Structural Pricing of Bilateral Counterparty Risk including Funding Costs: the XVA's for Energy-Commodities OTC deals

Vincenzo Eugenio Corallo
Ph.D Student in Finance and Economics
Doctoral School of Economics - Sapienza University of Rome
Via del Castro laurenziano 9, 00161 Rome
vincenzo.corallo@uniroma1.it

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Extended abstract

The 2008 global financial crisis reavealed no economic entity can be considered *default-free* anymore. For this reason, both banks and corporates have to deal with bilateral counterparty risk in their OTC derivatives trades. Since the mainstream approach has been to evaluate derivative claims in terms of the cost for their hedging, the pricing of Counterparty Credit Risk is inherently related with the way it is financed. In the light of the exceptional growth of credit spreads it has been observed during the crisis, the impact of funding costs on the balance sheet of major dealers has been massive. Among others, J.P. Morgan Chase in its Q1 2014 public report declared Funding Value Adjustments (FVA) had been accounted for $ 1.5 billions. With the accordance of consultancy firms, FVA's have been accounted as additive price corrections. Nevertheless, the debate on funding costs is still ongoing bacause of their non simmetry, non linearity and non pure additivity. Their nature of value adjustment or profitability analysis tool has still to be clarified. Differently from the more commonly used reduced form models, in this work the random default time is addressed within a structural approach à la Black-Cox (1976), i.e. the bankruptcy is modeled as the first time in which the firm equity value hits a lower fixed barrier. In addition, it is has been followed an approach in line with Fusai and Ballotta (2015), who proposed a multivariate time-changed Lèvy process as underlying source of

both market and credit risk. The inclusion of such a skewed, leptokurtic pure jump stochastic process is motivated by its superior capability to replicate non null short-term default probabilities compared to the Brownian Motion. Through the application of asset pricing principles it has been derived a general expected value representation of default value adjustments easy to interpret from an economic point of view.

In a toy case study, a numerical exercise has been performed in order to compute the correction for Counterparty Default Risk focusing on derivative claims issued on most liquid commodity assets negotiated in the Chicago Mercantile Exchange (CME). Because of the pure jump nature of the underlying risk drivers, it has required the use of the Fourier Cosine Series (COS) method for calibration purposes. Once obtained vectors of calibrated parameters, the hybrid nature of the present methodology is configurated by the use of a joint Monte Carlo simulation of defaults.

Keywords
counterparty credit risk; XVA; pricing; hedging; replicating strategies; sensitivities; jumps

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