TF MARKET ADVISORS

A Comparison of

the S&P/ISDA U.S. 150 Credit Spread Index and

the Markit CDX NA IG Index

November 1, 2013

Executive Summary

This paper[1] compares and contrasts the S&P/ISDA U.S. 150 Credit Spread Index (the "S&P 150") with the historical performance of the Markit CDX North American Investment Grade Indices ("CDX IG") and provides a detailed analysis of the current version S&P 150 compared to the on-the-run Market CDX NA IG20 Index ("IG20").

The S&P 150 has Reference Entities[2] that have larger equity market capitalizations and more debt outstanding than the Reference Entities in the CDX IG. Since the names that S&P 150 and IG20 have in common tend to be much closer to the average spread of each portfolio, the selection bias, with S&P 150 focusing on debt outstanding and CDX IG focusing on most liquid CDS, is the root cause of the difference. This difference in index make-up should be persistent over time and may provide for a more broad appeal of S&P 150 as a benchmark since the companies included may be better known to market participants outside the traditional CDS market.

The inclusion of financials[3] in the S&P 150 is another key distinction. The financials are the largest corporate bond issuers and have often been leaders in the CDS market (with spreads going both wider and tighter). This crucial aspect of the S&P 150 helps tracking bond portfolios more accurately because inclusion of the financials and their historic performance, including the default of Lehman (which would have been in the S&P 150 at the time)[4], makes the S&P 150 more representative of the broad bond market's overall performance.

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[1] TF Market Advisors, LLC ("TFMA") is an independent financial research provider with deep expertise in fixed income and credit products. TFMA has a global macro and thematic approach to markets, focusing on near term trading strategies along with longer term tactical risk positioning. TFMA's team of 3 people have a combined 40 years in the markets and have traded over $1 trillion of bonds, loans, and credit derivatives, ranging from sovereign debt to distressed loans. Please contact us with any questions at tchir@tfmarketadvisors.com

[2] Reference Entity is a defined term in the ISDA Credit Derivatives Definitions which govern CDS contracts, but company or issuer is used throughout this paper for ease of reading, but ultimately CDS refers only to Reference Entity or Reference Entities.

[3] Industry classifications are based on The Global Industry Classification Standard (GICS®). It is an enhanced industry classification system jointly developed by Standard & Poor's Financial Services LLC (S&P) and MSCI in 1999. GICS was developed in response to the global financial community's need for one complete, consistent set of global sector and industry definitions and has become the standard widely recognized by market participants worldwide. It sets a foundation for the creation of replicable, custom-tailored portfolios and enables meaningful comparisons of sectors and industries globally. The Global Industry Classification Standard is the exclusive property of Standard & Poor's Financial Services LLC (S&P) and MSCI.

[4] Lehman Brothers at the time of its default would have been included in then current version of S&P 150 because it was in the S&P 500, investment grade, had liquid CDS and a large amount of long term debt outstanding.

The performance of the CDX IG index is compared to that of the S&P 150 index. Year to date relative performance is evaluated, as is longer term performance. The bankruptcy of Lehman Brothers (the "Lehman Moment") is examined in greater detail, so it is useful to see how much that affected each index. The conclusion is that the indices are correlated, but including the financials is a meaningful difference. Other reasons that the S&P 150 could be more relevant to investors who track benchmark bond indices that other CDS indices.

The Constituents

IG20 consists of 125 Reference Entities and the S&P 150 consists of 150 Reference Entities. Both are equally weighted indices which makes the comparison more direct. There are 77 Reference Entities that are common to both indices[5].

The 48 names unique to IG20 can be found in Appendix B and the 73 names unique to the S&P 150 can be found in Appendix C.[6]

The indices can be compared on several metrics.[7,8,9]

	S&P150	CDX IG
Reference Entities	150	125
Spread (basis points)	74	85
Debt Outstanding ($ Billions)	22,640	13,871
Equity Market Cap ($ Billions)	66,358	43,250
CMA Quote Frequency	270	313
Rating	BBB+	BBB+

Sources: TF Market Advisors, CMA, Capital IQ

During this period the S&P 150 had a portfolio with a tighter average spread.[10] That indicates that the market is pricing the S&P portfolio has higher quality. That has been consistent throughout the course of the year.[11]

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[5] See Appendix A for the list of Reference Entities that are common to both indices. The current version of CDX IG uses Boeing Capital but that is expected to change to Boeing Inc in the next version to match changes in Boeing's financing plans. AT&T Corp. and AT&T Inc. both have CDS outstanding and future versions of the S&P 150 will reference the more liquid, and larger AT&T Inc. contract for consistency.
[6] CDX Constituents can be found in the Index Annex section at www.markit.com
[7] Spread Data is from CMA and is the average spread from July 12th 2013, until August 13th 2013 (a 1 month period from when the data was collected). The CMA Quote Frequency is the average number of daily quotes received for each name based on the same time period.
[8] Debt outstanding is from Capital IQ
[9] Equity Market Cap is from August 12th 2013. Three Reference Entities in the CDX IG index are private companies so were not included in the calculation. Some CDS contracts reference a subsidiary other than the holding company, but in those cases, the holding company Market Cap was used.

The average rating is the same for both indices (based on ratings by Standard & Poor's, Moody's and Fitch).

