Recent Trends in the Domestic Market for Credit Default Swaps (CDS)—Posting Theoretical Prices Based on Market Price Data

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In the past, prices of credit default swaps (the most basic type of credit derivative) were calculated from corporate bond spreads, which supposedly reflect the same credit risk. Unfortunately, calculated prices frequently diverged from actual prices. To improve CDS price data—a key part of the market infrastructure—QUICK Corp. and NLI Research Institute have jointly developed a CDS pricing model that incorporates actual CDS market price data. The theoretical prices obtained from the model closely approximate market CDS premiums. We believe that improving the accuracy of CDS pricing will contribute to the development of the CDS market.

1. Introduction

In recent years, the impressive growth of the credit derivatives market has attracted much attention. In particular, the global market for a basic credit derivative called the credit default swap (CDS) is estimated at over $12 trillion (notional amount) as of June 2005, and still growing vigorously. Japan's domestic market, while small compared to the U.S. and Europe, doubled in the most recent six-month period, from $51.0 billion in June 2005, to $98.0 billion in December 2005.

A key factor behind the domestic market's steady growth has been improvement in the market infrastructure. Disclosure was improved when several competing indexes were unified into one benchmark index called the Dow Jones iTraxx CJ in July 2004. Moreover, dealers now constantly update price quotes on a growing number of CDS contracts, and post prices for more maturities. Against this backdrop, QUICK Corp. and NLI Research Institute jointly developed a CDS pricing model, which QUICK Corp. is scheduled to launch as a new service in late June 2006.

2. Credit Risk and CDS

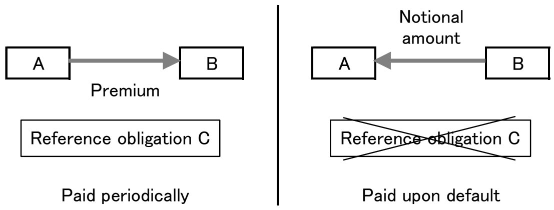
In financial transactions, credit risk refers to the risk that a creditor cannot recover debt when the borrower fails to meet contractual debt obligations. In addition, for financial assets such as corporate bonds and loans, it also includes the risk of indirect loss when market valuations decline in response to the credit rating.

In Japan's corporate bond market, it used to be customary for the bond underwriter—who also happened to be the bond issuer's main bank—to protect ordinary investors from losses in the event of bankruptcy by buying the defaulted bonds. But after the asset bubble burst in the early 1990s, bankruptcies proliferated, making it increasingly difficult for main banks to protect ordinary investors. The final straw came when Yaohan Japan defaulted on a convertible bond in 1997, followed by Mycal Corp.'s straight bond default in 2001. These defaults overwhelmed the main banks, forcing them to quit the practice of buying defaulted bonds from investors. Since then, main banks have avoided this practice.

As a result, investors have looked for other ways to reduce credit risk. One way is to use credit derivatives, and the most basic type of credit derivative with the highest volume is the CDS.

The basic transaction that occurs in a CDS is illustrated in Figure 1. The CDS seller (protection buyer A) pays a periodic premium over the contracted period to the CDS buyer (protection seller B). During the contracted period, as long as no credit event occurs to reference asset C, the protection seller pays nothing to the protection buyer; but if a credit event does occur, the protection seller must pay the contracted amount to the protection seller. There are several motives for using a CDS contract, such as investing in credit risk or speculation. But the most common motive is to hedge against credit risk. The CDS makes it possible to hold a reference asset while transferring the associated credit risk.

Figure 1 CDS Contract

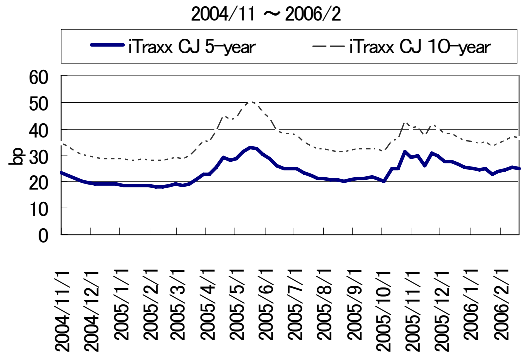


3. The Domestic CDS Market

To understand the domestic CDS market as a whole, we start by looking at market indexes. Figure 2 plots the iTraxx CJ CDS index for 5-year and 10-year maturities from November 2004 to February 2006. Following a flat period from late 2004, CDS premiums spiked twice in 2005—in April and May, and again in October and November—before declining moderately again.

