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CREDIT DERIVATIVE AS A TOOL FOR TRANSFERING CREDIT RISK

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The credit derivative is an important and relatively new mechanism for transferring credit risk. It is a tool for transferring credit risk between two parties by means of bilateral agreement. In real life a variety of foundations have natural needs to manage or reduce their credit exposure. The parties to the agreement have different motives for taking a positive or a negative position at a particular time. The fundamental feature of the credit derivative market – since the application range of the traditional instruments such as bonds and loans is limited and they do not offer the appropriate level of flexibility – is that the parties to the agreement can easily alter their credit risk without actual asset transfers.

The credit derivatives market was originally created in the early 1990s in London and New York. According to the April 2007 report of the International Swap and Derivatives Association (ISDA) the estimated size of the market was $35.1 trillion in 2006. The credit derivatives market experienced rapid growth in recent years. Nowadays, it is facing instability caused by the developments in the US real estate market.

One of the most significant developments in financial markets in recent years has been the creation of liquid instruments in the credit market. The base among these instruments is formed by CDS index tranches. The main traded CDS indices are consolidated into a single family under the names DJ CDX and DJ iTraxx and managed by International Index Company. Every six month a new rebalanced index is launched and associated "on-the-run" securities are issued. The indices are created for main currencies, investment grade and non-investment grade credit and the main regions. The securities on the main indices are available at five and ten year maturities.

CDS index tranches are synthetic collateralized debt obligations (CDO's) based on CDS indices, where each tranche references a different segment of the loss distribution of the underlying CDS index. The main advantage of index tranches relative to other CDOs is that they are standardized.

The determination of credit portfolio loss distributions is significant for the valuation and risk management of a credit derivatives portfolio. Default correlation is one of the main drivers for portfolio loss. To evaluate default correlation two popular credit risk models are widely used: the Reduced Form Model and the Structural Model. Since the default of one obligation may affect another, we use a normal copula function approach to model the dependence structures between defaults of the obligations, assume N obligors, constant correlation matrix with the only parameter $0< \rho < 1$ for all assets.

The Reduced Form Approach models a time of default τ as a time of the first jump of Poisson process. In this setting the fundamental object of modeling is the stochastically varying instantaneous rate of default $\lambda(t)$. Having the marginal default probabilities of all times of defaults and using the normal copula function, we can estimate the default distribution for obligors by generating N independent uniform random variables U_i on $(0,1)$ from N-dimensional Gaussian copula. Given individual spreads and recoveries we calculate instantaneous rates of defaults and therefore the survival function looks as follows:

$$\gamma_i(t) = \ln S_i(t) = -\lambda_i \cdot t$$

and the simulated default time for each obligor is

$$\tau_i = \inf\{t > 0 : \gamma_i(t) \le \ln U_i\}$$

The Structural Approach assumes that the assets of the different firms or companies follow a correlated stochastic process, representing the total value of assets. When the value of an asset falls below a certain threshold, the firm is considered to be in default. We assume that the firm value of each credit is driven by two main components: systematic risk Z that represents general state of the business cycle and idiosyncratic risk ε_i that reflects the events linked to the credit itself.

Therefore the risk driver of i^{th} credit in the portfolio is

$$X_i(t) = \sqrt{\rho} Z + \sqrt{1-\rho}\varepsilon_i$$

where Z, ε_i are independent Gaussian random variables, $i \in \{1,..., N\}$ and X_i are normally distributed with zero mean and unit variance. ρ is assumed to be the same for all obligors.

The default threshold is given by

$$F_i(t) = P(\tau_i \le t) = P(X_i \le K_i) \qquad X_i = N(0,1)$$

$$K_i = \Phi^{-1}(F_i(t))$$

$F_i(t)$ - default probability of i^{th} obligor

where conditional default probability is

$$p_i^{i|Z} = P(X_i \le K_i \mid Z) = \left(\varepsilon_i \le \frac{K_i - \sqrt{\rho} \cdot Z}{\sqrt{1-\rho}} \mid Z \right) = \Phi\left(\frac{K_i - \sqrt{\rho} \cdot Z}{\sqrt{1-\rho}} \right)$$

With the development of a liquid market for standardized CDO tranches it became obvious that the simple one factor Gaussian copula model is not able to reflect the real world picture. Over the last years, this has driven the interest of developers and practitioners to new tools and models that could be more reliable. The next step in this direction was the introduction of the Implied Correlation Approaches .

Conclusion

The credit derivatives market itself is a relatively new part of capital markets. Presently, there exist two main approaches which model credit risk: the Structural Approach that is based on diffusion of a firm's value and the Reduced Form Approach based on the concept of hazard rate. Both models have advantages and disadvantages over each other. The choice for one or the other model should be made based on the particular situation. The concept of implied correlation is a significant step towards creating more sophisticated models that are capable of capturing real life problems more efficiently.