There is a noticeable difference between the sizes of the companies in the two indices measured both by debt outstanding and by equity market capitalizations. The S&P 150 Reference Entities tend to be much larger on average by both measures.

The CMA Quote Frequency, a measure of liquidity, shows that the Reference Entities making up the CDX IG index are potentially more liquid. While quoted more frequently, the companies in the S&P 150 index are quoted sufficiently so that underlying Reference Entity liquidity should not be a limiting factor.

With 77 names overlapping, it is also informative to compare the "unique" names in each index, as that drives the differences.

	Common To Both	Unique to S&P150	Unique to CDX IG
Reference Entities	77	73	48
Spread (basis points)	71	78	107
Debt Outstanding ($ Billions)	18,485	27,023	6,468
Equity Market Cap ($ Billions)	60,851	72,167	15,015
CMA Quote Frequency	296	244	341
Rating	BBB+	A-	BBB

Sources: TF Market Advisors, CMA, Capital IQ

1. <u>Average spread</u>. The Reference Entities shared by both indices have an average spread of just 71 bps. The companies unique to the S&P 150 have a higher (but not materially higher) average spread of 78. The average spread of the names unique to IG20 is 107 bps. This is materially wider than the names that are in common. The selection process, which for CDX IG is driven by CDS liquidity,[12] seems to select higher spread (lower rated) companies compared to the S&P 150 methodology.
2. <u>Equity market capitalizations and debt outstanding</u>. While the equity market capitalization of the companies in common is $61 billion, it drops to only $15 billion for the names unique to IG20. There is a similar dramatic reduction in debt outstanding as

[10] See Appendix D for a more detailed analysis of average spread versus intrinsic value for CDS indices
[11] See the "YTD Performance" section to see a longer comparison of the "intrinsic value" of the two indices.
[12] CDX IG rules can be found at http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/Markit%20CDX%20HY%20and%20IG%20Rules%20Mar%202013.pdf

the unique companies have only 35% of the debt outstanding that the companies in common have on average.

The tendency of the selection process for the S&P 150 is to include much larger companies, which in the current environment also leads to slightly higher credit quality (based on spreads and average rating). The Reference Entities in the S&P 150 are more familiar to many investors both on the equity side and the bond side. Having debt outstanding as a selection criterion helps ensure that the S&P 150 has names that are relevant to the bond market. While potentially giving up some liquidity on the underlying CDS front, the "liquidity" constraint in the S&P 150 selection process[13] mitigates that risk. The quote frequency is lower on the S&P 150 names. The names unique to the S&P have 18% fewer CMA quotes than the names that are common to both indices. The CDX unique names have quote frequencies that are 15% higher than the common names. That is consistent with the philosophy of the indices as the CDX IG has single name CDS liquidity as one of its primary drivers for inclusion.

The bias in the selection methodology of CDX IG is to include liquid names that are important to the CDS market which currently leads to a selection of smaller issuers, less well known to many investors, and currently trading weaker than the average company in the indices. This selection bias may create an index that is less useful as a benchmark for the broader corporate bond market.

The inclusion of financials is a key distinction (see the next section) as they are large issuers with large amounts of debt outstanding, but their impact goes much further as it fundamentally changes the risk/reward of the S&P 150 versus the CDX IG indices.

In summary, the difference in the portfolios is that the IG20 index may have some Reference Entities that have more liquid CDS than some that are in the S&P 150, but the portfolio as a whole trades at a higher spread, and that difference is explained largely by the inclusion of smaller companies.

<u>The Inclusion of Financials is a Key Difference</u>

One of the most distinctive features of the S&P 150 is the inclusion of the big banks. Having Bank of America, Citigroup, Goldman Sachs, JP Morgan, Morgan Stanley, PNC Financial Services Group, U.S. Bancorp, and Wells Fargo is a big enough distinction to merit its own discussion.

In virtually any corporate bond index, financials, particularly the money center banks make up a large portion of the index. Currently, LQD which is an ETF that attempts to replicate a benchmark bond index, has over 32% of its holdings in financials.

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[13] S&P 150 methodology can be found at http://us.spindices.com/documents/methodologies/methodology-sp-isda-cds-indices.pdf

But it isn't just that the financials are important to the bond market, they are very active in the CDS market as well. So including financials improves the liquidity of the S&P 150.

Largest CDS Net Notional Outstanding by Reference Entity from DTCC Warehouse

Rank	Reference Entity	Net Notional	Index
1	GENERAL ELECTRIC CAPITAL CORPORATION	7,346,967,370	Both
2	BERKSHIRE HATHAWAY INC.	6,189,836,602	Both
3	JPMORGAN CHASE & CO.	3,845,477,586	SP150
4	BANK OF AMERICA CORPORATION	3,706,746,442	SP150
5	METLIFE, INC.	3,691,486,124	Both
6	MORGAN STANLEY	3,339,259,956	SP150
7	THE GOLDMAN SACHS GROUP, INC.	3,338,752,428	SP150
8	WELLS FARGO & COMPANY	3,259,499,355	SP150
9	CITIGROUP INC.	2,498,065,924	SP150
10	MERRILL LYNCH & CO., INC.	2,083,931,427	SP150
11	AT&T INC.	1,903,206,179	Both
12	CATERPILLAR INC.	1,814,781,463	Both
13	ANADARKO PETROLEUM CORPORATION	1,813,066,664	Both
14	MBIA INSURANCE CORPORATION	1,694,197,518	Neither
15	J. C. PENNEY COMPANY, INC.	1,605,091,008	Neither
16	COMPUTER SCIENCES CORPORATION	1,585,952,231	IG20
17	INGERSOLL-RAND COMPANY	1,566,625,309	IG20
18	THE PROCTER & GAMBLE COMPANY	1,550,137,407	SP150
19	NORDSTROM, INC.	1,498,397,132	IG20
20	FORD MOTOR COMPANY	1,497,162,176	Both

