



# Counterparty credit risk and the credit default swap market<sup>☆</sup>

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## ABSTRACT

Counterparty credit risk has become one of the highest-profile risks facing participants in the financial markets. Despite this, relatively little is known about how counterparty credit risk is actually priced. We examine this issue using an extensive proprietary data set of contemporaneous CDS transaction prices and quotes by 14 different CDS dealers selling credit protection on the same underlying firm. This unique cross-sectional data set allows us to identify directly how dealers' credit risk affects the prices of these controversial credit derivatives. We find that counterparty credit risk is priced in the CDS market. The magnitude of the effect, however, is vanishingly small and is consistent with a market structure in which participants require collateralization of swap liabilities by counterparties.

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## 1. Introduction

During the past several years, counterparty credit risk has emerged as one of the most important factors driving financial markets and contributing to the global credit crisis. Concerns about counterparty credit risk were significantly heightened in early 2008 by the collapse of Bear Stearns, but then skyrocketed later in the year when Lehman Brothers declared Chapter 11 bankruptcy and defaulted on its debt

and swap obligations.<sup>1</sup> Fears of systemic defaults were so extreme in the aftermath of the Lehman bankruptcy that Euro-denominated CDS contracts on the U.S. Treasury were quoted at spreads as high as 100 basis points.

Despite the significance of counterparty credit risk in the financial markets, however, there has been relatively little empirical research about how it affects the prices of contracts and derivatives in which counterparties may default. This is particularly true for the \$57.3 trillion notional credit default swap (CDS) market in which defaultable counterparties sell credit protection (essentially insurance) to other counterparties.<sup>2</sup> The CDS markets have been the focus of much attention recently because it was AIG's massive losses on credit default swap positions

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<sup>1</sup> Lehman Brothers filed for Chapter 11 bankruptcy on September 15, 2008. During the same month, American International Group (AIG), Merrill Lynch, Fannie Mae, and Freddie Mac also failed or were placed under conservatorship by the U.S. government.

<sup>2</sup> The size of the CDS market as of June 30, 2008 comes from estimates reported by the Bank for International Settlements.

that led to the Treasury's \$182.5 billion bailout of AIG. Furthermore, concerns about the extent of counterparty credit risk in the CDS market underlie recent proposals to create a central clearinghouse for CDS transactions.<sup>3</sup>

This paper uses a unique proprietary data set to examine how counterparty credit risk affects the pricing of CDS contracts. Specifically, this data set includes contemporaneous CDS transaction prices and quotations provided by 14 large CDS dealers for selling protection on the same set of underlying reference firms. Thus, we can use this cross-sectional data to measure directly how a CDS dealer's counterparty credit risk affects the prices at which the dealer can sell credit protection. A key aspect of the data set is that it includes most of 2008, a period during which fears of counterparty defaults in the CDS market reached historical highs. Thus, this data set provides an ideal sample for studying the effects of counterparty credit risk on prices in derivatives markets.

Four key results emerge from the empirical analysis. First, we find that there is a significant relation between the credit risk of the dealer and the prices at which the dealer can sell credit protection. As would be expected, the higher the dealer's credit risk, the lower is the price that the dealer can charge for selling credit protection. This confirms that prices in the CDS market respond rationally to the perceived counterparty risk of dealers selling credit protection.

Second, although there is a significant relation between dealer credit risk and the cost of credit protection, we show that the effect on CDS spreads is vanishingly small. In particular, an increase in the dealer's credit spread of 645 basis points only translates into a one-basis-point decline on average in the dealer's spread for selling credit protection. This small effect is an order of magnitude smaller than what would be expected if swap liabilities were uncollateralized. In contrast, the size of the pricing effect is consistent with the standard practice among dealers of having their counterparties fully collateralize swap liabilities.

Third, the Lehman bankruptcy in September 2008 was a major counterparty credit event in the financial markets. Accordingly, we examine how the pricing of counterparty credit risk was affected by this event. We find that counterparty credit risk was priced prior to the Lehman bankruptcy. After the Lehman event, the point estimate of the effect increases but remains very small in economic terms. The increase is significant at the 10% level (but not at the 5% level).

Fourth, we study whether the pricing of counterparty credit risk varies across industries. In theory, the default correlation between the firm underlying the CDS contract and the CDS dealer selling protection on that firm should affect the pricing. Clearly, to take an extreme example, no investor would be willing to buy credit protection on Citigroup from Citigroup itself. Similarly, to take a less extreme example, we might expect the pricing of CDS

dealers' credit risk to be more evident in selling credit protection on other financial firms. Surprisingly, we find that counterparty credit risk is priced in the CDS spreads of all firms in the sample except for the financials.

These results have many implications for current proposals to regulate the CDS market. As one example, they argue that market participants may view current CDS risk mitigation techniques such as the overcollateralization of swap liabilities and bilateral netting as largely successful in addressing counterparty credit risk concerns. Thus, proposals to create a central CDS exchange may not actually be effective in reducing counterparty credit risk further.

This paper contributes to an extensive literature on the effect of counterparty credit risk on derivatives valuation. Important research in this area includes Cooper and Mello (1991), Sorensen and Bollier (1994), Duffie and Huang (1996), Jarrow and Yu (2001), Hull and White (2001), Longstaff (2004, 2010), and many others. The paper most closely related to our paper is Duffie and Zhu (2009) who study whether the introduction of a central clearing counterparty into the CDS market could improve on existing credit mitigation mechanisms such as bilateral netting. They show that a central clearing counterparty might actually increase the amount of credit risk in the market. Thus, our empirical results support and complement the theoretical analysis provided in Duffie and Zhu.

The remainder of this paper is organized as follows. Section 2 provides a brief introduction to the CDS market. Section 3 discusses counterparty credit risk in the context of the CDS markets. Section 4 describes the data. Section 5 examines the effects of dealers' credit risk on spreads in the CDS market. Section 6 summarizes the results and presents concluding remarks.

## 2. The credit default swap market

In this section, we review briefly the basic features of a typical CDS contract. We then discuss the institutional structure of the CDS market.

### 2.1. CDS contracts

A CDS contract is best thought of as a simple insurance contract on the event that a specific firm or entity defaults on its debt. As an example, imagine that counterparty A buys credit protection on Amgen from counterparty B by paying a fixed spread of, say, 225 basis points per year for a term of five years. If Amgen does not default during this period of time, then B does not make any payments to A. If there is a default by Amgen, however, then B pays A the difference between the par value of the bond and the post-default value (typically determined by a simple auction mechanism) of a specific Amgen bond. In essence, the protection buyer is able to put the bond back to the protection seller at par in the event of a default. Thus, the CDS contract "insures" counterparty A against the loss of value associated with default by Amgen.<sup>4</sup>

<sup>3</sup> For example, see the speech by Federal Reserve Board Chairman Ben S. Bernanke at the Council on Foreign Relations on March 10, 2009. For an in-depth discussion of the economics of CDS clearinghouse mechanisms, see Duffie and Zhu (2009).

<sup>4</sup> For a detailed description of CDS contracts, see Longstaff, Mithal, and Neis (2005).

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