Modelling and Forecasting Liquidity Supply Using Semiparametric Factor Dynamics

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Abstract

More and more exchanges do not only use electronic limit order books as organisational mean. There is also a recent trend towards giving traders access to the order book information. The limit order book is the major source of information when it comes to liquidity supply1 and is hence extremely important for liquidity risk mitigation.

As the two step functions depicting the order book - the bid and the ask curve - are defined by a high number of points whose location changes over time, the order book happens to be both a highdimensional and dynamic object. As a consequence statistical modelisation is difficult and we are currently unaware of attempts to overcome this problem in a directly data driven fashion. We propose the use of a Dynamic Semiparametric Factor Model (DSFM) that combines nonparametric flexibility with a lowdimensional factor model. We use the obtained factor functions and their loadings to describe and understand order book dynamics as well as for forecasting purposes.

Besides dimension reduction, we obtain economically interpretable factor functions and an easy and parametric model for factor dynamics. The so obtained order book forecasts can directly be applied to liquidity risk mitigation.