An analysis of iTraxx CJ components reveals that the two spikes had different causes. The first spike in CDS premiums was broadly based in the market, while the second spike came from a sharp surge in specific names such as Sanyo Electric Co. and Japan Airlines.

Figure 2 iTraxx CJ Index



Source: QUICK ActiveManager

We next turn to major names in the domestic automotive industry to see whether Japan was affected by the surge in CDS premiums for U.S. automakers General Motors and Ford Motor Co. Figure 3 tracks the CDS premiums of Toyota, Nissan, and Honda.

As with the iTraxx CJ, there is a spike of 10～20 basis points from April to May 2005 for all three. However, by July the CDS premiums return to their pre-spike level and level off. The CDS premium for Toyota, who boasts a high AAA credit rating from Standard & Poors, never rises above 10 bps, and averages 5.66 bps for the period. Reflecting a three-year streak of record profits, Toyota enjoys a high credit quality. Nissan's CDS premium averages 16.96 bps for the period—slightly higher than Toyota and Honda—although Nissan's long-term bond credit rating recovered to BBB+ (S&P) as of May 2005 on strong business results. Honda's CDS premium lies in between, averaging 10.39 bps for the period. Considering the high credit quality of the three domestic automakers, the rise in CDS premiums cannot be explained by company-specific factors.

The spike in CD premiums of the three domestic automakers may have resulted from the credit downgrades of GM and Ford.[1] In May 2005,

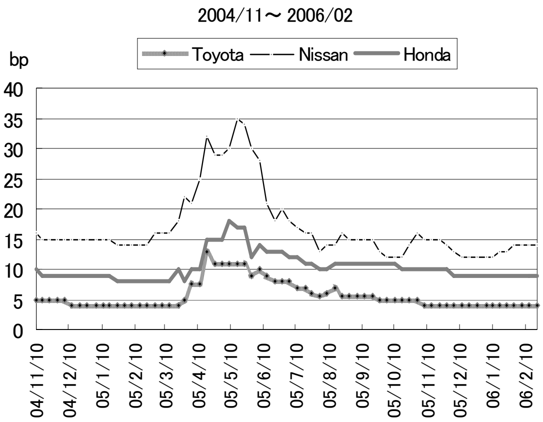
[1] Prompted by deteriorating earnings estimates reported in mid May 2005, both Moody's and S&P announced credit downgrades, temporarily boosting CDS premiums to 1,000 bps for GM and 800 bps for Ford.

S&P downgraded GM to a speculative BB rating.

With the downgrade, CDS premiums of both companies rose significantly. The higher credit risk of GM and Ford prompted steeper CDS premiums for both companies in western CDS markets, which may have spilled over to Japan's automakers.[2] When GM and Ford announced restructuring plans in June, CDS premiums of both declined.

CDS premiums of Japan's domestic automakers also responded by returning to previous levels. Indeed, Japan's domestic CDS market as a whole is very likely to have been impacted by the events at GM and Ford. In the next section, we consider the November 2005 spike in the CDS index.

