

## Stakeholder memo - Volatility Forecasting

### Introduction

We aim to forecast market volatility using advanced statistical and machine learning methods. Accurate volatility forecasts enable better risk management and improved derivative pricing strategies.

### Method

There are numerous methods that can be used to forecast volatility. They can be separated into several main categories, namely, autoregressive models, machine learning models, and deep learning models. Models can also be improved or combined. For example, the GARCH model evolves from the ARCH model, and LSTM addresses the vanishing gradient problem of RNNs. Ensemble and hybrid models can also be used to optimize performance.

### Deliverables

1. Preprocessed data
2. Models' specification and performance evaluation
3. Interpretation of these results

### Risk

There are some potential problems when using models to forecast volatility. To start with, financial data are hard to acquire, especially for higher frequency data. Data is also subject to changes and look-ahead bias, so the data quality is questionable. Financial data may not be

stationary and extra pre-processing is required. For machine learning models, extra care needs to be taken in order to avoid the model overfitting.