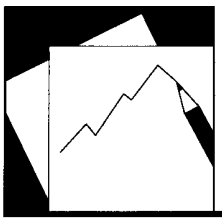

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The Use (and Abuse) of CDS Spreads During Distress

Manmohan Singh and Carolyne Spackman

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Monetary and Capital Markets Department

The Use (and Abuse) of CDS Spreads During Distress

Prepared by Manmohan Singh and Carolyne Spackman[1]

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Abstract

Credit Default Swap spreads have been used as a leading indicator of distress. Default probabilities can be extracted from CDS spreads, but during distress it is important to take account of the stochastic nature of recovery value. The recent episodes of Landbanski, WAMU and Lehman illustrate that using the industry-standard fixed recovery rate assumption gives default probabilities that are low relative to those extracted from stochastic recovery value as proxied by the cheapest-to-deliver bonds. Financial institutions using fixed rate recovery assumptions could have a false sense of security, and could be faced with outsized losses with potential knock-on effects for other institutions. To ensure effective oversight of financial institutions, and to monitor the stability of the global financial system especially during distress, the stochastic nature of recovery rates needs to be incorporated.

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Author's E-Mail Address: msingh@imf.org; cspackman@imf.org

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I. INTRODUCTION

Credit Default Swap spreads have been used as a leading indicator of distress. Default probabilities can be extracted from CDS spreads, but during distress it is important to take account of the stochastic nature of recovery value. Standard practice in modeling CDS spreads in corporate and sovereign contexts assume a fixed risk-neutral loss rate (or recovery value). Duffie and Singleton (1999), Houweling and Vorst (2005) and others have suggested that it is difficult to disentangle both a stochastic probability and a stochastic recovery. Pan and Singleton (2008) acknowledge the practical importance of the cheapest-to-deliver (CTD) bond as a proxy to stochastic recovery. Carey and Gordy (2008) view recovery as the neglected 'step-sister' in the credit risk literature.

Mathematically, CDS spreads are a function of the probability of default/distress (p), *and* the recovery value (r), where both *p* and *r* are jointly stochastic. The standard models simply assume *r* to be constant (usually at 20 to 40 percent). Duffie (1999) highlighted that when CDS spreads are high, it may not be correct to use a constant *r* to extract default probability signals.[2] Zhang (2008) shows evidence that recovery values are not related to economic cycles but rather the legal covenants. Singh (2003 and 2004) suggests that the cheapest-to-deliver (CTD) bonds are a good proxy for a stochastic recovery value during distress. Singh and Andritzky (2005 and 2006) show the use of CTD in the context of emerging markets restructurings. Singh and Andritzky (2007) use CTD to distinguish between recovery of face value (RFV) and recovery of market value (RMV). Section II discusses the application of CTD in the recent distress in financial institutions (Lehman, Landsbanki and WAMU) where recovery was determined via the ISDA protocol. Section III suggests policy implications of using stochastic recovery.

II. RECENT DISTRESS IN FINANCIAL INSTITUTIONS

The recent episodes of Landbanski,Washington Mutual (WAMU) and Lehman illustrate that using the industry-standard fixed recovery rate assumption gives default probabilities that do not pick up changes in bond prices, the underlying reference entities for the CDS market. Such fixed recovery rate models assume a constant recovery amount on reference obligations and rely upon changes in CDS spreads to derive implied probability of default. However, if CTD bond price information is ignored, financial institutions using fixed rate recovery assumptions could have a false sense of security regarding default probability, and could be faced with outsized losses, with potential knock-on effects for other institutions. To ensure effective oversight of financial institutions, and to monitor the stability of the global financial system, the stochastic nature of recovery rates needs to be incorporated.

[2] The probability of default (i.e., the hazard rate) and the recovery value more or less offset each other when bonds trade near par. Such approximation works poorly when bonds trade at high spreads.

