EE Department Seminar

April 20th, 2012, Friday, 3 p.m.
Yorgo Istefanopulos Meeting Lounge (KB 201)

Control Engineering Methods applied to Risk Management, Hedging and Pricing in Finance.

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In this talk the application of methods from control engineering such as dynamic programming and dynamic systems modeling to field of finance is presented. At first an introduction to dynamic models in finance is given using the "language" from control engineering. The main challenges in risk management, hedging and pricing for finance are explained and solution from control engineering are presented and compared to classical solutions. We will introduce the portfolio optimization problem as a control problem and show solutions in continuous and discrete time. Moreover, the well-known solutions and their assumptions for derivative pricing, i.e. Black-Scholes formula for European option pricing and hedging, are presented and compared to solutions for the same problem using control methods. We show that under the same assumption for the market models, e.g. normality of returns, both yield the same pricing and hedging values. When changing the assumptions to reflect better real observed price movements such as extreme events, clustering of volatility and skewness, the control methods yield solutions which improve the risk management and hedging and thus, present methods to banks and insurance that have considerable positive impact on the risk management and the hedging of options.

Florian Herzog was born in Munich, Germany on July 18th 1975. He received a joint Master Degree in Engineering and in Mathematics at the ETH Zürich in 2002 (with honors and the ETH medal), a Master of Science from Georgia Institute of Technology in Operations Research in 2001. In 2005 he completed his Ph.D. degree at the ETH Zürich with thesis entitled "Strategic Portfolio Management for Long-term Investments: Am Optimal Control Approach". Between finishing the Master degree and starting the PhD, he work at SIG Pack Systems AG in Schaffhausen, Switzerland and developed an control algorithm to manage the interaction 50 to 100 robots working in packaging systems and created two European patents for the coordination packing assembly lines. In 2005 after completing the Ph.D. he founded as co-founder swissQuant Group AG, a specialist quantitative modeling and software firm for risk management systems, portfolio construction and optimization, quantitative asset allocation and advisory systems. Dr. Herzog served from 2005 to 2009 as Chief Technology Officer (CTO) and since 2009 as CEO. In this time swissQuant Group has grown to a staff of 25 Quant Engineers, 100 clients and 150 completed project and systems. Among the successfully project were the first integrated risk management system for the largest power utility in Switzerland, the margin system for the largest European equity and derivative exchange, a automatic asset allocation systems for a large private bank where more than 60'000 accounts are rebalanced overnight and the largest risk management for wealth management where portfolio risk for more than 1 Mio portfolios are computed, with more 300'000 direct investments and more 200'000 derivatives. Dr. Herzog research centers on stochastic modeling of financial data, portfolio optimization, risk management and statistical methods for data fitting in natural sciences.