

Machine learning project: Calibrate a model of OTC markets

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1 The project

The project consists in using machine learning to calibrate the OTC market model of Hugonnier, Lester, and Weill (2018, see [sfi-jh/HLW2](#)) to transaction level data coming out of the municipal bond market.

2 Data and objective

The data for the project is in the `.dat` files located in the `sugarsync` folder

`OTC-MLProject`

that I sent you an invitation to. In these files each line consists of 9 numbers: The first 8 are the input parameters $\theta \in \mathbf{R}^8$ and the last number gives the norm

$$\mathbf{O}(\theta) \equiv \|\mathbf{T}_{\text{data}} - \mathbf{T}_{\text{model}}(\theta)\|$$

of the difference between the data targets \mathbf{T}_{data} and the model-implied counterparts $\mathbf{T}_{\text{model}}(\theta)$ induced by the given vector of parameter values. The goal is to learn $\mathbf{O}(\theta)$ from the given set of data and then to determine the vector θ^* of parameters that minimizes this function.

The data used for learning the objective function was generated from the model by sampling uniformly over the hypercube

$$[0.2, 0.99] \times [0.2, 0.99] \times [-0.2, 1] \times [0.01, 1] \times [0.8, 4]^2 \times [-0.2, 1] \times [0.01, 1]$$

and the constraints that define the region of the parameter space in which to work are given by $\theta \in [0, 1]^2 \times \mathbf{R}_+^6$.