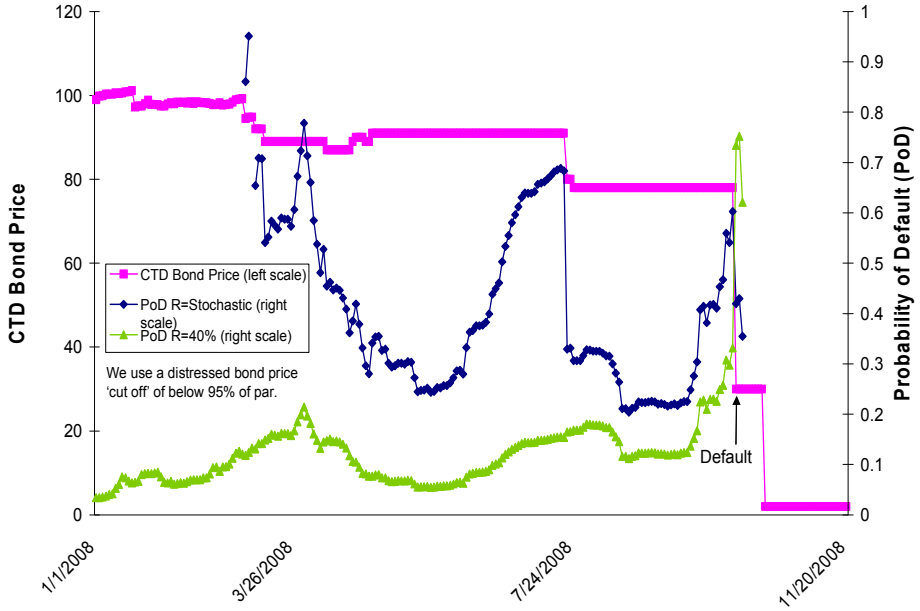
Before a credit event, CDS spreads may widen quickly, reflecting demand from CDS protection buyers, but the cash bond market may be illiquid and cash bond prices may therefore not move.[3] The CDS market may be dominated by fast-moving hedge funds, while the cash bond market may be dominated by buy-and-hold real money investors. The signals from the two markets may therefore be at odds during distress. When using CDS spreads to extract default probability signals, it is important to take account of the stochastic nature of recovery values, since CDS spreads may rise because *both* default probabilities are rising, *and* perceived recovery rates (as proxied by the CTD) are falling.

Three recent financial institution credit events illustrate the need to take account of stochastic recovery values. In the Landsbanki and Washington Mutual charts below, it can be seen that the probability of default calculated with the fixed recovery rate (green line) predicts too low a probability of default until default is imminent. The probability using the stochastic recovery rate (blue line) is more volatile but it was at least high well ahead of the default event. Unlike sovereigns or corporates, financial institutions have few tangible assets. As shown in the Lehman and the Icelandic bank defaults, recovery values are therefore generally low.[4] This makes it even more important to model the probability of default accurately when these institutions are in distress.

[3] CDS spreads are usually more sensitive to changes to perceived default risk than the spreads on cash bonds, but in Lehman's case, cash bond prices collapsed before CDS spreads rose. This produced the rather unusual scenario where the basis was positive during distress.

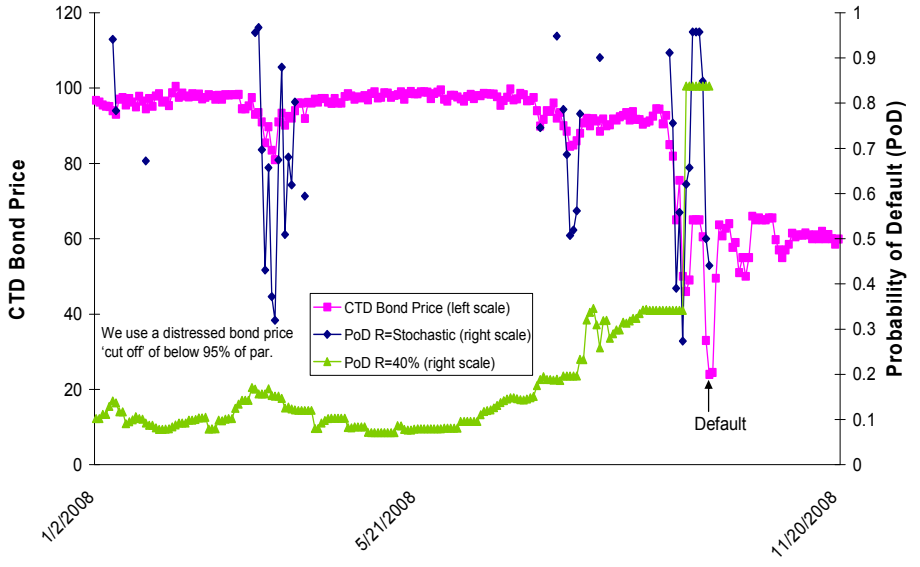
[4] Washington Mutual was an exception and had a much higher recovery rate since it was acquired by JPMorgan Chase.