Sources: TF Market Advisors, DTCC

Of the top 20 U.S. CDS Reference Entities[14] there are 8 companies that appear in the S&P 150 but not in the CDX IG index and only 3 names that do not appear in the S&P 150 but do appear in the CDX IG index. **So while liquidity is not a focus of the S&P 150 creation, the inclusion of financials results in inclusion of more of the most active names than the IG20.**

The difference comes down to the inclusion of the big banks. It is a substantial distinction that the big banks, which are a key component of the bond market and are clearly very active in the CDS market, appear in one index and not the other.

The difference takes on even more significance when considered in light of how often financials are the drivers of the equity and credit markets. These companies are central to the credit

[14] Sorted by Net Notional Outstanding from DTCC warehouse data from June 2013

markets and often lead the way wider or tighter, so their inclusion gives a more accurate picture of the credit markets.

Originally, CDX did not include many of the larger banks or broker dealers. Investors were initially concerned about "self-referencing" or "wrong way" risk when a counterparty writes protection on its own name. There was concern that CDS products in particular would not grow if banks were included. There were market risk concerns about buying protection on an index that included a bank, from that bank. There were some legal questions about the validity of the contract. Some banks were worried that buying protection on themselves via an index could be a form of trading that wasn't allowed. Of even greater concern than the banks, was the broker dealers or Investment banks such as Goldman Sachs, Merrill Lynch, Morgan Stanley, and Bear Sterns. Those institutions didn't have the same high level of counterparty credit risk that the banks had at the time. While the market had accepted "self-referencing" or "wrong way" risk in OTC Derivative products linked to equity indices, such as the S&P 500 Equity Index, the CDS decided to exclude those entities.

Now, the market has developed and changed enough that the inclusion of financials, and the associated benefits of having the indices, is possible. Here are some of the changes that have occurred that should make this development possible:

- Clearing makes it easier to include names that traditionally had been bilateral counterparties to the trade. With clearing in CDS they can be included, just like these same entities clear and trade S&P 500 contracts where their embedded equity risk is typically more volatile than the embedded credit risk in the S&P 150. The S&P e-mini futures contracts that trade $200 billion of daily volume on the CME already includes this the stocks of some clearing members and the market accepts that.[15]
- The concept of CDS Indices has been accepted and investors trade these as indices reducing investor fear or skepticism of having big banks included in the risk. CDS indices were only "invented" in 2002 with names like HYDI, JEDI, and TRACERS[16]. Back then many investors were skeptical that they were truly "indices" and focused very much on the single name risk. Over the years, the indices have proven themselves to be market barometers rather than a way to capture specific single name risk and that change in perception also enables this change.

[15] There are differences, but it is a valid analogy and one that will be demonstrated based on some historical analysis later in this report.
[16] HYDI and JEDI were JP Morgan CDS Indices linked to U.S. High Yield and European Corporate Credits respectively. TRACERS was a Morgan Stanley product linked to U.S. Investment Grade entities.

Index Arbitrage, Rolls, and Liquidity

Most market participants believe that inclusion in the CDX indices adds to the liquidity of the Reference Entity. The fact that some market participants attempt to "arb" the index[17] causes all of the index names to be traded, thus increasing the liquidity and trading volumes of those names. There can be a constant source of supply and demand of the individual issuers in the index.

If this theory is correct, then there is reason to believe that inclusion of a company in an index can lead to greater liquidity over time. That potential, coupled with the fact that the entities being added to the S&P 150 are much bigger by debt outstanding than those unique to the CDX IG index, creates further opportunity for the liquidity gap (already small) to decrease further.

The S&P 150 is designed to roll quarterly. That means there would be a new version of the index created every 3 months which aligns with the single name roll. The CDX IG indices roll semi-annually.

So every "on-the-run" CDX index spends 3 months trading to the "on-the-run" single name maturity date and 3 months trading to a non-standard date. There are times when even that 1 quarter differential can mean far less liquidity.

By trading to the "on-the-run" date, it should be easier to get accurate price discovery for all of the names in the S&P 150, than it is for the CDX index when it is trading off-the-run. Always trading to the on-the-run date can help offset that currently the S&P 150 names are quoted less frequently. Index arbitrage activity may also increase the quote frequency in the S&P 150 names over time.

