MSc ETH UZH in Quantitative Finance

Master Thesis

Pricing of a derivative contract hedging an environmental investment

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Abstract

Environmental investments, which are still recent and unknown, need a safe and appealing structure for potential investors. The EU ETS market and the ERPA contracts offer this possibility. These are derivative contracts between the buyer and the seller of an environmental investment. They take every aspect of the investment into consideration and cover the risks taken by both parties. This thesis presents one of these derivative contracts called corridor contract, especially suited for anti-deforestation projects. The payoff of a corridor contract depends on an interval of gas emission rate fixed in advance. This form of payoff helps decreasing the deforestation by giving people a financial motive to stop cutting and start selling carbon credits instead. The underlyings of this product are CER spot prices and lumber prices. Using historical data, both of them will first be modelized with two independent calibrated geometric Brownian motions. The finite element method will then be used to price this contract. This method consists of turning the problem into a stochastic differential equation and solving it by discretizing in space and in time. The computing is done using MATLAB. Under several assumptions, we find that the price for a 2-year project in Guatemala is €1.5 million. Finally, a sensitivity analysis shows how variable this result can be with respect to some parameters.