Figure 1. Landsbanki



Sources: Bloomberg. L.P., Markit

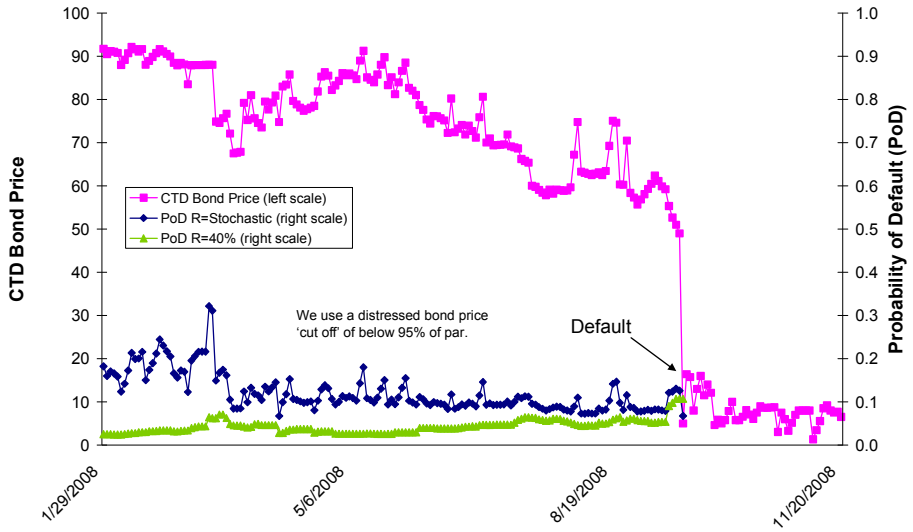
Figure 2. Washington Mutual



Sources: Bloomberg. L.P., Markit

Lehman's default shows an exceptional case when cash bond prices collapsed to around 20 cents) even as CDS spreads remained relatively low leading to the unusual scenario where the basis was positive during distress. However, CTD bonds proxied by the 2034 bond were trading well below par and implied probability using the CTD would have provided valuable insights rather than simply relying on CDS spreads and fixed recovery value assumptions.[5] There is a marked difference between the probability signals emanating from the two assumptions on recovery values, especially as the fixed model relies solely upon CDS spreads and ignores the CTD bond price. Barclays (October 20, 2008) writes: "In recent financial institutions bankruptcies, CDS levels were clearly not the leading indicator. Lehman Brothers provides the best example, as its CDS remained in spread running the week of its bankruptcy filing. This actually resulted in some of the best basis trades ever in the credit market as the bonds cratered well before CDS."

Figure 3. Lehman Brothers



Sources: Bloomberg. L.P., Markit

[5] For ISDA's deliverable bonds, please see: http://www.isda.org/companies/lehman/lehmandeliverableobs.html.

III. POLICY IMPLICATIONS OF USING STOCHASTIC RECOVERY

Financial surveillance needs an armory of tools that are used flexibly to monitor risks of distress. Even though it might be posited that use of CDS spreads to extract distress signals with a stochastic *r* could potentially lead to false signals for those entities that are in distress but do not default, we do not consider these elevated distress scenarios to be false alarms.[6] On the other hand, to utilize constant recovery values alone in such distress situations ignores important information from CTD bond prices in signaling distress. Using constant recovery values for distressed financial institutions would yield extracted default probabilities that may be too low.

