Option to Default: Counterparty Credit Risk in OTC Derivatives

Dr. Lourenco Miranda, U.S. Bank – Corporate Treasury Minneapolis, MN
Dr. Swati Agiwal, U.S. Bank – Corporate Treasury Minneapolis, MN

Many financial institutions incurred significant counterparty credit risk (CCR) losses in their trading of over-the-counter (OTC) derivatives transactions during the appalling market disruption of 2008-2009. These losses were mainly due to direct defaulted counterparties or from credit valuation adjustments (CVA) related to mark-to-market losses on non-defaulted counterparties. In particular, the Lehman default and its aftermath amplified the focus of market participants on the matter of CCR in trading books.

With that in mind, the Basel Committee on Banking Supervision (BCBS) published a consultative paper (CP) in December 2009 that intended to remedy certain concerns that emerged during the financial markets crisis, which the Basel II capital adequacy framework did not fully addressed.

One such issue is high potential losses from CCR at individual financial institutions and in the broader financial sector. After the consultative period, the Committee issued in June 2011 – in its revised and latest version – a series of reform measures, popularly called Basel 3, to strengthen the regulation, supervision and risk management of the banking sector. These measures aimed to: improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source; improve risk management and governance; and to strengthen banks' transparency and disclosures.

To illustrate the CCR concern, let’s consider the case where a prime-quality (in terms of credit risk) dealer enters into an OTC derivative where it purchases a potentially positive a cash flow from a sub-prime counterparty and sells an identical cash flow back to another prime quality dealer for the same price. Without any counterparty risk consideration the dealer makes no profit/loss.

However, in reality, this intermediary dealer has a loss due to the disparity in counterparty risk that it maintained and did not pass to the other prime quality dealer.

To assess the adjustment, one general analogy to this discrepancy value is to assume that the two counterparties implicitly sold each other an option to default on the trade. In this example, since the intermediary dealer has bought a positive cash flow, it has a positive receivable from the sub-prime counterparty. Since it is at risk of counterparty’s default, it has implicitly sold an option-to-default for which it never received the money.

Therefore, the dealer should “charge” its trader the value of this option-to-default.

On the other hand, the sub-prime counterparty has implicitly bought the same option-to-default for which it never paid. Based on the same accounting principle, it should give its trader the “benefit” equal to the charge applied to the dealer’s trader. Since the positive amount is represented as an asset on the dealer’s trading book, the charge by the dealer to this underlying trade is a receivable that was not charged and benefit given to the sub-prime counterparty is a payable that was not paid.

During a given period, either or both counterparties may default. Should that happen, the net exposure of the portfolio, at the time of default, and the portion of the amount to be lost determines the risk of the surviving counterparty.

Therefore, in general, there are three contributing factors to counterparty risk: 1) credit risk measure of the counterparties, 2) the credit risk free market value of the portfolio and 3) recovery rates of both counterparties in case of default of any one of the two. To properly model the counterparty risk, all three should be viewed as stochastic variables with their interdependence considered.

The objective of this project is to review the literature pre and post financial crisis related to counterparty credit risk, and to propose a comprehensive modeling framework for the option-to-default post crisis, considering the three risk factors mentioned above, including a critical view of the different measures of counterparty exposure, and a proposal of how to hedge this type of “optionality” risk, specially for illiquid markets.

References:

1. Giovanni Cesari; Aquilina, J.; Charpillon, N.; Filipovic, Z.; Lee, G.; and Manda, I. - Modelling, Pricing, and Hedging Counterparty Credit Exposure: A Technical Guide (Springer Finance);

2. Jon Gregory, Counterparty Credit Risk: The new challenge for global financial markets (The Wiley Finance Series);

http://www.bis.org/bcbs/basel3.htm?ql=1 (General Basel 3)

http://www.bis.org/publ/bcbs189.htm (Basel 3 Final Paper)

http://www.bis.org/publ/bcbs209.htm (Basel 3 CCR FAQ)