

# Functional Time Series Analysis and Its Application on Limit Order Book

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## Abstract

In this study, we use a vector functional auto-regressive model to analyze the supply and demand curves of a Limit Order Book (LOB) simultaneously. The supply and demand curves are represented by a linear combination of a set of B-spline basis functions. The corresponding coefficients of the B-spline basis functions are shown to follow a vector auto-regressive model, which can be applied to predict the future demand and supply curves. By computing the areas under the predicted supply and demand curves, we propose a trading strategy based on the LOB data. An empirical study is conducted with the AAPL, MSFT and SPY stocks. Numerical results indicate that the proposed trading strategy has satisfactory investment performance.

Keywords : area under curve , B-spline functions, functional autoregressive model, limit order book, vector autoregressive model.