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Missing the Same Risk Twice

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Abstract:

In this paper, we review dynamics of the CDS-bond basis during the 2008 Crisis and how it behaves in this new period of market distress. We explore the risk modeling challenges posed since 2008, and suggest a new model for keeping pace with the market today.

Prior to 2007, Credit Default Swaps (CDS) and bonds of the same issuer were tightly linked, as any rational market participant would expect. Not only did this relationship break down during the Crisis, it has never returned to its pre-crisis state, and market events of late 2011 have shown a trend back to levels characteristic of the Crisis. For the post-Crisis risk manager, the CDS Basis is one of many risk modeling challenges.

Prior to the 2008 Crisis, theory[1] held that the CDS Basis should above all be stable, since both the CDS and bond ultimately priced the same issuer's likelihood of default. Departures from the stable level should (and did) attract arbitrageurs who pushed the basis quickly back. Moreover, theory said that the CDS Basis should be moderately positive, since the arbitrage trade to monetize a positive basis involves the difficulty of short selling a corporate bond.

A negative basis, therefore, was a rare and valuable find, presenting an opportunity to buy a bond and earn more in spread income than the cost to protect against the bond's default. A negative basis would either persist, with the trade generating risk-free cashflows over the life of the bond, or would converge to zero, allowing the trade to be unwound at a profit. The risk in the trade – that the basis would become even more negative, leading to mark-to-market losses – was seen as remote. Indeed, many banks attributed zero risk to these trades.[2]

The market events of 2008 upset the notion of the negative basis trade as an arbitrage. Rather than persisting or converging, the basis on almost all bonds widened to ever larger negative levels: minus 400bp was not an unusual value. Most participants in the basis trade could not survive the mark-to-market losses that these levels implied, and were forced to unwind their trades at a heavy loss. For the risk manager, the task is clear: add the basis to the set of modeled risk factors. But before discussing the risk model, it is worth reflecting on what caused such a radical change in this market.

The explanation for the change[3] involves two main characters of the 2008 drama: counterparty and liquidity risk. Credit default swaps are bilateral contracts; the buyer of protection faces the risk that in the event that he is owed a default payment, the seller of protection (the counterparty) does not fulfill his obligation. Since sellers of protection for the most part are large broker-dealers, the counterparty risk on CDS trades was seen as negligible prior to 2008. This clearly changed during the crisis, when a material risk emerged that CDS counterparties would not be able to meet their obligations on CDS contracts. Buyers of CDS protection thus were not willing to pay as much for this unsure protection. As a result, CDS spreads tightened, though the credit of the underlying issuers did not improve.

On the other side of the trade was the impact of liquidity. For one, institutions overall were in need of cash, and selling corporate bonds was an attractive source; the resulting selling pressure, again unrelated to issuer credit, drove bond spreads up. Second, the bond purchases that formed part of the negative basis trades were largely financed through the short-term repo market. When that financing source dried up, would-be arbitrageurs were forced to unwind their basis trades, driving bond spreads up, CDS spreads down and the basis into more negative territory. Finally, the rush to exit what had become a crowded trade, motivated by nothing other than the panic of being last, had the same market impact.

From a risk modeling perspective, the basis appears in at least two contexts. One is

[1] See Blanco et al (2005).

[2] See Senior Supervisors Group (2008) and Finger (2008).