Figure 3　CDS Premium of Automakers



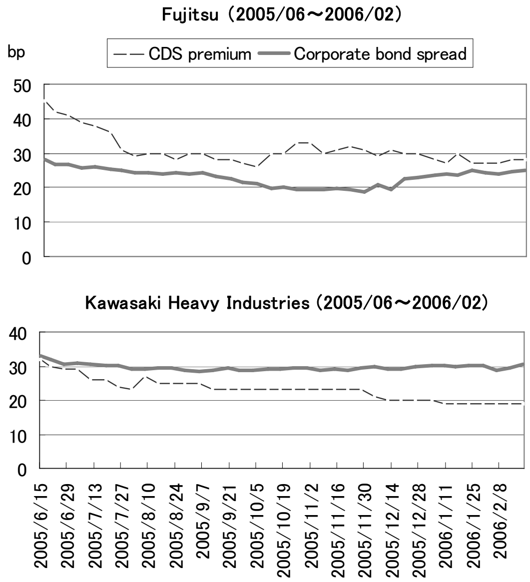
Source: QUICK ActiveManager

4. CDS Premium and Corporate Bond Spread

First, we examine the relationship between CDS premiums and corporate bond spreads, both of which are sensitive to credit risk.[3] Since the CDS premium and corporate bond spread reflect the credit quality of the same company, they should approximate each other. However, observed CDS premiums and bond spreads frequently diverge from each other by various amounts depending on the name. When the CDS premium exceeds the bond spread, the situation is referred to as a positive basis; conversely, when the CDS premium is smaller than the bond spread, there is a negative basis.

Figure 4 shows examples of a positive basis (Fujitsu, top), and negative basis (Kawasaki Heavy Industries, bottom).

Figure 4　Positive & Negative Basis



Source: QUICK ActiveManager

Theoretically, there is a stronger tendency for a positive basis to occur. One reason is the difference in default criteria between bond default and the credit events specified in CDS contracts.[4] Frequently, CDS contracts include not only bankruptcy and failure to pay, but restructuring as credit events.[5] As a result, CDS contracts carry a higher default probability than bonds, which pushes up the premium. In

[2] Rising CDS premiums were observed not only among automakers but throughout the domestic CDS market.

[3] The corporate bond spread is defined as the difference in yield between the corporate bond and JGB with the nearest time to maturity as the CDS contract.

[4] According to the ISDA (International Swaps and Derivatives Association), contracts can define three credit events (3CE; bankruptcy, failure to pay, and restructuring), or two credit events (2CE; bankruptcy and failure to pay).

[5] Restructuring events include reduction in interest payable, reduction in principal amount, and postponement of payment.

addition, CDS contracts carry a counterparty risk wherein the protection seller may fail to make the contingent payment when a credit event occurs to the reference asset. Also, some contracts feature a delivery option.[6] On the other hand, a negative basis may occur when CDS contracts have lower initial costs than corporate bonds, and when strong demand exists to use CDS contracts as a building block for more complex derivatives.

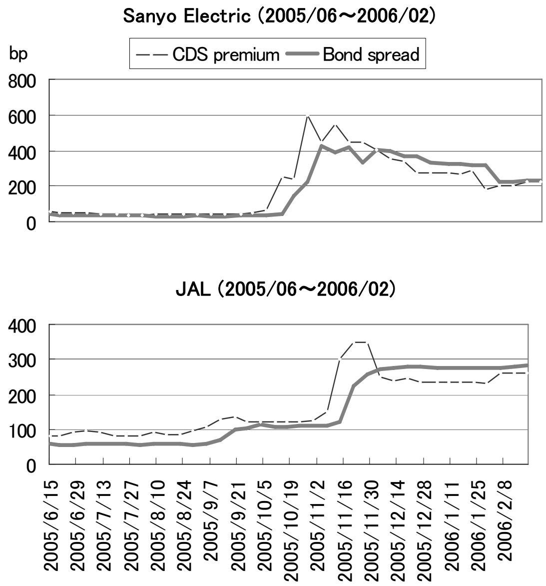
As we saw in Figure 4, the bond spread tends to be less volatile than the CDS premium. To examine the relationship between CDS premium and bond spread, we look at Sanyo Electric Co. and Japan Airlines (Figure 5). Premiums of both names attracted attention when they surged in October and November 2005. The CDS index also spiked at that time, despite relative calm in the broad market. Thus we surmise the cause of the spike can be attributed to these two issues.

Figure 5 shows the CDS premium and bond spread for Sanyo Electric and Japan Airlines from June 2005 to February 2006. Until September, Sanyo Electric's CDS premium fluctuated between 40 bps and 60 bps. But then expectations surfaced of a record mid-term loss, combined with a cloudy outlook for the restructuring of unprofitable operations. The premium spiked to 600 bps in mid October. In November, its credit rating was downgraded to a speculative rating (BB at S&P, and Baa2 at Moody's), keeping the CDS premium high at 400 bps to 500 bps. In Mid December 2005, a capital increase from financial institutions was announced, enabling the company to proceed with reorganization. As a result, the premium declined to 200 bps in early 2006, where it has stabilized.

