Abstract

In this thesis, we analyze new possibilities in predicting daily ranges, i.e. the differences between daily high and low prices. The main focus of our work lies in investigating how models commonly used for daily ranges modeling can be enhanced to provide better forecasts. In this respect, we explore the added benefit of using more efficient volatility measures as predictors of daily ranges. Volatility measures considered in this work include realized measures of variance (realized range, realized variance) and range-based volatility measures (Parkinson, Garman & Klass, Rogers & Satchell, etc). As a subtask, we empirically assess efficiency gains in volatility estimation when using range-based estimators as opposed to simple daily ranges. As another venue of research in this work, we analyze the added benefit of slicing the trading day into different sessions based on trading activity (e.g. Asian, European and American session). In this setting we analyze whether whole-day volatility measures reliably aggregate information coming from all trading sessions. We are led by intuition that different sessions exhibit significantly different characteristics due to different order book thicknesses and trading activity in general. Thus these sessions are expected to provide valuable information concealed in the aggregate volatility measure.

Next, we investigate the possibility to gradually update daily volatility forecasts by incorporating all up-to-date information. That means once a trading sessions ends its volatility and trading activity measures are used for updating the current day's volatility forecast. These updated forecasts exhibit very strong gains in terms of goodness-of-fit and thus short-term traders active in later sessions of the day can gain a significant advantage over traders active early in the day.

The array of models within which we investigate the aforementioned effects include the heterogeneous autoregressive model, conditional autoregressive ranges model and a vector error-correction model of daily highs and lows. Models performing well in terms of in-sample fit are challenged on out-of-sample, one-day-ahead forecasting. Contrary to results presented in literature, models based on co-integration of daily highs and lows fail to produce good quality forecasts. When one strives for the best one-day-ahead daily ranges forecasts a HAR model using realized ranges as predictors with a GARCH volatility-of-volatility component is the preferred option.