

## Agent Based Models for Credit Spread Markets

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### ***Abstract***

We study the credit spread markets using models that could reproduce the time-series properties of credit spreads. There are two main approaches, (1) consider interest rates as random processes and the dynamics involved is formulated as stochastic differential equations and (2) solving for the spreads by assuming individual agents preferences. We consider the second approach. We consider a market where we have different agents that are interacting among themselves and forming the spread patterns in the market. Conventional economics studies equilibrium models and the equilibrium patterns that would induce no further reaction from the economic agents. In equilibrium economics, agents can make best guess of the future by using all available information which is also known as rational expectations. In reality, agents would continuously react to the patterns that they co-produced and the market would keep evolving to a new spread pattern. We model the economy by considering non-equilibrium economics. One way of adopting the features that are required for modelling non-equilibrium economics is Agent Based Models (ABMs). We Consider a set of heterogeneous agents with each agent has a set of different trading strategies that are ranked according to their performance in the spread market. Agents would update the ranking from time to time according to their performance in the trading. While the agents have been interacting and the generated patterns that they co-produce may match with the real credit spread time-series. But, this set of agents would represent just a particular scenario and we don't know a priori which scenario would be the best approximate fit (possible match) to the real credit spread time-series. We use Genetic Algorithms (GA) and search for the best possible scenario by considering usual fitness evaluation, reproduction, crossover and mutation operations in GA. It would be more interesting to understand the internal organisation of the economic agents. After finding the best ABM to a real credit spread time-series, we study the internal structure (for example, traders behaviour and their strategies in the market) of the credit spread market. For that we categorise the agents according to the incentives provided to them like minority agents, majority agents and the variations of them in the Econophysics literature. With the available categories, we study the agents behaviour in the credit spread market at various points in time.