

An Equilibrium Model for the OTC Derivative with the Counterparty Risk

Kazuhiro Takino*

October 18, 2013

1 Introduction

In this article, we propose a framework to analyze the derivative contract in the OTC derivative markets with the counterparty risk. *Equilibrium* in this study is supposed as an equilibrium of demand and supply. As a result, this study provides a microeconomic analysis of the OTC derivative market.

After the financial crisis in 2008, the counterparty risks have been concentrated in the OTC derivative markets. To hedge the counterparty risk, the importance of the credit charge has been recognized from practitioners. The credit charge is also called *Credit Valuation Adjustment (CVA)* in practice. The department to manage the credit/counterparty risk in the financial institution (often called *Credit Portfolio Management (CPM) Division*) charges the in-house trader the monetary amount of the CVA when the trader holds the positive exposure in the derivative contracts. Sorensen and Bollier (1994) firstly proposed a method to assess the counterparty risk for the interest rate swap. After that, the pricing models of the CVA have been offered in several papers up to now (e.g., Brigo and Masetti (2005), Fujii and Takahashi (2013), etc.).

Recall the credit charge is used to hedge the counterparty risk in the OTC derivative contract. The credit charge is thought of a sort of the cost to hedge such a risk. It is following that the credit charge is costly for the market participant who has the positive exposure. This leads that the credit charge might have an incentive such an investor to reduce the derivative contract to the counterparty who has the counterparty risk. On the other hand, as to the market participant with the negative exposure, she/he gets away from the payment of the charge since she/he has no counterparty risk. This amount is known as *credit benefit*, and it is posted as a profit from the derivative contract. For instance, Citi reported the profit of \$2.5 billion according to the widening of its CDS spreads in the first-quarter of 2009 (Citigroup (2009)). This implies that it is profitable for the market participant with the negative exposure to sign the derivative contract. The investor who has the negative exposure therefore wants to expand the related derivative contract. In any case, it is considered that the credit charge influences on the OTC derivative markets. At this point, Table 1 shows the monetary amounts of the commodity derivative contracts in the U.S. and Japan at the fourth quarter of each year (U.S. Data are released by the U.S. Department of the Treasury and Japanese data reported by Bank of Japan). The derivative contracts had increased from 2003 to the recent financial crisis for both markets. After the financial crisis in 2008, however, the contract

*Faculty of Commerce, Nagoya University of Commerce and Business, JAPAN. Email: takino@nucba.ac.jp