Zimmermann/Gibson, (1994), "Schwierige Regulierung derivativer Finanzmärkte", *NZZ* 15./16.10.1994.

Wall (1991), "Supply and demand developments in the financial futures world market", *Finanzmarkt und Portfolio Management* 5, pp. 330-343.

Duffie (1989), "Futures Markets", Prentice-Hall, Chapter 9.

Gibson/Zimmermann (1996), "The benefits and risks of derivative instruments: An economic perspective", *Finanzmarkt und Portfolio Management* 10 and *Derivatives Trading & Regulation* 1.

Gibson/Zimmermann (1996), "Derivative Finanzmärkte: Oekonomischer Nutzen, Risiken und Ueberwachung", Chapter 1, in: **Nobel** (1996), "Aktuelle Rechtsprobleme des Finanz- und Börsenplatzes Schweiz", Stämpfli; extended version in *Zeitschrift für Schweizerisches Recht* (1996).

Gastineau/Margolis (1994), "The future of equity derivatives: What lies ahead?", *Financial Analysts Journal*, November/December, pp. 6-11.

Merton (1995), "Financial innovation and the management and regulation of financial institutions", *Journal of Banking and Finance* 19, pp. 461-481.

Merton (1995), "A functional perspective of financial intermediation", *Financial Management* 24, pp. 21-41.

Merton (1990), "The financial system and economic performance", Journal of Financial Services Research, pp. 263-300.

Zimmermann (1998), "Innovationsprozesse im Finanz und Risikomanagement", Manuscript.

Zimmermann (1999), "Value at Risk – ein problematisches Paradigma", Manager Bilanz, November 1999.

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