

Predictions in Financial Time Series

Allan Steel

Institute of Technology Blanchardstown

allan@allansteel.com

June 3, 2014

Contents

- 1 Introduction
- 2 Data
- 3 Technical Analysis
- 4 Time Series
- 5 Results

Introduction

- Technical Analysis
- Time Series Analysis

- Financial Data - time series
- Yahoo
- National Indices - geographical spread
- UK, Germany, France, US, Japan, Australia

OHLC Data

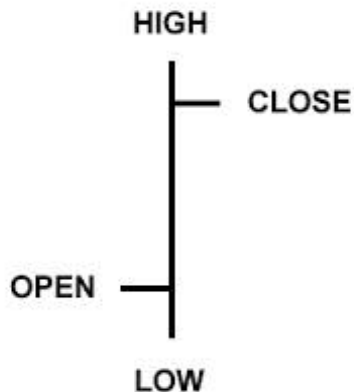


Figure: A schematic representation of open, high, low and closing prices (OHLC)

Table: Final 6 rows of the Dax data set

Date	Open	High	Low	Close
13/12/2013	9017	9047	8991	9006
16/12/2013	9005	9188	8998	9164
17/12/2013	9143	9162	9085	9085
18/12/2013	9145	9191	9122	9182
19/12/2013	9280	9352	9257	9336
20/12/2013	9371	9413	9353	9400

German Dax Summary Statistics

Table: Summary statistics of the Dax data set.

Statistic	N	Mean	St. Dev	Min	Max
Open	3,621	5,858.36	1,559.40	2,203.97	9,752.11
High	3,621	5,906.70	1,561.17	2,319.65	9,794.05
Low	3,621	5,804.85	1,557.49	2,188.75	9,714.02
Close	3,621	5,857.74	1,559.39	2,202.96	9,742.96

German Dax 2000 to 2013

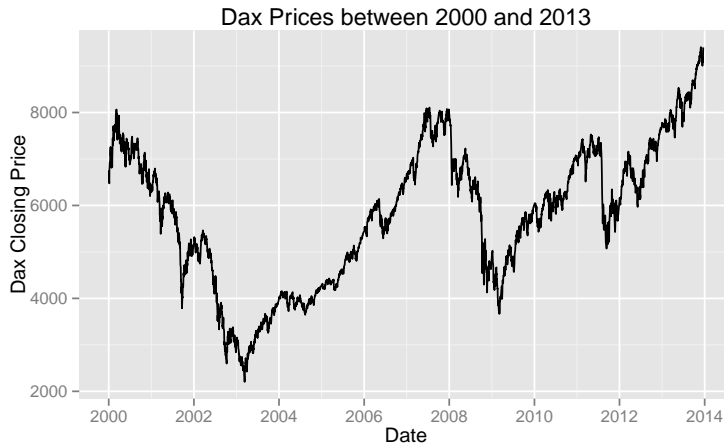


Figure: Graph of German Dax in 2013.

Technical Analysis

- Technical analysis is the study of historical prices
- Practitioners of technical analysis in the past were referred to as chartists
- all that was needed to know about a particular market was contained in its pricing chart

Murphy defines technical analysis as:

“Technical analysis is the study of market action, primarily through the use of charts for the purpose of forecasting future price trends.”

"Obviously I am biased against the chartist. This is not only a personal predilection, but a professional one as well. Technical Analysis is anathema to the academic world. We love to pick on it. Our bullying tactics are prompted by two considerations: (1) the method is patently false; and (2) it's easy to pick on. And while it may seem a bit unfair to pick on such a sorry target, just remember: it is your money we are trying to save."

- ARIMA
- Hybrid ARIMA

- Plot the data to get a general feel for the time series and to establish if it is stationary.
- Stabilize any variance in the data with a transformation process such as the Box-Cox method.
- Arima models work with stationary data, so if necessary, take differences of the data until it is stationary.
- Examine the auto-correlation and partial auto-correlation (ACF/PACF) plots in order to determine if an $AR(p)$ or $MA(q)$ model is appropriate.
- Test the chosen model(s), using the AICc to determine if a better model is available.
- Check the residuals from the best model by plotting the ACF, and doing a portmanteau test on them. If the results from these tests do not look like white noise, a modified model may be required.
- Finally, once the residuals have a similar pattern to white noise, the model can be used to generate forecasts.

- Introduction
- Data

The End