



A Framework for Managing Counterparty Risk

By Edward Baker and Robert Colehan

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The year 2008, among other distinctions, can without doubt be labeled the year of counterparty risk. Although counterparty risk always has been a feature of the global capital markets, the collapse (and effective collapse) of several financial institutions brought it to a new, heightened level of importance. Our firm has developed and implemented the following framework for monitoring our counterparty risk on a real-time basis.

What is Counterparty Risk?

In its most general form, counterparty risk is the risk that parties to financial commitments or contracts fail to honor their obligations. In the capital markets, this means that a party that is obligated to deliver a payment or an asset through a financial transaction fails to deliver. This can take various forms, such as a party to a swap not being able to make payment at the end of the swap term. But more calamitously for a company in our position, for instance, it can mean that the prime broker who has a claim on our portfolio assets fails and the assets get locked up in bankruptcy proceedings.

Monitoring Counterparty Risk

The events of 2008 made clear that it is imperative for anyone trading in the capital markets—and especially anyone utilizing the services of a prime broker—to closely monitor the risk of potential default by counterparties. The emphasis is on the words “closely monitor” because 2008 showed that

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counterparties can experience devastating financial deterioration in a matter of days. Fortunately, capital markets appear well-informed about these events and quickly reflect deterioration through a number of market-based measures.

Our experience in the first half of 2008 led us to take on the challenge of developing and implementing a framework for monitoring our counterparty risk on a real-time basis. We recognize the importance of market-based measures but also include some longer-term characteristics such as rating-agency ratings and balance sheet data. Unfortunately, the rating agencies failed to identify the evolving risks and have proven to be largely unreliable for the purposes at hand, a point underscored in appendix 2 of this article. Furthermore, the fundamental data is by its nature backward-looking and unlikely to reflect rapid near-term deterioration in financial conditions.

The market-based characteristics we have identified are the following (illustrated in table 1); we discuss the specifics in appendix 1:

- Five-year single name credit default swap (CDS) spreads
- Short-term change in the company's traded share price

- Change in the company's share price from its all-time high
- Volatility of the company's traded share price

The events of 2008 provided a fantastic laboratory for developing rules related to these measures. Our observations over the course of the year led us to identify threshold levels for these constructs to serve as guides for action. We have set two independent thresholds that put us on alert that risk is reaching critical levels. When the first level is reached, we look carefully at the company's fundamentals and ratings assessments. If all is deemed acceptable we continue to watch the company's market characteristics. If the second threshold level is reached, we will seek to take immediate action to reduce our exposure to that particular counterparty. Unfortunately, in some cases, it is impossible to completely eliminate counterparty exposure over the timeframes in which events unfold.

The threshold levels that we use for these items were entirely empirically derived and based on observed events in 2008. While we do not purport to claim that these are any more than rules of thumb, we have found them to be useful guides. Another caveat here is



TABLE 1: COUNTERPARTY RISK MANAGEMENT (SEE APPENDIX 1)

PRIME BROKERS AND COUNTERPARTIES							
Component	Live/static	Bank 1	Bank 2	Bank 3	Bank 4	Bank 5	Bank 6
Counterparty type >	data	pbc	cp	pbc	pbc	pbc	pbc
5 yr CDS	GCDS						
Price	Live	174.32	100.13	83.91	76.98	79.23	79.82
Price 5 days ago	Live	165.97	105.17	87.58	79.30	81.43	82.07
Price 3 months ago	Live	179.38	115.69	99.29	87.78	77.69	76.58
Price 6 months ago	Live	467.52	255.41	127.59	111.04	109.53	112.10
Equity Price							
Current Share Price	Live	3.20	14.86	16.00	50.75	47.00	12.285
5 day % change in share price	Live	-17.31%	-2.30%	1.91%	5.93%	-2.85%	-7.42%
Share price 5 days ago	Live	3.87	15.21	15.70	47.91	48.38	13.27
1 month % change in share price	Live	-25.41%	-9.11%	-5.04%	-1.88%	-4.62%	-17.11%
Share price 1 month ago	Live	4.29	16.35	16.85	51.72	49.275	14.82
3 month % change in share price	Live	-24.88%	-15.71%	-17.95%	-2.65%	-8.34%	-11.36%
Share price 3 months ago	Live	4.26	17.63	19.50	52.13	51.28	13.86
Current % change from high	Live	-94.39%	-73.02%	-77.76%	-57.18%	-69.01%	-62.57%
All time high	Static	57.00	55.08	71.95	118.51	151.64	32.82
Equity Volatility	HIVG/GV						
Current 30 day historic volatility	Live	39.69	34.19	34.52	33.83	35.08	39.52

