Optimal investment with counterparty risk: a default-density approach

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We consider a financial market with a stock exposed to a counterparty risk inducing a jump in the price, and which can still be traded after this default time. This jump represents a loss or a gain of the asset value at the default of the counterparty. We use a default-density modeling approach, and address in this incomplete market context the expected utility maximization from terminal wealth. We show how this problem can be suitably decomposed in two optimization problems in a default-free framework: an after-default utility maximization and a global before-default optimization problem involving the former one. These two optimization problems are solved explicitly, respectively by duality and dynamic programming approaches, and provide a fine description of the optimal strategy. We give some numerical results illustrating the impact of counterparty risk and the loss or gain given default on optimal trading strategies, in particular with respect to the Merton portfolio selection problem. For example, this explains how an investor can take advantage of a large loss of the asset value at default in extreme situations observed during the financial crisis. Based on jont work with Y. Jiao (Paris 7).