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Credit Risk and LGD Modelling

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Abstract

This paper deals with the methods for estimating credit risk parameters from market prices, e.g. Probability of Default (PD) and Loss Given Default (LGD). Precise evaluation of these parameters is important not only for bank to calculate their regulatory capital but also for investors to price risky bonds and credit derivatives. In this paper, we introduced reduced-form analytical methods for the calculation of LGD to pricing Credit Default Swaps. Reduced-form credit risk models were introduced as a reaction to structural approach, especially trying to decrease informational difficulty when modelling credit risk. In the reduced-form approach, the market value of defaulted bonds is the same as in the fraction recovered from the exposure at default. We use the face value convention, which Hull & White (2000) presented in their model which extended recovery of face value convention for coupon bonds.

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1. Introduction

Credit risk is the oldest form of the risk in the financial market. Credit risk, or the risk that money owed is not repaid, has been prevalent in banking history. Credit risk is the most important risk type that has been present in finance, commerce and trade transactions. Credit risk techniques have undergone significant development in recent decades. This had led to the development of new methods for the estimation of the potential bankruptcy of borrowing entities and parameters specifying possible losses. These parameters include Loss Given Default.

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The LGD “means the ratio of the loss on an exposure due to the default of a counterparty to the amount outstanding at default.” This ratio is required to be estimated by banks. Reduced-form models, unlike structural-form models, do not condition default on the value of the enterprise value not be estimated to implement them. This paper is mainly focused on reduced-form approach to pricing credit default swaps (Klieštík, Lyakin & Valášková, 2014).

2. Definition and basic characteristics of the LGD

Provide the clear and accurate definition of the default is not easy. Each financial institution can differently specify the situation where the client is already in default. Different situations which can be regarded as a failure of the debtor then offer a space to the different definitions of default. Default can be defined as delay in repayment of interest or the situation when it is clear that the risk of losses will occur (Kollár & Klieštík, 2014).

Which will be the loss in the case of partners default? It is the one of the question which is important for banks or other financial institutions. Naturally, after the less or more excepted situations that affect the financial sector and also after the development of the new financial instruments, there is fear from outstanding debts and possible debtor default.

Moody's (2005, p.39) definition of default is “any missed or delayed disbursement of interest or principal, including delayed payments made within a grace period, if issuer files for bankruptcy or legal receivership occur. Distressed exchange arises when (i) the issuer offered bondholders and new security that amounts to a diminished financial obligation or (ii) the exchange had the apparent purpose of helping the borrower avoid default.

Another definition of default which was presented by BCBS (2005, p. 96) is: “a default is considered to have occurred with regard to a particular obligor when either one of both of the following events have taken place.

- The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realising security.
- The obligor is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered of a limit smaller than current outstanding. “

There are also many ways to define the credit risk. The most used definition is “credit risk is the default risk results from the unwillingness or inability to pay the debt” (Cisko & Klieštík, 2013). There are three parameters of credit risk and also three main ingredients in Basel model II (Engelmann & Rauhmeier, 2006):

- Probability of Default, PD: is the financial term describing the likelihood of a borrower's defaulting over a particular time horizon. It provides an estimate of the likelihood that a client of a bank or financial institution will be unable to meet its debt obligations.
- Loss Given Default, LGD: expressing percentage of exposure which will be not recovered after counterparty's default.
- Exposure at Default, EAD: this term estimating outstanding exposure at the time of default.

3. LGD modelling

Modelling the default risk is an important problem in theory and also in practice of banking and finance. There two basic credit risk pricing models, structural and reduced-form model. These models are based on financial theory, focusing on the financial structure, cash-flow analysis or market prices (Gavláková & Klieštík, 2014).

The structural-form model was first introduced by Black & Sholes (1973) and Merton (1974). Merton model is using the theory of option pricing presented by Black and Scholes. Also know structural model for assessing credit is the Gambler's ruin model. In the structural model, the credit event is modelled as the hitting time of a barrier by a process adapted to the information flow. The intuition of this model is that the company defaults when the value of its assets is lower that of its liabilities when the debt matures. More specifically, the default of the firm is triggered by the event that the asset value of the firm below a certain threshold level related to the liabilities of the firm.

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