Stochastic recovery value assumptions may be very useful especially during distress episodes when cash bonds trade below par, and the CTD option implicit in the credit-event settlement process becomes important. In fact, due to the standard use of ISDA contracts and protocols to settle CDS contracts, as demonstrated in Table 1 below, this stochastic recovery methodology to derive probability of default can and perhaps should be applied to other sectors and sovereigns in distress. (See Box 1 on Ecuador).[7]

Table 1. CDS Settlements Determined Under the ISDA Cash Opt-in Protocol

Credit	Auction Date	Recovery Rate
Lehman Brothers	10/10/2008	8.625
Washington Mutual	10/23/2008	57.000
Landsbanki	11/04/2008	1.250
Ecuador	1/14/2009	31.375

Hence, the importance of the CTD bond price signals in indicating probability of default should not be ignored during periods of elevated distress. This means that in order to ensure effective oversight of institutions and more broadly, the stability of the global financial system, models that take into account the stochastic nature of recovery value should be incorporated into any financial monitoring system. Otherwise, when losses occur they may be higher than anticipated with fixed recovery assumptions, and the outsized losses of one institution may then lead to a cascade of losses in other institutions, generating systemic instability.[8]

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[6] See the case of Brazil, Singh and Andritzky, "The Realities of Emerging Market CDS."

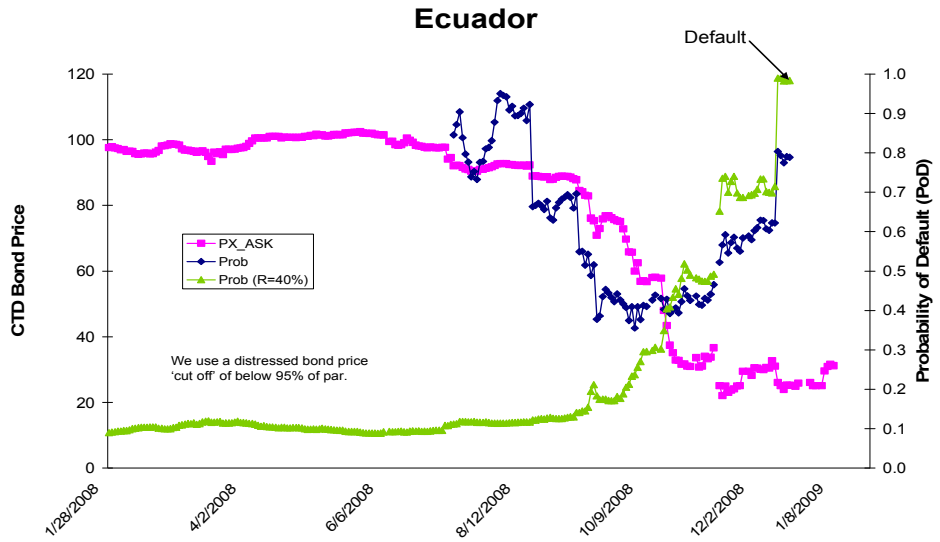
[7] To be clear, cash settlement only would apply as a standard term for widely traded reference entities. Those reference entities with low CDS notional, particularly relative to bonds outstanding, may continue to be physically settled. For example, although Washington Mutual, Inc. (holding company) CDS was largely cash settled, Washington Mutual Bank CDS was physically settled due to its significantly lower notional (parties were free to settle for cash bilaterally).

[8] We refer to probability of default or distress in the broader context that includes conditional probabilities of default, joint probability of default, distance to distress, and joint default dependence (i.e., via the off-diagonal elements). In all such models, the general assumption has been to hold recovery value constant (in the range of 20–40).

Box 1. Ecuador ISDA Auction

Typically in emerging markets, a delivered bond (usually CTD) is physically delivered when a credit event occurs. Since the number of CDS contracts exceed the underlying bonds available for delivery, recent credit events have resulted in ISDA auctions for cash settlement. Ecuador was first ever sovereign on January 14, 2009 that settled some of its CDS contracts via cash (i.e., following the ISDA protocol) for those who could not obtain a bond for physical delivery.[1] In the auction, the recovery rate was set at 31.75, in line with the approximate price of the CTD bond (2012 or 2030). The 2015 bond was also an acceptable delivery due to the pari-passu clause in the auction but was priced higher as Ecuador promised to honor this bond.

The figure below extracts default probability using the 2030 bond as the CTD—empirically the cheapest bond—rather than a fixed recovery value (the green line). The difference between the two methodologies again highlights the importance of incorporating price signals from the CTD bond. CDS spreads can disentangle and move first (not always as shown in the case of Lehman), but remain a derivative of the underlying cash bond market, which may generate different signals.



