Bachelorseminar

Finanzmarktmodellierung

1 Bankruptcy Prediction

The risk of default is an important factor for investors, as it is usually linked to a total loss of payments in the event of bancruptcy. Consequently, predicting the occurrence of this event can help prevent and limit losses of investors. The risk of default and level of financial distress can be described by fundamental firm-level variables which in turn can be used to model the probability of default. In this topic you will apply machine learning techniques on a dataset to predict bankruptcy. Start might be Altman (1968) and Zikeba et al. (2016).

2 Stylized Facts of Asset Returns

Empirical returns show characteristic statistical properties (so-called *stylized facts*), such as the occurrence of fat tails in the distribution of returns or the presence of volatility clusters. Provide an overview of various stylized facts and investigate their occurrence using appropriate statistical tests among others on a real dataset. Start might be Buchanan (2012) and Taylor (2005).

3 Crypto Assets

In this topic you give an introduction to price efficiency, the efficient market hypothesis (EMH) and a description of the crypto-market. Construct a dataset which contains of several crypto-currencies and perform different price efficiency tests to test your hypotheses. Furthermore, examine the thesis of whether cryptocurrencies are a "safe haven" versus stocks. Start might be Urquhart (2016).

4 GARCH Models

In this topic you give an introduction to GARCH models in finance. Further, you construct a dataset containing daily stock prices different stock market indices such as the S&P 500. Fit GARCH model of different orders to the time series and evaluate the in-sample and out-of-sample (forecasting) performance. Start might be Christian Francq (2019).

5 Credit Card Clients and their Probability of Default

In recent years, financial institutions over-issued credit cards to unqualified customers leading to high accumulated credit card debts and crisis. From the perspective of risk management, uncertainty about the repayment ability of credit card users is crucial. On a given dataset you are modeling the probability of default of credit cardholders taking over 30,000 observations into account. Which variables are significantly being the strongest predictors of customer default? Before, you shed light on the literature dealing with probability of default in the context of credit card holders. Start might be Ma (2020).

6 Economic Narratives

Narratives in society define our daily lives and also impact each individual's financial decisions. Provide insight into the topic area of narratives in economics and finance (Shiller, 2017). Illustrate the impact on economic fluctuations with examples. Address the question of whether narratives can be modeled similarly to the spread of epidemics.

7 ESG Ratings and Firm Size

ESG ratings are used to measure firm's environmental, social and governance (ESG) performance or risk. These ratings are mostly based on information provided by the company. In this respect, larger companies usually have a resource advantage over smaller companies that do not have the capacity for an ESG committee or a separate ESG report, for example. Investigate the impact of firm size on the ESG ratings using an actual dataset. Start might be Drempetic et al. (2020).

8 Financial Fraud Detection

Economically, financial fraud is becoming a serious problem. A striking case is the Ponzi scheme perpetuated by Bernard Madoff, former NASDAQ chairman, which has led to the loss of around US$50 billion worldwide. For this topic you examine several data mining techniques to detect financial fraud. Start might be Ngai et al. (2011).

9 Performance Measures

Various performance measures exist in order to evaluate the performance of a portfolio. Give an overview of different metrics and examine the rank correlation between these on a real dataset. Answer the question whether investment decisions can be made only based on the Sharpe ratio. Start might be Marhfor (2016).

References

Altman, Edward I (1968). "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy." In: *The journal of finance* 23(4), pp. 589–609.

Buchanan, M. (2012). "It's a (stylized) fact!" In: *Nature Physics* 8 (1).

Christian Francq, Jean-Michel Zakoian (2019). *GARCH Models.* ISBN: 9781119313571.

Drempetic, Samuel, Christian Klein, and Bernhard Zwergel (Nov. 2020). "The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review." In: *Journal of Business Ethics* 167.

Ma, Yuhan (Jan. 2020). "Prediction of Default Probability of Credit-Card Bills." In: *Open Journal of Business and Management* 08, pp. 231–244.

Marhfor, Ahmed (Jan. 2016). "Portfolio Performance Measurement: Review of Literature and Avenues of Future Research." In: *American Journal of Industrial and Business Management* 06, pp. 432–438.

Ngai, Eric WT et al. (2011). "The application of data mining techniques in financial fraud detection: A classification framework and an academic review of literature." In: *Decision support systems* 50(3), pp. 559–569.

Shiller, Robert J. (Apr. 2017). "Narrative Economics." In: *American Economic Review* 107(4), pp. 967–1004.

Taylor, Stephen J. (2005). *Asset Price Dynamics, Volatility, and Prediction.* STU - Student edition. Princeton University Press. ISBN: 9780691134796.

Urquhart, Andrew (2016). "The inefficiency of Bitcoin." In: *Economics Letters* 148, pp. 80–82. ISSN: 0165-1765.

Zikeba, Maciej, Sebastian K Tomczak, and Jakub M Tomczak (2016). "Ensemble Boosted Trees with Synthetic Features Generation in Application to Bankruptcy Prediction." In: *Expert Systems with Applications.*