Applied Credit Risk Modelling Seminar – Spring Semester 2022

Developing a Default Rate (DR) model:
Time series Probability-of-Default (PD) modelling for mortgage lending

1. Overview

The goal of this assignment is to get a thorough understanding of time-series PD modelling and to familiarize oneself with Default Rate forecasting modelling approaches. The portfolio used for this assignment is a mortgage portfolio (i.e., retail financing), however the modelling techniques in scope can be applied to a broad range of asset classes (SMEs, large corporates, specialized lending, other retail, banks & financial institutions, etc.) with the inclusion of different risk drivers.

2. Assignment

1. Give a general overview on default rate modelling (definition, applications, literature review, regulatory purpose)
2. Read the papers from Li Mingxin and Muellbauer et al.
3. Compare the historical default rates of the two countries and provide some commentary
4. Use the provided data to build a default rate forecasting model for each country. The model should be trained with the aim to optimize forecasting accuracy in and out of sample. Different modelling methods can be explored (linear regression, logistic regression). The economic rationale of the chosen models needs to be assessed.
5. For each model the respective statistical assumptions and diagnostics should be analysed and compared. Statistical limitations/pitfalls should be outlined (multicollinearity, heteroskedasticity etc.) along with potential corrective actions. The macroeconomic variables provided can be used as explanatory variables in the model either in their initial form or after applying economically intuitive variable transformations (i.e., moving averages, binary transformations, lags).

3. Data

The data consists of default rates (or delinquency rates) from mortgage portfolios in the UK and US, as well as of macroeconomic variables (risk factors) from the respective countries which are to be used as explanatory variables. Note that if an extension of the dataset is deemed necessary, additional macroeconomic variables can be found in the national official statistics offices.

The frequency of the provided data is quarterly, however in the modelling the data can be aggregated to annual.

4. References

Mingxin, L., 2014. Residential Mortgage probability of Default Models and Methods. Financial Institutions Commission, Research Paper.

Aron, J., & Muellbauer, J. (2016). “Modelling and forecasting mortgage delinquency and foreclosure in the UK.”. Journal of Urban Economics, 94, 32–53. https://doi.org/10.1016/j.jue.2016.03.005