■ = Critical Source: The Cambridge Strategy Asset Management Ltd.

that we may find that these rules will evolve over time. This is most likely to be the case for the CDS spreads given that the CDS marketplace is relatively new and in the midst of some rather profound changes (see appendix 1).

In any event, the current threshold levels that we are using for our CDS spreads are 300 for our level 1 indicator and 400 for our level 2 (“it’s time for immediate action”) indicator. Each of the other characteristics has its own levels, which we will elaborate on later.

Case Studies

It is instructive to consider a few case studies from 2008. Unfortunately, it was a year rich in such case studies. We will touch on all six of the year’s major “failures”: Bear Stearns, Lehman Brothers, AIG, Citibank, Bank of America, and Merrill Lynch. The case studies can be found in appendix 2.

The Current Environment

At this time the world’s governments have greatly reduced the threat of failure on the part of many counterparties, especially the large prime brokers. As a consequence, even though our indicators may move us into high alert,

we may not take the same urgent action that we would have taken previously. On the other hand, it is prudent to diversify counterparty risk exposures and to have at least two prime brokers as part of every investment program. While the government may provide a “guarantee” that the counterparty won’t fail, the counterparty still may be forced into a compromised position that impedes the ability of the counterparty to completely fulfill its obligations. This is particularly a concern in the context of changing political regimes and evolving problems related to the continuing deterioration in capital markets. As a consequence, we find it essential to continue monitoring counterparty risk for all counterparties that we do business with, regardless of whether the government has stepped in to provide support.

It is also possible to explicitly hedge the counterparty risk as part of a protection plan for a fund or business. The most obvious way to do this is simply to buy a credit default swap on the counterparty in question. Then, if the counterparty defaults, a payment will be received through the CDS, which will help offset at least some of the loss related to the default. If the concern is

related to the prime broker exposure, it is very hard to estimate the magnitude of the expected loss because the prime broker typically would not (or should not) have claim to all of the assets and this amount will vary over time. (The details of these arrangements will be buried in the ISDA and CSA¹ contracts in place with the prime broker.) Nevertheless, the CDS would provide some insurance against the costs of such a default. The issue then is at what price this insurance is worth it. If you consider buying this insurance when the prime broker is in duress, you will pay an expensive price. Bear in mind also the counterparty risk associated with any CDS contract that you buy, because no central clearing house stands between the buyer and seller of these contracts. However, it was announced in March 2009 that a central clearing house for CDS contracts has been established in the United States and active negotiations are in process to establish one in Europe.²

Other Applications

It is often important to consider the potential for failure or a liquidity crisis for parties that we do business with



COUNTERPARTIES					FLAGS
Bank 7	Bank 8	Bank 9	Bank 10	Bank 11	
cp	cp	cp	cp	cp	
49.79	112.28	95.95	58.94		300bp warning, 400+ critical
54.76	121.79	99.02	59.33		
66.55	150.73	80.15	55.91		
108.60	226.36	130.22	81.34		
40.27	29.12	2.293	681.80		
-2.42%	-3.67%	0.88%	-3.07%		
41.27	30.23	2.273	703.40		
-7.17%	-12.63%	-6.14%	-8.11%		
43.38	33.33	2.443	742.00		
-10.41%	-7.20%	-12.50%	-6.60%		
44.95	31.38	2.62	730.00		
-40.04%	-68.11%	-70.48%	-37.68%		90%+ fall from all time high = critical
67.17	91.31	7.77	1094.00		
22.55	33.63	34.19	32.62		150% warning, 200% critical

otherwise. For example, it is useful to use the framework we have developed when considering whether to accept an investment from a client, particularly in the case of a capacity-constrained product where the client wants to absorb a considerable amount of the capacity. This is an issue for any product where sudden and unexpected withdrawals by a client could impact other clients. A review of the client's current CDS price, in the context of our counterparty risk framework, can be very revealing.