As for Japan Airlines, earnings were squeezed by a decrease in passengers combined with rising fuel prices. As a result, a large net loss occurred in the mid-term, triggering a credit downgrade. The CDS premium, which had been stable at 100 bps, surged as high as 350 bps in mid November, and subsequently stabilized at a high level.

In both cases, CDS premiums responded immediately to the credit downgrades. Notably, bond spreads also reacted quickly to changes in the CDS premium. Although usually far less volatile than CDS premiums, bond spreads appear to be highly responsive in periods of stress. However, due in part to the time lag with CDS premiums, bond spreads can diverge from CDS premiums by up to several hundred basis points.

Figure 5 CDS Premiums of Sanyo Electric and JAL



Source: QUICK ActiveManager

5. Theoretical CDS Premium

Finally, we consider the rapidly growing need for CDS valuation methods (pricing). Previously, due to the lack of reliable CDS price data, parameters for calculating theoretical prices were obtained from corporate bond price data, which is readily available and also supposedly reflects the credit risk of the reference entity. But as we explained,

[6] If delivery is stipulated, the type and characteristics of the replacement instrument are stipulated at the start of the CDS contract. When a credit event occurs, the protection seller selects the appropriate replacement instrument from the available pool and delivers it to the protection buyer.

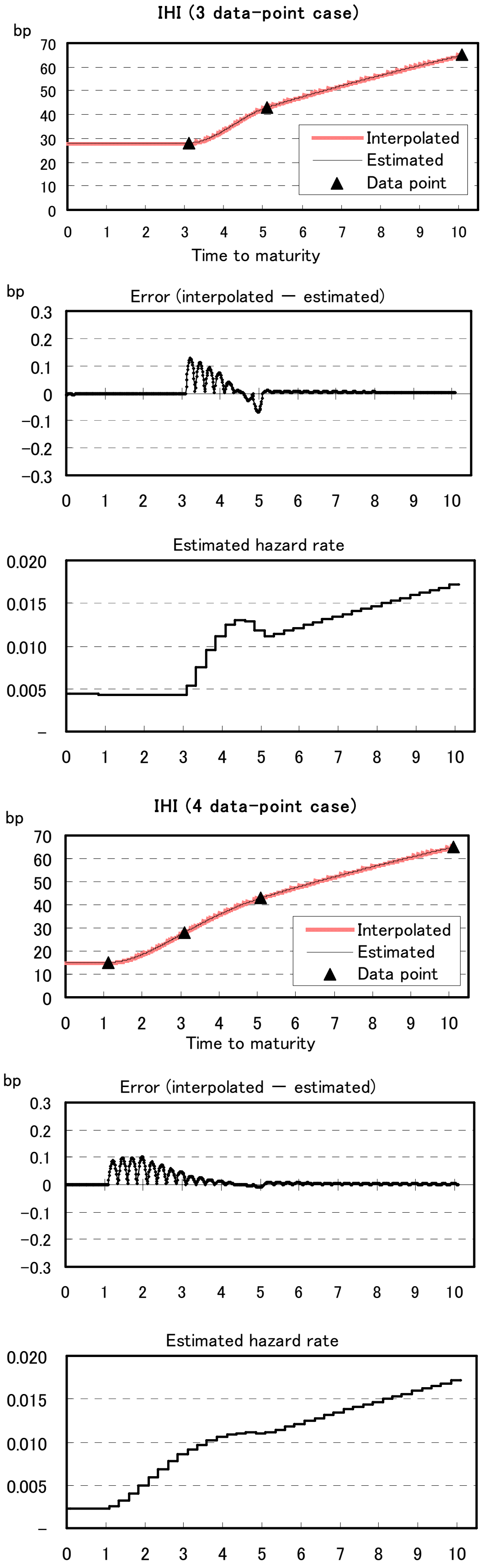
since bond spreads tend to diverge from CDS premiums, theoretical CDS prices obtained from bond spreads are not very accurate. Now, however, with CDS market prices becoming more available, it is possible to use CDS market data to theoretically price all types of CDS contracts with greater accuracy.

The basic approach to CDS pricing is no-arbitrage pricing theory.[7] In this approach, arbitrage opportunities are assumed to not exist, and the CDS premium obtains at a level that equalizes the present value of premiums paid by the protection buyer and the present value of the amount received by the protection seller.