At one time quarterly rolls would have been difficult:

- The CDX IG indices were created with dealer input and the process from start to finish took almost a month, so dealers would have been kept very busy just maintaining the index[18]
- Investors often viewed the CDX IG index as a replacement for bond positions or even for single name risk, so held the positions longer, but the index has "morphed" into a trading vehicle where "off-the-run" index volumes drop quickly, with indices that are only a year old, having less than 5% of the activity of the on the run index[19]

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[17] Buying CDS on all of the Reference Entities and selling protection on the index, or vice versa

[18] Original rules that can be found at www.markit.com provide a timeline of when dealers had to submit possible reference entities, and when voting would occur for final index selection

[19] Recent DTCC data

Since the S&P 150 selection process is mechanical, and is calculated and maintained by S&P, it can be updated quarterly. That is consistent with the S&P 500® index which is also updated quarterly. Keeping the index aligned with the on-the-run single name market should help price discovery for the index valuation.

Average Spread versus Index Spread

It is important to clarify that there is a difference between "average" spread and the index intrinsic spread (or fair value spread). Average spread is often used when doing rough analysis of the indices and their components but that average spread does not directly translate into index intrinsic spread. This is important in analyzing the returns data presented. Please see Appendix D for a brief example.

Intrinsic versus Fair Value and "Historical" Data

Before examining the relative performance of the CDX IG and the S&P 150 it is important to understand how the historical performance for the S&P 150 is calculated.

The CDX IG have actual historical data, which are the trading spreads for the indices that at the time were on-the-run.

For S&P 150, the historical data has been calculated in a two-step process.

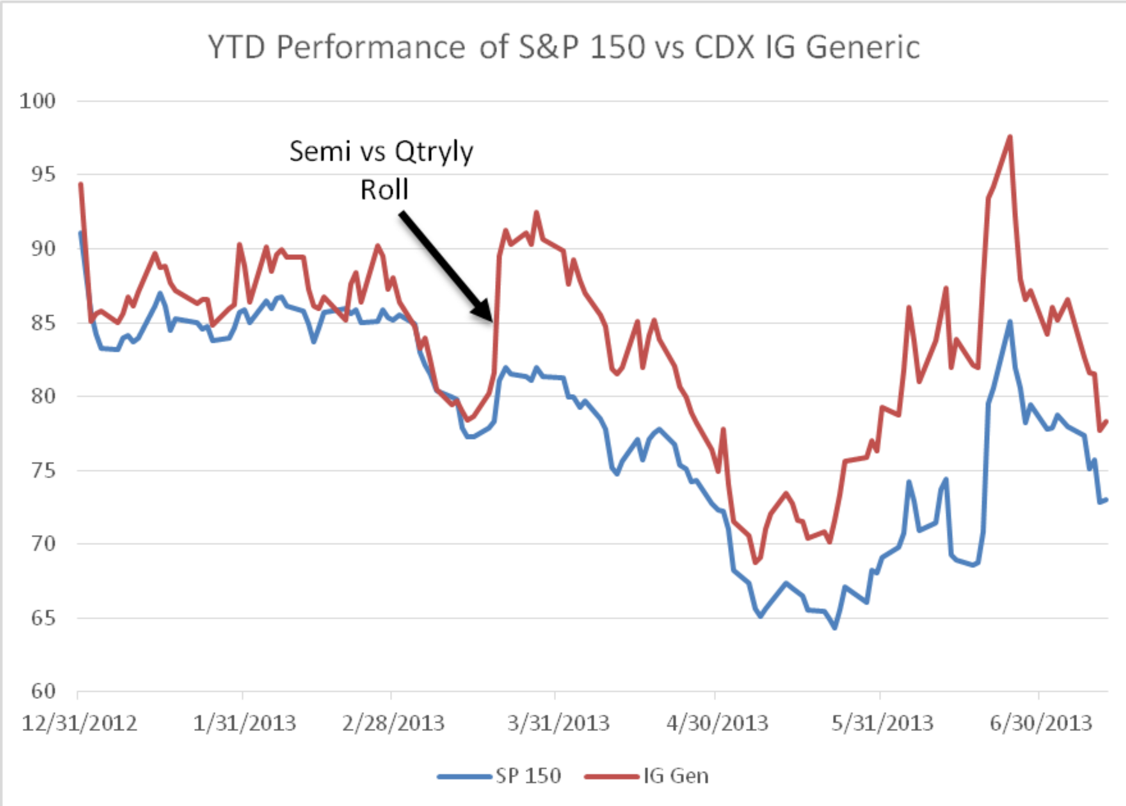
1. S&P applied the index methodology on the historical index creation dates to determine what the index would have been at the particular time. This is the most complicated way to "replicate" historical indices, but is the best way. It is easier to take the existing Reference Entities but that doesn't reflect the changing nature of the market. It wouldn't allow for Lehman to be included in the historical S&P 150 index, when it clearly would have. So by following the prescribed methodology to create the relevant index at the time, the most realistic data is created.
2. S&P calculated the "intrinsic" value of the index for each of those "historical" indices. This requires pricing on each name in the index while it is would have been an "on the run" index. The calculations follow the correct intrinsic value calculation methodology from Appendix D using CMA data.

There is a "basis" between the index "intrinsic" or "fair value" and traded spread. Appendix E delves into this concept which is important for understanding the historical information presented. Although the index tends to trade near fair value over time (and that is particularly true post SNAC[20]), there is no way to know the "traded" spreads for the S&P 150 historically.