The study of single-name CDSs has led us to look at the behavior of sovereign CDSs as an additional economic risk barometer and tool for anticipating change in a nation's currency. We have noted that sovereign CDSs have very good predictive powers and we believe they can act as an effective currency crisis early warning system. This is a topic that we are currently researching.

Appendix 1: Market-Based Characteristics

Credit default swap (CDS). A CDS is a derivative contract wherein the seller makes a payment to the buyer of the contract if a default occurs on the part of a named party specified in the con-

tract. The contract typically is linked to a specific unsubordinated bond issued by the named party. The seller of the contract receives a periodic payment made by the buyer (the CDS price spread), and if a default occurs on the underlying bond then the seller pays to the buyer essentially the difference between the face value of the bond and the market value upon default. Note that the buyer of the CDS doesn't need to own the underlying bond. Although the CDS has many features of an insurance policy it differs in the last respect mentioned, i.e., the buyer does not need to own the underlying bond.

CDSs were introduced in 1997 by a group of financial engineers at JP Morgan Chase. They are traded very actively in over-the-counter markets. The current market is of staggering proportions. Although estimates vary, one estimate has put this market at a notional amount (i.e., the amount of the underlying debt instruments) of as much as US \$60 trillion in mid-2008. Recent events, including the default of Lehman Brothers, have caused the market to shrink somewhat though it is still huge. CDSs are priced in terms of a basis point value of the amount

of protection that the buyer wants to purchase, so a quote of 300 covering a \$10-million face value bond would cost \$300,000 annually. This spread reflects the probability of default on the part of the issuer of the underlying bond.

Five-year single-name credit default swap. Our research has shown that using a five-year CDS based on an individual firm's senior corporate debt is the most effective choice for risk monitoring purposes. We track the current spread for these instruments, then look backward at intervals of five days, three months, and six months. Our focus is on the change in the spread over these various timeframes.

Changes in share price. We track the share price at current levels then look back five days, one month, and three months. More important, however, is the percentage move from a company's all-time traded high in its share price. Our research shows that a certain percentage of decline is normally a point of no return.

Share price volatility. We track the rolling 30-day historic volatility of the underlying share price. We have chosen a 30-day period because it fits our response requirements best. At shorter



intervals we find that this measure is too unstable to have much predictive power and at longer intervals it is not sufficiently responsive to changes in market perceptions.

Appendix 2: Case Studies

Bear Stearns. Bear Stearns experienced an equity price collapse on Friday, March 14, 2008, and was merged into JP Morgan Chase over the weekend of March 15th and 16th. The equity price and volatility didn't work as predictors of the impending default because one massive sell-off occurred just one day before the JP Morgan Chase acquisition. However, the CDS spread clearly gave ample warning. The CDS spread traded through our 300 flag level on February 29, 2008, and through the 400 critical level on March 6, 2008, eight days before the share price collapsed, providing more than enough time to make a decision on what to do about any exposure (see figure 1).