Below we present a numerical example from our CDS pricing model. Based on CDS premiums observed in the market,[8] we interpolate a market CDS premium curve.[9] Once model parameters are set to recreate the CDS premium curve theoretically, the pricing model can then be used to estimate theoretical CDS prices for arbitrary conditions (premium, time to maturity, number of payments, etc.)

Figure 6 plots two CDS premium curve for Ishikawajima-Harima Heavy Industries Co. —one with three data points (top three graphs), and the other with four data points (bottom three graphs). In both cases, the interpolated CDS premium curve (calculated from market CDS prices) closely approximates the estimated premium curve (calculated from the hazard rate).[10] Since the difference between the two

Figure 6 Interpolated (Market) and Estimated CDS Premiums



Source: QUICK ActiveManager

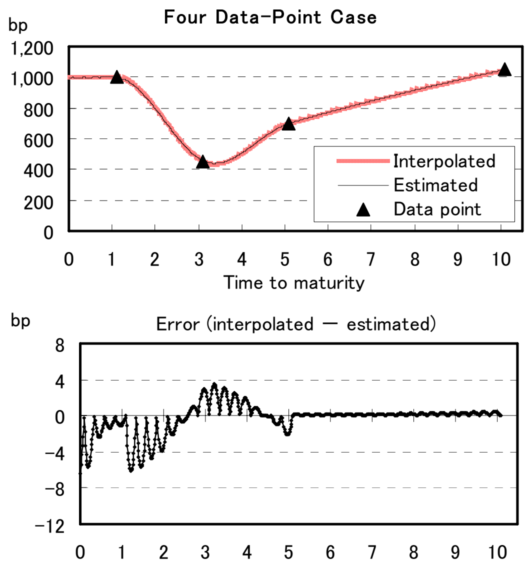
[7] An arbitrage opportunity exists when investors can earn risk-free profit. No-arbitrage pricing theory requires a consistent relationship among financial assets such that arbitrage opportunities do not exist.
[8] For a two data-point case, market data consists of 3-year and 5-year CDS premiums; for a three data-point case, it consists of 3-year, 5-year and 10-year CDS premiums; for a four data-point case, it consists of 1-year, 3-year, 5-year and 10-year CDS premiums. However, since 1-year CDS data is unavailable, we must set an arbitrary value.
[9] The 10-year curve was plotted based on CDS premiums of two to four different maturities, and in consultation with major market participants.
[10] Model parameters for the estimated CDS premium curve are calculated from the interpolated curve. The estimated curve depicts the current theoretical fair premium.

curves is very small, the error is plotted separately in the middle graph. Compared to the CDS premium, which is measured in double-digit basis points, the error is limited to a 0.1 basis-point range, indicating the accuracy of the model.

The bottom graph shows the hazard rate, which we estimated from the interpolated CDS premium curve.[11] The term structure of the hazard rate can be used to obtain the bond price. Considering the low volatility of domestic corporate bond spreads, our model suggests that CDS price data can also be used to calculate corporate bond prices.

Figure 7 shows a hypothetical CDS premium curve with an extremely high short-term CDS premium.[12] The four data points are 1,000 bps for a 1-year maturity, 455 bps for a 3-year maturity, 700 bps for a 5-year maturity, and

Figure 7 Hypothetical CDS Premium Curve



Source: QUICK ActiveManager

1,050 bps for a 10-year maturity. Unlike ordinary CDS premium curves, which increase consistently with maturity, this CDS premium curve is high at both the short and long end, and dips in the middle. Still, as the bottom graph shows, our model performs well even in this unusual case.

6. Conclusion

We described a new development in pricing credit default swaps, the most basic product in the credit derivative market. In the past, the lack of CDS price data meant that CDS pricing had to rely on corporate bond price data. However, with the growing availability of CDS price data, pricing can become more accurate, as we showed using several examples of CDS premium curves calculated from CDS price data. Further advances in the pricing of CDS and other credit derivatives will contribute significantly to the development of the domestic credit derivative market.

[11] The hazard rate can be considered as the probability density that a surviving company will default in the next time interval.

[12] This case actually occurred in the U.S. The short-term CDS premium was considerably higher than the medium-term CDS premium.