[20] Standard North American Contract or the SNAC protocol was the "big bang" for CDS where in Q2 2009 all market participants adopted new standard terms for CDS. The big changes were that single name CDS now traded with a pre-set "coupon" of 100 bps and NO R was adopted as the standard Credit Event selection (Restructuring or

Year to Date Performance Comparison

This is the YTD comparison of the S&P 150 intrinsic value versus the CDX IG Generic index.[21]



Sources: TF Market Advisors, S&P Dow Jones Indices, Bloomberg

The indices are reasonably well correlated which makes sense as they both measure broad credit markets in a period of time that has had relatively low volatility (by the standards after the financial crisis of 2007-2008) and limited idiosyncratic risk as downgrades have been low and LBO activity has remained small. A simple correlation of the spreads is 0.83 while a correlation of the change of spreads is still 0.78.

The daily volatility, as measured by standard deviation of the daily returns is marginally higher for the CDX IG versus the S&P 150. The reason for the increased volatility could be:

- CDX IG is a slightly smaller index with smaller names that already trade a little bit wider on average may have had increased risk.

Modified Restructuring was no longer a Credit Event). That matched the terms of the CDX index and made the contract more fungible as the "unwind" or "assignment" process was purely mechanical rather than negotiated.

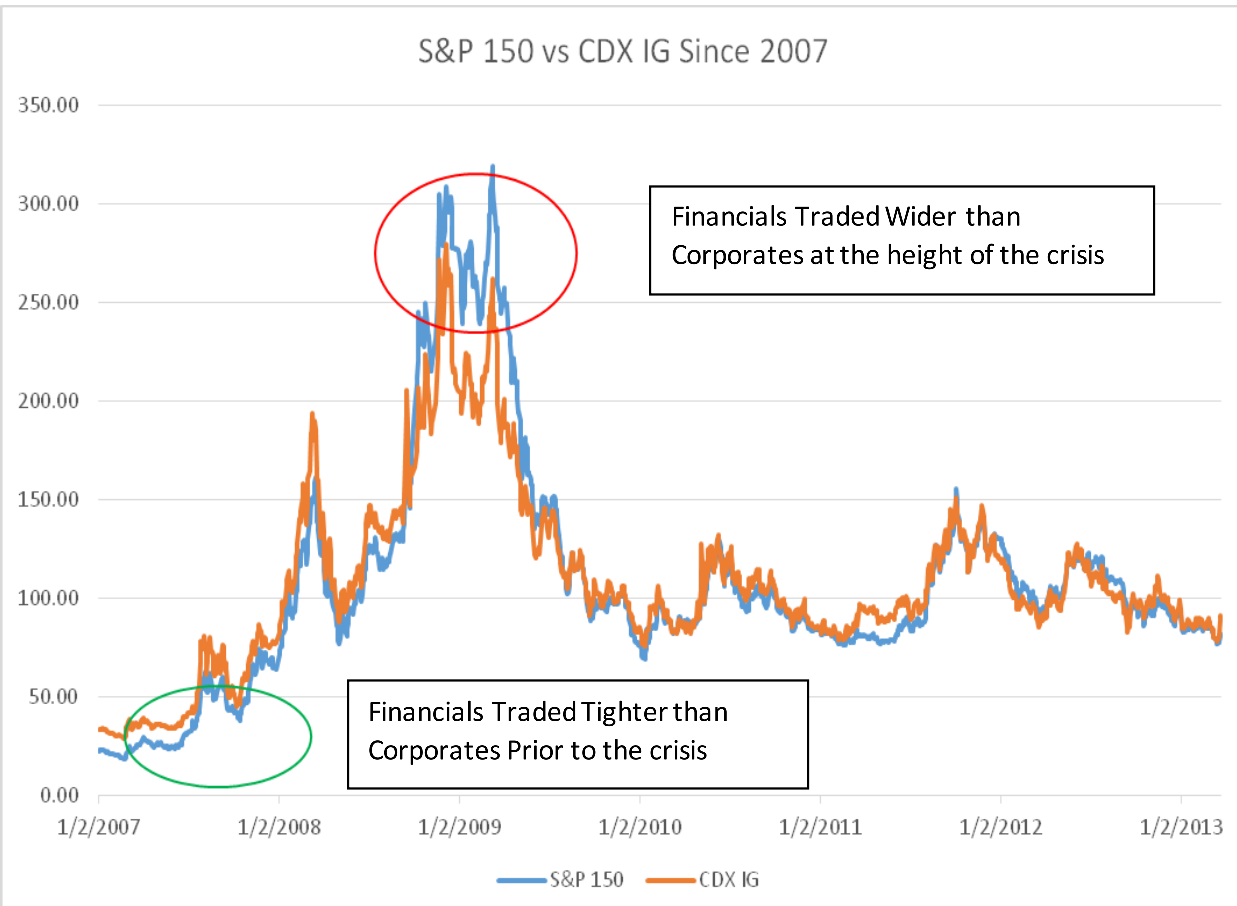
[21] The S&P 150 data are provided from http://us.spindices.com/indices/fixed-income/sp-isda-150-cds-index-otr-index and the CDX IG Generic is a composite of IG19 until the March roll and then IG20 as provided by Bloomberg.

* Data for the CDX IG is the traded prices, but for the S&P 150 is only intrinsic values, so shifting basis could explain some of the increased volatility.

