Lombard lending: Modeling lending values

Hubert Mrugala and Wenqi Li | 22.04.2021

We have conducted a project that assesses lending values in the lombard lending business. Lombard credit is a type of loan that is backed by a liquid financial asset that is called collateral. The value of the credit can be drawn up to a percentage of the market value of the pledged asset, i.e. lending value.

In our approach we follow Juri (2014)*, and test the model on 20 individual equities that constitute the Swiss Market Index. In the analysis, we focus mostly on 4 stocks: Credit Suisse, Richemont, Swisscom and SGS. For these stocks we provide detailed statistic measures and then apply the model mentioned in the paper. Calculations were done for both the standard model and the model adjusted for liquidity. For simplicity, we assume the client does not react on the margin call, thus the counterparty credit risk has been ignored. We also backtest the standard model for 24 different contracts with an assumption that the bank exposure is constant over the loan period. Further, we discuss pros and cons of the model, its limitations and possible extensions.

For the adjusted model, the liquidity parameter is estimated through tick trading data. Under the assumption of Geometric Brownian Motion, the liquidity can be analyzed through a linear regression. Alternatively, the liquidity parameter can be estimated through Average Daily Trading Volume (ADTV). Through modelling with 3-month tick data for four Swiss stocks, it is proven that the ADTV method provides a very good approximation to liquidity parameter from using tick data with $R^2 = 0.983$. The ADTV method is chosen in our further analysis due to the easiness of data approach and simpler, but still high-quality results.

For the period of the last three years among the four equities the Swisscom stock seems to be the most stable one with the lowest standard deviation, Value at Risk and CAPM beta. If we'd have to rank the equities from the one of the highest quality to the one of the lowest only on the basis of their statistics, it'd be the following: 1) Swisscom, 2) SGS, 3) Richemont, 4) Credit Suisse. When it comes to the lending values, the model gives the same ranking with lending values 90%, 89%, 84%, 79% respectively. When we adjust for the liquidity and test for a high number of asset fire sales, then the Credit Suisse stock gives the best results, as it is the most frequent traded asset in the sample of four equities.

The model applied for the collateral is geometric Brownian motion. It assumes the log returns of the stock are normally distributed and the drift and volatility terms are constant, which is not true on the stock market. The distribution is often heavy-tailed and the volatility is not constant. We suggest three possible extensions a) local volatility model, b) stochastic volatility, c) Merton's model with jumping process. Each has its own advantages and drawbacks. Additionally, the model under the geometric Brownian motion is suitable only for one type of collateral. In a multi-collateral case, the collateral portfolio can contain securities which have different stochastic processes. In that case, it is required to add new stochastic components and stochastic processes to model lending values.

* Alessandro Juri, 2014. "Lending Values and Liquidity Risk," Journal of Applied Finance & Banking, SCIENPRESS Ltd, vol. 4(1), pages 1-12.