Risk Modeling and Model Risk – the IRBA Case

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Abstract Recently, the Basel Committee launched *International Convergence of Capital Measurement and Capital Standards* (CMCS), BIS (2004), a revision of the Basel Accord from 1988 which is the output of a project known as Basel II. Especially for rating systems the CMCS contain a number of qualitative and quantitative standards a financial institution has to fulfill in order to calculate regulatory capital requirements by means of an internal ratings based approach (IRBA). Among the relevant parameters is e.g. the probability of default (PD). Its application prerequisites an approval by the competent regulatory authority, typically done through an on-site examination. At the heart of the quantitative requirements are the model building and validation processes.

Whereas statistical methods are commonly used for consumer credits since the mid 80ies, see Hand (1997), Thomas et al (2002) for an overview, statistical models have only recently been applied to other areas of credit business. This paper focuses on the application of logistic regression models to a real life portfolio of corporate clients with a data history of ten years.

Most financial data which are used as (multivariate) inputs in rating systems are prone to missing values and outliers, see Hand (1997) and Siddiqi (2006). Our data are mainly prone to contamination from mis-keyed values. The problems an auditor is facing due to this contamination is the starting point of our paper.

Logistic regression is sensitive to contamination, see Pregibon (1981) and Coppas (1988). Defaults of corporates are rare events. Hence validating rating systems by well-known methods such as ROC curves or alike is difficult, see Thomas et al (2002). According to our audit strategy we used the institution's data and re-estimated its model completely.

We compare four different approaches to modifying the mis-keyed observations in the underlying data set. Given these we highlight their impact on the ratings derived from the rating model.

In order to emphasize the practical relevance of this data cleaning, we benchmark the four approaches against a commonly used stress-test, where all creditors are down-graded by one notch.

In addition to this analysis we consider diagnostic plots in order to identify influential observations that may deserve further consideration. This paper exemplifies how statistical methods may be applied not only within the credit process but also for auditing purposes. Last but not least the paper gives insights into regulators´ model approval process under Basel II.

References

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