The spike in March is noticeable as that is when the IG19 index rolled into IG20. The CDX IG indices have semi-annual rolls as opposed to quarterly rolls. For investment grade single names, the "quarterly" roll risk is worth about 4 to 5 bps. IG20 was launched and traded about 9 bps wider than IG19, so most of that gap in the chart is a function of the roll (and thus greater extension of maturity) and not the markets.

Over the Long Run

Since 2007 the indices have performed similarly.



Sources: TF Market Advisors, S&P Dow Jones Indices, Bloomberg

Two areas where the S&P 150 significantly deviated from the CDX IG stand out. The first period is in early 2007 when financials were still considered by the credit markets less risky than non-financials. The second is at the heart of the financial crisis when the financials, including Lehman, caused the S&P 150 to have a much wider spread level.

Long-term historic data such as this can be distorted by rolls (during periods of stress the roll looks like a gap tighter, which it is, but not because of improved credit conditions but because of some weak names dropping out as a result of downgrades or Credit Events.)[22]

The Lehman Moment

Whenever CDS is mentioned there is always talk of the "Lehman Moment". Lehman was the only "money center" bank to experience a Credit Event. It was not in the CDX IG at the time, but it was in the hypothetical S&P 150 indices from that time. It would have been included because it was in the S&P 500, investment grade, had liquid CDS and a large amount of long term debt outstanding.

That difference warrants spending some additional analysis looking at that period of time.

[22] Credit Event is a defined term in the ISDA Credit Derivatives Definitions

Sources: TF Market Advisors, S&P Dow Jones Indices, Bloomberg

This first noticeable point of interest is in March 2008 when Bear Stearns was bought by JPMorgan. That sparked a strong rally in credit and other risk assets.

It is curious that CDX IG was wider than the S&P 150 despite the concentration of financials in the S&P 150. There are several possible reasons for this:

- Bear Stearns was still viewed as more of an isolated case; whereas, by the time Lehman fell, there was growing concern of a "domino effect" where each bank that collapsed would just put the next weakest bank on the firing line. That is what prompted so many emergency measures by the Fed and the Treasury Department.
- Products like CPDO and leveraged super senior were also being unwound at the time. As these products had great leverage and "negative" convexity, as market spreads moved wider, more and more pressure was generated to buy protection for hedging these positions. That would have increased the "basis" between index trading spreads and implied fair values.

The Lehman Credit Event demonstrates that it had been largely priced in. After a brief initial gap wider, the market actually traded tighter after Lehman. Partially that was result of the removal of a defaulted name, and the index roll at that time which removed other weak names, but it was also a direct response to TARP and bailing out AIG. The market actually attempted to rally but finally sold off until March/April 2009 when stress tests, fatigue and QE1 all helped "end" the financial crisis and spark the market rally that has continued ever since.

During the financial crisis, the S&P 150 seems to have reflected the fear in the market better than the IG indices. The financials were a driving factor in the crisis and their inclusion meant that the S&P 150 would have significantly underperformed the CDX IG indices, but tracked what the market was like at that time more accurately.

For some who might be surprised how well the S&P 150 would have withstood Lehman, it is a clear demonstration of how well CDS, particularly liquid names, trades and prices risk in a timely manner. Lehman was not a complete surprise so the name itself should not move down that much on the default, and it would have been only 1 out of 150 names so a small portion of the index price (even a surprise move of 50pts in price would only be worth 0.33% price move in the index). Similarly, since it was not a complete surprise, the knock on effect on other names would be less so. In addition, Merrill was rescued by Bank of America at the same time and AIG was rescued by the Treasury, which were both significant moves tighter and would have helped to offset losses at the time.

Appendix A

Reference Entities Common to S&P 150 and CDX IG20

S&P 150	*CDX IG20*	*Reference Entity*	*Reference Obligation*	*Sector*	*S&P Rating*
	✓	Boeing Capital Corp			
✓		Boeing Company/The	097023AD7	Industrials	A

