

Derivatives & Risk Management

Master Seminar

Institute for Financial Markets

Prof. Dr. Marcel Prokopczuk

Winter Semester 2019/2020

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Institute for Financial Markets

Room: I-044

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- Submission of list of topic preferences until:
Wednesday, **17th July 2019, 11a.m.**, Room I-044
- Topic assignment:
Thursday, **18th July 2019**
- Binding registration until:
Monday, **22nd July 2019**
- Submission of seminar paper until:
Wednesday, **20th Nov. 2019, 11a.m.**, Room I-044
- Presentations:
Mid December

- Preparation of a seminar paper in groups of 2 or 3
- Scope: 20 pages (groups of 2), 25 pages (groups of 3)
- Independently performed empirical application or quantitative analysis is the core of the seminar paper
- Use of appropriate statistics software such as R, STATA, or Matlab is highly recommended
- Pure literature research is not sufficient
- Presentations of the seminar papers will be held in a blocked seminar in December
- Assessment: 60% written work, 40% presentation

Topic 1: Valuation of American Options Using Monte Carlo Simulation

Description:

- Unlike for European options, there is no close-form solution for the valuation of American options. Therefore, a number of Monte Carlo simulation-based approaches have been proposed within the past decade to address the problem of pricing American-style derivatives.
- The technique of MC simulation is a numerical tool to simulate uncertain events. By simulating these uncertain events sufficiently often, it is possible to obtain information about the distribution of the investigated variable.

Task:

- Theoretical description of valuation of American options.
- Valuation of American options making use of Monte Carlo simulation techniques.

Basic Literature:

- Hull, J. C., (2011). *Options, Futures, and Other Derivatives*. 8th ed., Prentice Hall.
- Tilley, J., (1993). Valuing American Options in a Path Simulation Model. *Trans. Soc. Actuaries*, 45, 83-104.

Description:

- Characterizing asset return dynamics using volatility models is an important part of empirical finance.
- The family of GARCH volatility models has become an important toolkit in empirical asset pricing and financial risk management.

Task:

- Theoretical description of “Generalized Autoregressive Conditional Heteroskedasticity” models.
- Use of an appropriate GARCH process to capture the variance process of log stock returns.
- Valuation of (European) options.

Basic Literature:

- Hull, J. C., (2011). *Options, Futures, and Other Derivatives*. 8th ed., Prentice Hall.
- Christoffersen, P., & Jacobs, K. (2004). Which GARCH Model for Option Valuation. *Journal of Management Science*, 50, 1204-1221.
- Duan, J.-C., (1995). The GARCH Option Pricing Model. *Mathematical Finance*, 5, 13-32.

Topic 3: Valuation of Interest Rate Derivatives Using the Ho-Lee and Hull-White Model

Description:

- Next to the famous Vasicek (1997) and the Cox, Ingersoll, and Ross (1985) model, the Ho-Lee and the Hull-White model are common no-arbitrage yield curve models which are frequently used to price interest rate derivatives.

Task:

- Theoretical description of the Ho-Lee vs. Hull-White model.
- Fitting the models to market data; followed by empirical examination or simulation.
- Comparison and evaluation of the models' performances.

Basic Literature:

- Hull, J. C., (2011). *Options, Futures, and Other Derivatives*. 8th ed., Prentice Hall.
- Veronesi, P., (2010). *Fixed Income Securities: Valuation, Risk, and Risk Management*. John Wiley & Sons
- Hull, J., White, A., (1990). Pricing Interest-Rate-Derivative Securities. *The Review of Financial Studies*, 3, 573-592.
- Ho, T. S. Y., Lee, S.-B., (1986). Term Structure Movements and Pricing of Interest Rate Claims, *Journal of Finance*, 41, 1011-1029.

Topic 4: Forecasting Volatility: Historical vs. Implied Volatility

Description:

- Volatility is a critical factor influencing the option pricing; however, it is an extremely difficult factor to forecast.
- Hence the crucial problem lies with the accurate estimation of volatility.

Task:

- Theoretical description and discussion of historical vs. implied volatility.
- Forecast of historical and implied volatility using an appropriate choice of models.
- Comparison and evaluation of the obtained results.

Basic Literature:

- Hull, J. C., (2011). *Options, Futures, and Other Derivatives*. 8th ed., Prentice Hall.
- Prokopczuk, M., Wese Simen, C., (2014). The Importance of the Volatility Risk Premium for Volatility Forecasting, *Journal of Banking & Finance*, 40, 303-320.
- Fleming, J., Kirby, C., Ostdiek, B., (2001). The Economic Value of Volatility Timing, *The Journal of Finance*, 56, 329-352.
- Fleming, J., Kirby, C., Ostdiek, B., (2003). The Economic Value of Volatility Timing Using “Realized” Volatility, *The Journal of Financial Economics*, 67, 473-509.