Citibank. Citibank has survived but only after several rounds of capital injection from the U.S. government. Citibank's CDS spread has been up and down through our 300 and 400 flagging levels several times. The earliest warning was on September 16, 2008, when it hit 300; the first time through 400 was on November 20, 2008. It traded through 400 again in February 2009 and went to a high of 622 in March 2009. It has been very volatile since then. Clearly, if the government had not stepped in with massive support, Citibank would have gone into administration. Citibank's shares were down 98 percent from their high of \$57 at one point and traded briefly below \$1; again, well through our flag for equity price adjustments and showing that if left solely to market forces, Citibank would not be here today. Our share-price and volatility measures also would have given ample warning of imminent collapse. On March 16, 2009, the equity price was still around \$16 but on November 20, 2008, it was around

FIGURE 1: BEAR STEARNS CDS SPREADS (MARCH 26, 2007–MAY 30, 2008)



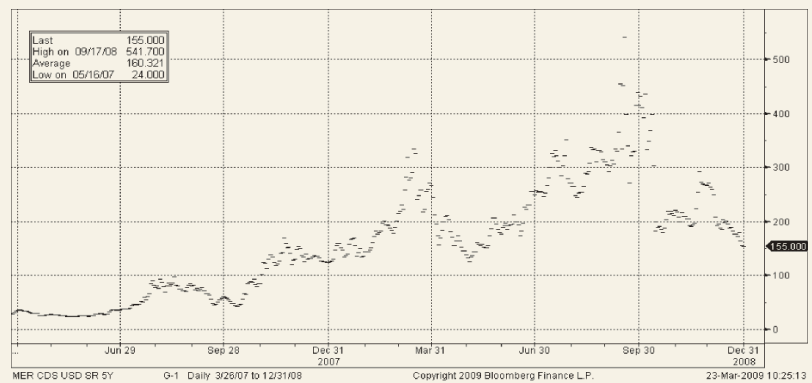
Source: Bloomberg Finance LLP

FIGURE 2: CITIBANK CDS SPREADS (MARCH 24, 2008–MARCH 20, 2009)



Source: Bloomberg Finance LLP

FIGURE 3: MERRILL LYNCH CDS SPREADS (MARCH 26, 2007–DECEMBER 31, 2008)



Source: Bloomberg Finance LLP

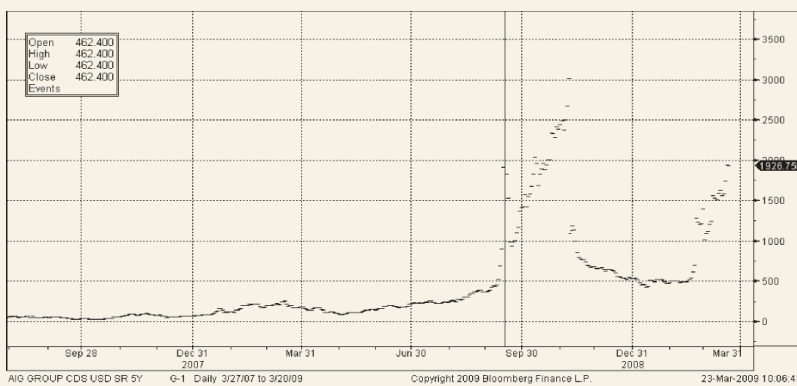


FIGURE 4: BANK OF AMERICA CDS SPREADS (MARCH 26, 2007–MARCH 20, 2009)



Source: Bloomberg Finance LLP

FIGURE 5: AIG CDS SPREADS (MARCH 26, 2007–MARCH 20, 2009)



Source: Bloomberg Finance LLP

FIGURE 6: LEHMAN BROTHERS CDS SPREADS (MARCH 26, 2007–SEPTEMBER 12, 2008)



Source: Bloomberg Finance LLP

\$5. Equity volatility hit 150 percent on October 7, 2008, and 200 percent on November 24, 2008; the equity prices on those dates were around \$15 and \$6, respectively (see figure 2).

Merrill Lynch. As with Lehman Brothers, early warning bells signaled several months before Merrill Lynch was purchased by Bank of America. On March 10, 2008, the CDS spread hit 300 before risk abated and then went back up through 300 on July 14, 2008, and hit 400 on September 12, 2008. Merrill Lynch did not go into administration, but its share price fell by almost 93 percent. The CDS spread would have enabled an exit of any exposure to the falling equity price, which was \$43 on March 10, 2008, \$26 on July 14, 2008, and \$17 on September 12, 2008. The last traded price before the takeover was just under \$11, down from an all-time high of almost \$99 (see figure 3).