S&P 150	***CDX IG20***	***Reference Entity***	***Reference Obligation***	***Sector***	***S&P Rating***
✓	✓	Aetna Inc	00817YAF5	Health Care	A-
✓	✓	Alcoa Inc.	013817AP6	Basic Materials	BBB-
✓	✓	Allstate Corp	020002AH4	Financials	A-
✓	✓	Altria Group Inc	02209SAA1	Consumer Non-Cyclical	BBB
✓	✓	American Electric Power Company, Inc.	025537AE1	Utilities	BBB
✓	✓	American Express Company	025816AW9	Financials	BBB+
✓	✓	American International Group, Inc.	026874AZ0	Financials	A-
✓	✓	Amgen Inc	031162AJ9	Health Care	A+
✓	✓	Anadarko Petroleum Corp.	032511AX5	Oil & Gas	BBB-
✓	✓	AT&T Inc	001957BD0	Telecommunications	A-
✓	✓	Baxter International Inc.	071813AM1	Health Care	A+
✓	✓	Berkshire Hathaway Inc	084664BE0	Financials	AA+
✓	✓	Bristol-Myers Squibb Co	110122AB4	Health Care	A+
✓	✓	Capital One Bank, (USA) N.A.	14040EHK1	Financials	BBB
✓	✓	Carnival Corp.	143658AF9	Consumer Cyclical	BBB+
✓	✓	Caterpillar Inc.	149123BM2	Oil & Gas	A
✓	✓	CBS Corporation	124857AA1	Consumer Cyclical	BBB
✓	✓	Cigna Corp	125509AZ2	Health Care	BBB
✓	✓	Cisco Systems Inc.	17275RAC6	Technology	A+
✓	✓	Comcast Corp.	20030NAE1	Consumer Cyclical	BBB+
✓	✓	ConocoPhillips	20825CAF1	Basic Materials	A
✓	✓	CSX Corporation	126408GF4	Industrials	BBB
✓	✓	CVS Caremark Corporation	126650AV2	Consumer Non-Cyclical	BBB+
✓	✓	Deere & Co.	244199BB0	Industrials	A
✓	✓	Dell Inc.	247025AE9	Technology	A-
✓	✓	Devon Energy Corporation	251799AA0	Oil & Gas	BBB+
✓	✓	DirecTV Holdings LLC	25459HBA2	Technology	BBB
✓	✓	Dominion Resources, Inc.	25746UBE8	Utilities	A-
✓	✓	Dow Chemical Company	260543BJ1	Basic Materials	BBB
✓	✓	Du Pont E.I. de Nemours & Co	263534BN8	Basic Materials	A
✓	✓	Duke Energy Carolinas, LLC	26442CAA2	Utilities	BBB+
✓	✓	Eastman Chemical Company	277432AD2	Basic Materials	BBB
✓	✓	ERP Operating LP	26884AAX1	Financials	BBB+
✓	✓	Exelon Corporation	30161NAD3	Utilities	BBB
✓	✓	FirstEnergy Corp	337932AC1	Utilities	BBB-
✓	✓	Ford Motor Company	345370BX7	Consumer Cyclical	BB+
✓	✓	General Electric Capital Corp	36962G3H5	Financials	AA+
✓	✓	General Mills Inc.	370334BB9	Consumer Non-Cyclical	BBB+
✓	✓	Genworth Financial, Inc.	37247DAK2	Financials	BBB-
✓	✓	Halliburton Company	406216AW1	Oil & Gas	A
✓	✓	Hartford Financial Services Group	416515AT1	Financials	BBB
✓	✓	Hewlett-Packard Company	428236AM5	Technology	BBB+
✓	✓	Home Depot Inc.	437076AR3	Consumer Cyclical	A-
✓	✓	Honeywell International Inc	438516AR7	Industrials	A

S&P 150	*CDX IG20*	*Reference Entity*	*Reference Obligation*	*Sector*	*S&P Rating*
✓	✓	International Business Machines Corp.	459200GJ4	Technology	AA-
✓	✓	International Paper Company	460146CE1	Basic Materials	BBB
✓	✓	Johnson Controls Inc	478366AG2	Consumer Cyclical	BBB+
✓	✓	Kroger Co	501044CH2	Consumer Non-Cyclical	BBB
✓	✓	Lockheed Martin Corporation	539830AE9	Industrials	A-
✓	✓	Loews Corporation	540424AN8	Financials	A+
✓	✓	Lowe`s Companies, Inc.	548661CK1	Consumer Cyclical	A-
✓	✓	Macy's, Inc.	55616XAA5	Consumer Discretionary	BBB
✓	✓	McDonald's Corporation	58013MEB6	Consumer Cyclical	A
✓	✓	Metlife, Inc.	59156RAU2	Financials	A-
✓	✓	Mondelez International, Inc.	50075NAL8	Consumer Non-Cyclical	BBB
✓	✓	Nabors Industries Inc.	629568AQ9	Oil & Gas	NR
✓	✓	Norfolk Southern Corp.	655844AE8	Utilities	BBB+
✓	✓	Omnicom Group	681919AS5	Consumer Cyclical	BBB+
✓	✓	Pfizer Inc.	717081AQ6	Health Care	AA
✓	✓	Raytheon Company	755111AF8	Industrials	A-
✓	✓	Reynolds American Inc.	761713AE6	Consumer Non-Cyclical	BBB-
✓	✓	Safeway Inc.	786514BP3	Consumer Non-Cyclical	BBB
✓	✓	Sempra Energy	816851AJ8	Utilities	BBB+
✓	✓	Simon Property Group, L.P.	828807BW6	Financials	A-
✓	✓	SLM Corp	78442FAQ1	Financials	BBB-
✓	✓	Target Corporation	87612EAP1	Consumer Cyclical	A+
✓	✓	Time Warner Cable Inc.	88732JAC2	Consumer Non-Cyclical	BBB
✓	✓	Time Warner Inc.	887317AC9	Consumer Cyclical	BBB
✓	✓	Union Pacific Corp.	907818CX4	Industrials	A-
✓	✓	United Parcel Service Inc.	911308AB0	Industrials	A+
✓	✓	UnitedHealth Group Inc	91324PBJ0	Health Care	A
✓	✓	Valero Energy Corp.	91913yab6	Oil & Gas	BBB
✓	✓	Verizon Communications Inc	92343VAF1	Telecommunications	A-
✓	✓	Viacom Inc.	92553PAB8	Consumer Cyclical	BBB+
✓	✓	Wal-Mart Stores Inc.	931142CB7	Consumer Non-Cyclical	AA
✓	✓	Walt Disney Company/The	25468PBD7	Consumer Cyclical	A
✓	✓	Xerox Corp.	984121BP7	Technology	BBB-

