

- Aid, Rene (University Paris Dauphine): Asset Liability Management of EDF nuclear plant decommissioning fund

EDF is a French energy utility owning fifty eight nuclear reactors, most of them built during the eighties. The evolutions of the countability standards, the change of status of the firm going public after fifty years of state own monopoly, the evolution of the European energy market as well as the approaching times of decommissioning has lead to the development of better ways to assess the financial risks linked with the fund provisioned for this liability . One important feature of this liability stands in its very long term commitment of more than a century. After a recall of the institutional setting of EDF nuclear plant decommissioning, we will present both how the physical constraints of decommission are turned into a financial liability and the methodology developed by the Financial Direction of EDF to define and assess its financial risk.

Joint work with Christine Vialas (EDF, Financial Direction)

- Ankirchner, Stefan (Humboldt University Berlin): Optimal hedging of weather derivatives

In this talk we consider insurance derivatives that are based on non-tradable underlyings, f.ex. weather derivatives based on a temperature index, or catastrophe futures based on a loss index. And we assume that the underlyings are correlated with assets tradable on a financial market. We study the Markov property of indifference prices of the insurance derivatives and the differentiability with respect to the underlyings. Once these properties are established, we can explicitly describe the optimal hedging strategies in terms of the price gradient and correlation coefficients. We obtain thus a generalisation of the classical 'delta hedge' in complete markets. We use the fact that exponential indifference prices of insurance derivatives can be represented in terms of solutions of Forward Backward Stochastic Differential Equation (FBSDE) with a quadratic growth generator. We show the Markov property of such FBSDEs and generalize results on the differentiability relative to the initial value of the forward equation.

- Barrieu, Pauline (London School of Economics): General Pareto optimal allocations and applications to multi-period risks

In this paper, we consider the problem of Pareto optimal allocation in a general framework, involving preference functionals defined on a general real vector space. The optimization problem is equivalent to a modified sup-convolution of the different agents' preference functionals. The results are then applied to a multi-period setting and some further characterization of Pareto optimality for an allocation is obtained for expected utility for processes.

- Barth, Andrea (University of Oslo): Spatial Temperature Risk: Hedging and Simulation

The first trade of a weather derivative took place in 1997. Now temperature derivatives are traded at the CME for certain cities in Europe, Japan and the USA. So companies in

these cities are able to hedge their risk of losses caused by seasonal weather. The question is now: How to hedge the risk in other parts of the domain (e.g. Europe, North America)? The main objective of this work in progress is to calculate a synthetic Temperature Future for each point of a domain given the price of weather derivatives traded in a fixed number of cities. To calculate the price of this synthetic Temperature Future we use the model for temperature described in [1], [2]. Therefor we simulate a random field which is representing the temperature in the domain over a given period, which coincides with given temperature data at certain points. A fast simulation method for these random fields is presented.

Joint work with Fred Espen Benth, University of Oslo, and Juergen Potthoff, University of Mannheim.

- Buckwar, Evelyn (Humboldt University Berlin): Stochastic climate models with delay
- Carmona, Rene (Princeton University): TBA
- Delbaen, Freddy (ETH Zurich): TBA
- Ekeland, Ivar (University of British Columbia): TBA
- Fehr, Max (ETH Zurich): Allowance price formation in environmental trading schemes

Cap and Trade Systems have not least since the ratification of the Kyoto Protocol in 2004 become popular environmental instruments. However recent price development of carbon allowances in the EU Emission Trading Scheme and it's impact on European electricity prices exhibits the importance of a clear understanding of such Trading Systems. To this end we propose a stochastic equilibrium model for allowance price formation in the European Emission Trading Scheme and show how it is related to fundamental price drivers. Thereby particular focus is given on the influence of market design on allowance prices and overall social costs.

- Gollier, Christian (Toulouse University): Does ambiguity aversion reinforce risk aversion?

It is suggested that ambiguity aversion makes individuals more precautionary, thereby offering a potential explanation for the equity premium puzzle. We show that this is not true in general. We consider a model in which risk-and-ambiguity-averse agents can invest in an unambiguously safe asset and in an ambiguous risky asset. We exhibit some sufficient conditions to guarantee that, ceteris paribus, an increase in ambiguity aversion reduces the demand for the ambiguous risky asset, and raises the equity premium. For example, this is the case when the set of plausible distributions of returns can be ranked according to the monotone likelihood ratio order. We also show how ambiguity aversion distorts the price kernel. Keywords: smooth ambiguity aversion, monotone likelihood ratio, equity premium, portfolio choice, price kernel, central dominance.