Bank of America. As with Citibank, BoA has survived only with government support. But in this case the CDS spread flashed warnings fairly late in the cycle. During the height of the 2008 banking crisis, the market was predicting that BoA would survive. The CDS finally hit 300 on March 3, 2009, but did not breach the critical 400 level. Apparently the absorption of Merrill Lynch has greatly increased BoA's default probability. BoA's share price was down 95 percent from its high, hitting our flag on January 20, 2009. Equity volatility hit 150 percent on October 3, 2008, when the share price was still \$34.50, well above its lows in 2009 of just more than \$3. The flagging system was successful in terms of predicting BoA's eventual survival, but aside from the 150-percent volatility flag in October 2008 it would not have preserved investors' capital. This is not an issue for us because we are looking at BoA as a counterparty, not an investment, so the flags performed successfully for us (see figure 4).

AIG. AIG's equity share price collapsed over the six-day period starting



FIGURE 7: LEHMAN BROTHERS SHARE PRICE VOLATILITY (MARCH 26, 2007–SEPTEMBER 12, 2008)



Source: Bloomberg Finance LLP


September 9, 2008, and the government bailout occurred on September 16, 2008. The company has survived only because of several rounds of massive federal support. Our CDS spread flags worked extremely well here. The spread hit 300 on August 13, 2008, and 400 on September 4, 2008. Since then the spread has traded at more than 3,000, back down to 500, up to more than 3,500, and is currently around 600. The equity price at the time of writing was 41 cents; the all-time high was almost \$104 in December 2000 but more recently hit \$73 in December 2006. Either way, AIG's shares were down almost 100 percent. Note that in this case all of our indicators worked well in relative terms. On the CDS spread dates mentioned previously the share prices were approximately \$22 and \$21, respectively. Our volatility indicator hit 150 percent on September 12, 2008, with the equity price around \$12, and then hit 200 percent on September 15, 2008, with the equity price around \$5. The big collapse in the share price from \$20 to just more than \$1 took just six trading sessions from September 9, 2008, and without government support bankruptcy would have occurred shortly thereafter (see figure 5).

Lehman Brothers. Lehman Brothers filed for chapter 11 bankruptcy

protection on September 15, 2008. The CDS spread sounded an early warning in March 2008 when it hit 300 and then 400. The risk then abated before hitting 300 on July 10, 2008, and 400 on August 21, 2008, giving several weeks' notice of impending collapse. The equity share price hit a critical level, falling 90 percent from its all-time high, on September 9, 2008, and our volatility assessment hit 150 percent on July 16, 2008, and then 200 percent on September 9, 2008, again clearly giving enough decision time to take protective action (see figures 6 and 7).

A Comment about Credit Ratings

In general, the credit ratings provided by the credit rating agencies have been of little use in predicting the collapse of the companies in our case studies. Although ratings downgrades occurred in some instances, they tended to significantly lag our other indicators. Often they were made in the last few weeks of the company's life, when the share price already had collapsed, well after our warning system had flagged imminent danger. In the case of Lehman Brothers, one rating agency actually upgraded the company three days before the firm filed for Chapter 11 on the basis that a rescue was thought to be imminent. Bear Stearns' ratings were unchanged for many years and were only

cut on the day before it was taken over by JP Morgan Chase. 

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Endnotes

- 1 The International Swaps and Derivatives Association (ISDA) is a trade body of some 330 market participants established in 1985. Among other things, it developed an international standard for transaction related documentation. The ISDA Master Agreement document is a standard agreement governing prime brokerage type relationships and the Credit Support Annex (CSA), is an attachment to the ISDA agreement with specific details related to the provision of credit facilities.
- 2 See Karen Brettell and Jonathan Spicer, UPDATE 3-CME to launch CDS clearing house, signs 8 big banks, Reuters.com (December 3, 2009), available at <http://www.reuters.com/article/idUSN0310556220091203>.