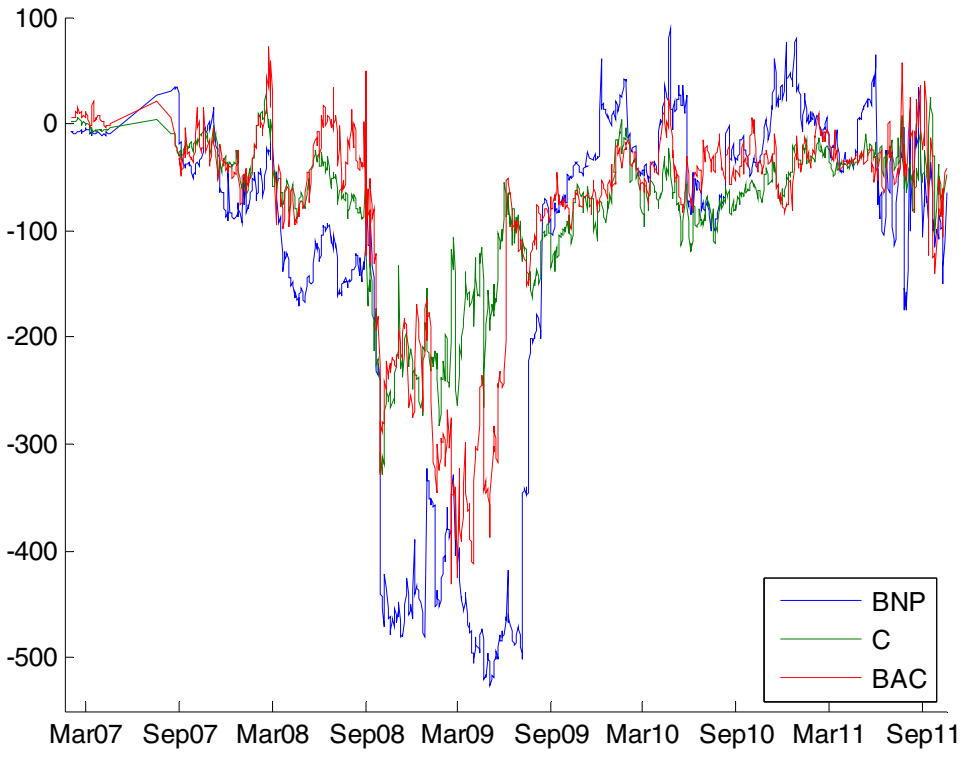
[3] See Bai and Collin-Dufresne (2011).

obvious: an explicit trade on the basis where other sources of risk are mostly hedged away. The other stems from the practice of using CDS market data to model the risk of other spread products. Since CDS liquidity is in many cases greater than bond liquidity, it has become common practice to proxy the risk of bond spreads by their CDS counterparts, even when there is no explicit exposure to CDS. There is thus a "model basis"—a difference between the true risk of the position and the risk captured by the CDS proxy.

To discuss basis risk modeling more concretely, we consider the basis on six bonds from three different financial issuers (BNP Paribas, Citigroup and Bank of America/Merrill Lynch). The bonds all mature in 2015 or 2016. We express the basis in bond terms, as the difference between the CDS-implied bond spread[4] and the yield spread given by the actual bond price.

The average basis for each of the three issuers is displayed in Figure 1. The basis was moderately negative for significant periods prior to the crisis, in seeming contrast with our earlier comments. Financial firms, however, correlate strongly with both liquidity and counterparty risk, and as such tend to display lower (or more negative) bases than the average issuer.[5] Other than these slightly lower levels, the basis data in Figure 1 seem to follow the general pattern discussed above: a huge drop in 2008, followed by a recovery in 2009, though back to 2007 levels, and heightened volatility and somewhat more negative levels in 2011.

Figure 1: CDS-bond basis on three financial issuers.



[4] That is, the bond spread derived from the default rates implied by the CDS levels.

[5] See and Collin-Dufresne (2011).

To assess the risk of the basis, we compare five different time periods: Pre-Crisis (prior to May 2007), Early Crisis (May 2007 through August 2008), Full Crisis (September 2008 through July 2009), Crisis Recovery (August 2009 through May 2011), and New Distress (June 2011 to the present). Statistics are presented in Table 1, where each row presents the average computed over the six bonds in the sample.

The volatility of the basis (measured on daily changes) displays the expected pattern, moving from an insignificant 3.1bp prior to the Crisis to 27.9bp in the most volatile period. It is striking that after a relatively benign stretch in 2009 and 2010, recent volatility has been almost back up to crisis levels. Correlations between the basis and the issuer's CDS show a similar, though more muted, pattern, rising with the Crisis, falling in the Recovery, and rising again recently. The heightened correlation in periods of distress is consistent with another of the Bai and Collin-Dufresne (2011) findings: credit quality is linked to the basis, since poorer quality bonds carry more stringent financing terms.

As a proxy for bond risk, the CDS produce the average volatilities on the third line of the table. Including the basis for a full treatment of bond spread volatility results in the volatilities on the fourth line. In most periods, the inclusion of the basis increases the total volatility – indicating the bonds are more volatile than their CDS counterparts – but during at least one period, the effect is the opposite. For bond risk, the addition of the basis to the CDS as a risk factor is a refinement, while for an actual basis trade, the basis risk factor is paramount.

The data presented thus far demonstrates that the basis became an important source of risk in the Crisis, and that the same measurable risk derived from the basis is on the upswing again. Where basis data is available, it is clear that it should be part of the risk model for credit products. But the use of the CDS proxy has spread precisely because of the lack of reliable price data for many bonds. If bond data is unavailable, then basis data is as well. The next challenge to the risk modeler is the search for an index to proxy for basis risk.