- Hinz, Juri (National University of Singapore): Modeling abatement strategies in a cap-and-trade system

In this talk, we focus on price formation of environmental allowances issued within a stylized cap-and-trade system. Thereby, we point out the role of the abatement strategy costs and elaborate on the appropriate description of price dynamics for the corresponding energy-related commodities. Further, we discuss the impact of the initial allocation of allowances on their price dynamics.

- Horst, Ulrich (University of British Columbia): TBA
- Kupper, Michael (ETH Zurich): TBA
- Ludkovski, Mike (University of Michigan): Valuation of Energy Storage: An Optimal Switching Approach

We consider the valuation of energy storage facilities in the framework of stochastic control. Our two main examples is natural gas dome storage and hydroelectric pumped storage. Focusing on the timing flexibility aspect of the problem we construct an optimal switching model with inventory. Thus, the manager has a constrained compound American option on the intertemporal spread of the commodity prices. Extending the methodology from Carmona and Ludkovski (2005), we then construct a robust numerical scheme based on Monte Carlo regressions. Our simulation method can handle a generic Markovian price model and easily incorporates many operational constraints and features. The main challenge is dealing with the path-dependent storage levels, for which two numerical approaches are proposed. The scheme is compared to the traditional quasi-variational framework and illustrated with a variety of concrete examples. We also consider related problems of interest, such as supply guarantees and mine management. This is joint work with Rene Carmona (Princeton).

- Mandel, Antoine (University Paris Dauphine): Production Externalities and Expectations, Application to the economics of Climate Change
- Moreno, Santiago (University of British Columbia): TBA
- Muehlenbachs, Lucija (University of Maryland): Modeling Discrete Decision Processes: The Case of the Oil Industry
- Porchet, Arnaud (Princeton University): Valuation of a Power Plant Under Production Constraints and Market Incompleteness

We develop a real option valuation model of a thermal power plant, which accounts for physical constraints (Switching costs, minimum on-off times, ramp rates or non-constant heat rates) and market incompleteness. We use the utility indifference approach to define the value of the physical asset. We derive the associated optimal control problems and provide a characterization of their solutions by means of a coupled system of reflected Backward Stochastic Differential Equations. We relate this system to a system of

variational inequalities. In the absence of friction, we prove that this utility-based value reduces to the classical no-arbitrage valuation, showing that this approach is really an extension of standard real option methods to incomplete markets. We finally provide a numerical comparative study by implementing BSDE simulation and PDE finite difference algorithm, and we discuss the tractability of this approach.

- Ramirez, Hector (University of Chile): Viability in Fishery Management

Viability means the ability of survival, namely the capacity for a system to maintain, during time, condition of existence, good health, safety, or by extension, effectiveness (in the sense of cost-effectiveness in economics). The question of survival obviously arise in life sciences. The analysis of adaptative mechanisms adopted by a population with respect to its environment, the study of coexistence conditions for several species, the maintenance of biodiversity are preoccupations met by ecological and biological scientists, which are close to viability issues. In this work we study some mathematical issues, concerning the viable control of discrete time systems. We thus provide mathematical tools to deal with dynamical systems under state and control constraints and shed new lights on some applied viability problems in fishery management.

- Sumaila, Rashid (University of British Columbia): Discounting and fisheries sustainability: An observation from the policy field

Clark (1973) was the first to highlight the concern that current discounting practices may lead to decisions that are counter to the quest for sustainable use of fisheries resources. In this presentation, I report on an observation from the fisheries policy field, which offers the potential to solve the vexing problem of discounting and the sustainable use of natural and environmental resources. My goal is to stimulate discussion between mathematicians and economists that may lead to the further development of what is termed intergenerational discounting in Sumaila and Walters (2005).

- Tachini, Luca (Zurich University): An Analysis of the Endogenous Dynamics of the Emission Allowance Price in the short-run

With the recent larger diffusion of market-based instruments for pollution control, a new strand of research, called Environmental Finance, has been developing analyzing the existence and the measure of the impacts of such new markets on covered companies. At this point in time it is important to develop financial instruments to mitigate the effects of the air-emission allowances, but before that we need to correctly derive the dynamics of the price process of the emission rights. In particular for the European Emission Trading Scheme, company strategies are likely to take short-term perspective given that targets currently exist only through 2012, however such short-run abatement technologies are often perceived as non-perfect substitute for emission permits. Hence, the dynamics of the price process in the short-term comes from the solution of the optimization problems of different companies that continuously adjust their emission permit portfolio buying when they are in permit shortage and selling when they are in permit excess.