Sources: Bloomberg. L.P., Markit

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[1] The CTD bond, the 2030 bond, dipped as low as 14 cents to the dollar in intra-day trading (we use day-end prices). Market sources indicate that experienced buyers of CDS anticipating a credit event would have bought Ecuadorian bonds at such depressed levels (for delivery) rather than wait for the ISDA auction price. In recent credit events, sovereign debt prices as measured by the CTD have been much higher than those seen in financial sector.

APPENDIX I. RECOVERY SWAPS OR WHERE THE CTD BONDS END UP AFTER DELIVERY

A credit event involves the delivery of a bond by the protection buyer to the protection seller. However, since the price of such bonds is unknown until delivery, both the buyer and seller of CDS do not know the extent of their losses.

The CDS protection seller, who receives a deliverable bond from the buyer (usually cheapest acceptable bond to the seller, or the cheapest to deliver bond) , might be forced to hold the bond throughout a restructuring as market liquidity for defaulted bonds has dried up. Typically an insurance company or a bank may not want to hold distressed assets in its portfolio for regulatory reasons. Therefore, the CDS seller can arrange to swap such CTD bonds at a *guaranteed* recovery rate before the credit event by entering into a recovery swap via iTraxx or a similar exchange platform. Some of the leading names that provide recovery swaps include Société Général, BNP Paribas, Deutsche Bank, and JPMorgan. A recovery swap enables investors to 'lock in' a recovery rate. Soft restructuring can trigger a recovery swap (i.e., actual default not needed). Recovery swaps are trading on the debt of about 70 companies, including automaker General Motors Corp. and bond- insurer MBIA Inc. These contracts, barely traded in 2006, are now worth well over $10 billion as more companies fail to repay debts. Also known as *recovery locks*, the agreements are bought as insurance by sellers of credit-default swaps, such as banks, hedge funds and insurers. Some sellers of the CDS contracts buy recovery locks to protect what they may get back on bonds when companies default. Holders of recovery swaps agree to exchange a preset fixed rate for the actual amount received by bondholders after a default. The investor getting the fixed amount will benefit if the amount they get for the bond is lower than the agreed fixed swap rate. Over time, mark-to-market changes can result in positive or negative losses as the CTD may be lower or higher than the recovery lock. Thus the recovery swap market, via the mark-to-market value of the recovery swap—will impact any CDS pricing (and thus the probability of default) on the underlying credit. The initial impetus for this came after Delphi-auction (the first to go through the ISDA protocol).[9]

Changing recovery rates

Many credit-default contracts written early this year assumed a 40 percent recovery rate in pricing deals. The October 10, 2008 derivative industry auction on bankrupt Lehman Brothers Holdings Inc.'s credit-default swaps set a value of 8.625 cents on the dollar for the New York investment bank's debt, according to Creditfixings.com. A credit-default derivative seller could have bought a recovery lock to ensure a 20 percent recovery rate on Lehman debt three days before the firm's September 15 bankruptcy. The seller would thus have received 11.375 cents on the dollar from the recovery contract.

[9] Physical delivery is allowed within the context of ISDA protocol if it suits the CDS investor (see Ecuador box).

Moody's indicates that corporate default rates in this cycle will likely match or exceed the peak levels reached in the previous two U.S. recessions. S&P cited an "inverse correlation" between defaults and investor recoveries, although legal covenants of contracts matter. When default rates are less than 2 percent, more than half of defaulted debt recovers more than 70 percent of face value, according to the rating company. When defaults are greater than 8 percent, more than half such debt recovers less than 40 percent, S&P estimated.

Specifics about recovery-lock contracts are not generally available because they are made privately and do not trade on an exchange; also bid-ask spreads are high. The contracts date back to 2005, when a Fitch Ratings report said investors were starting to use them to lock in returns after defaults. ISDA established standard documents for deals in 2006. The New York-based trade group does not keep records on the size of the market. There is limited demand for hedging the recovery rate when default rates are low and recoveries stable. Typically, investors assumed recovery rates for financial institutions in the range of 75 to 85 percent; with Lehman below 10 percent and with other financials at very low recovery rates, signals from CDS spreads using 40 percent recovery models can be misleading

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