Table 1: Statistics on the basis as a risk factor. Averages across the six sampled bonds.

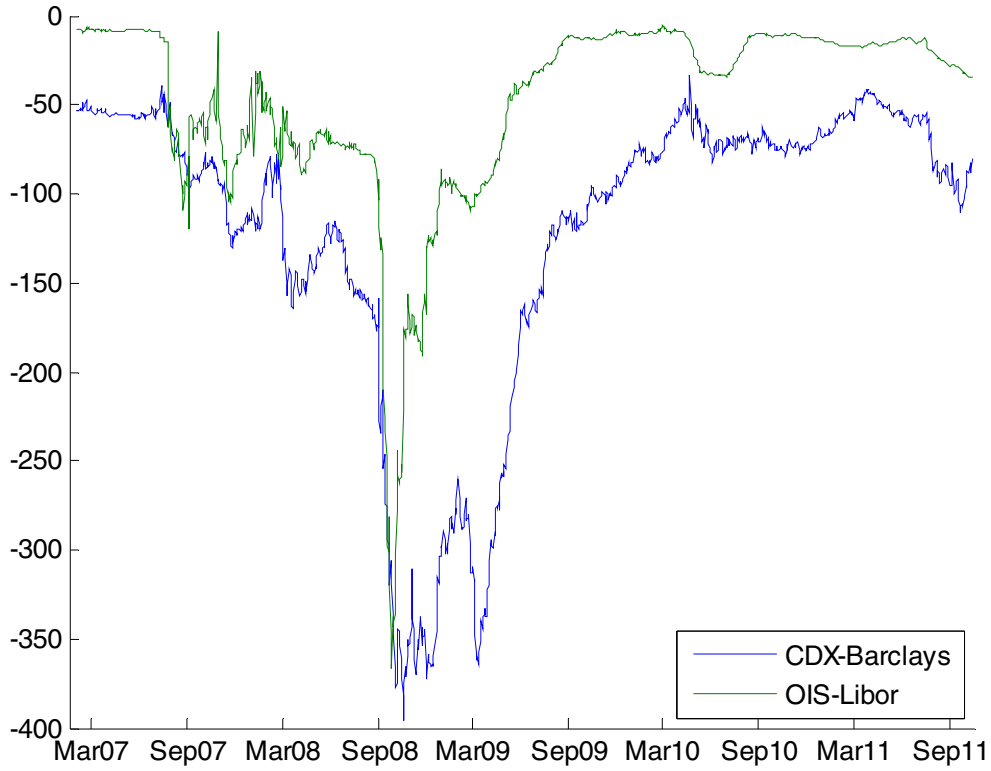
	Pre-Crisis	Early Crisis	Crisis	Recovery	New Distress	Entire Period
Basis volatility (bp)	3.1	10.9	27.9	10.9	22.6	17.0
Corr(basis,CDS)	20%	53%	53%	46%	63%	53%
CDS volatility (bp)	3.6	0.9	9.2	28.1	7.2	16.0
Bond spread volatility (bp)	5.1	3.1	9.8	27.8	9.9	18.2

Two candidates for the basis risk proxy are presented in Figure 2. The first is the difference between the spreads on two standard indices for investment grade credit in derivative and bond form,[6] whose constituents are comparable, but not identical. The second candidate is the spread between the three-month US Overnight Indexed Swap (OIS) and three-month USD Libor.[7] The OIS-Libor spread is an indicator of broad market liquidity and counterparty risk, both of which drive the CDS-bond basis.

Figure 2 shows that both indices display a similar pattern to the individual bases, and merit further analysis as proxy candidates.

The CDS-Bond basis, while perhaps not the most visible trade to go badly in the Crisis of 2008, was emblematic of the radical shift in assumptions about risk that the Crisis spurred. Far from disappearing, the risk in the basis has become elevated again in this new period of market distress. The model in this paper is a critical step in keeping pace with the market, in the hope that risk managers do not miss the same risk twice. ∎

Figure 2: Candidate proxies for CDS-bond basis risk.



[6] The CDX North American credit derivative index and the Barlcay's corporate bond index.

[7] For this spread, the convention is to quote Libor-OIS. We work with OIS-Libor here to obtain similar directional moves as the CDS-bond bases.

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