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Appendix B

Reference Entities in IG20 but not S&P 150

S&P 150	*CDX IG20*	*Reference Entity*	*Reference Obligation*	*Sector*	*S&P Rating*
	✓	ACE Ltd			
	✓	Arrow Electronics Inc			
	✓	AutoZone Inc			
	✓	Avnet Inc			
	✓	Barrick Gold Corp			
	✓	Beam Inc			
	✓	Block Financial LLC			
	✓	Boston Scientific Corp			
	✓	Campbell Soup Co			
	✓	Cardinal Health Inc			
	✓	Chubb Corp/The			
	✓	Computer Sciences Corp			
	✓	ConAgra Foods Inc			
	✓	COX Communications Inc			
	✓	Darden Restaurants Inc			
	✓	Expedia Inc			
	✓	Freeport-McMoRan Copper & Gold Inc			
	✓	Gap Inc/The			
	✓	Goodrich Corp			
	✓	Hillshire Brands Co			
	✓	HJ Heinz Co			
	✓	Ingersoll-Rand Co			
	✓	Kinder Morgan Energy Partners LP			
	✓	Kohl's Corp			
	✓	Marriott International Inc/DE			
	✓	Marsh & McLennan Cos Inc			
	✓	McKesson Corp			
	✓	MDC Holdings Inc			
	✓	MeadWestvaco Corp			
	✓	Motorola Solutions Inc			
	✓	National Rural Utilities Cooperative Finance Corp			
	✓	Newell Rubbermaid Inc			
	✓	News America Inc			
	✓	Nordstrom Inc			
	✓	Northrop Grumman Corp			
	✓	Pitney Bowes Inc			
	✓	Quest Diagnostics Inc			
	✓	Ryder System Inc			
	✓	Sherwin-Williams Co/The			
	✓	Southwest Airlines Co			
	✓	Staples Inc			
	✓	Starwood Hotels & Resorts Worldwide Inc			
	✓	Transocean Inc			
	✓	Tyson Foods Inc			
	✓	Whirlpool Corp			
	✓	XLIT Ltd			
	✓	Yum! Brands Inc			

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Appendix C

Reference Entities in S&P 150 but not IG20

S&P 150	*CDX IG20*	*Reference Entity*	*Reference Obligation*	*Sector*	*S&P Rating*
✓		3M Company	604059AE5	Industrials	AA-
✓		Abbott Laboratories	002819AC4	Health Care	A+
✓		Air Products & Chemicals Inc.	009158AR7	Basic Materials	A
✓		American Tower Corporation	029912AT9	Financials	BB+
✓		Apache Corp	037411AN5	Oil & Gas	A-
✓		Archer-Daniels-Midland Co.	039483AT9	Consumer Non-Cyclical	A
✓		Bank of America Corp.	06051GDX4	Financials	A-
✓		Boston Properties L.P.	10112RAQ7	Financials	A-
✓		Centerpoint Energy Inc	15189TAN7	Utilities	BBB+
✓		Chevron Corporation	881685AX9	Oil & Gas	AA
✓		Citigroup Inc	172967AQ4	Financials	A-
✓		Coca-Cola Company/The	191216AK6	Consumer Non-Cyclical	AA-
✓		Colgate-Palmolive Company	19416QBX7	Consumer Non-Cyclical	AA-
✓		Consolidated Edison Inc.	209111EK5	Utilities	A-
✓		Covidien Ltd.	22303QAG5	Health Care	A
✓		Danaher Corporation	235851AG7	Industrials	A+
✓		DTE Energy Company	233331AJ6	Utilities	BBB+
✓		Eaton Corp	278058DC3	Industrials	A3
✓		Eli Lilly and Company	532457AN8	Health Care	AA-
✓		Ensco PLC	26874QAB6	Oil & Gas	BBB+
✓		Entergy Corp	29364GAF0	Utilities	BBB
✓		EOG Resources, Inc.	293562AD6	Oil & Gas	A-
✓		Exxon Mobil Corporation	607059AT9	Oil & Gas	AAA
✓		Goldman Sachs Group Inc	38141GCM4	Financials	A-
✓		HCP, Inc.	40414LAA7	Financials	BBB+
✓		Health Care REIT, Inc.	42217KAL0	Financials	BBB-
✓		Hess Corporation	42809HAA5	Oil & Gas	BBB
✓		Illinois Tool Works Inc	452308AJ8	Industrials	A+
✓		Intel Corporation	458140AD2	Consumer Cyclical	A+
✓		Johnson & Johnson	478160AM6	Health Care	AAA
✓		JP Morgan Chase & Co.	46625HCE8	Financials	A
✓		Kellogg Company	487836BD9	Consumer Non-Cyclical	BBB+
✓		Kimberly-Clark Corp.	494368AQ6	Consumer Non-Cyclical	A
✓		Marathon Oil Corp	565849AE6	Oil & Gas	BBB
✓		Medco Health Solutions Inc	58405UAF9	Health Care	BBB+
✓		Medtronic Inc.	585055AH9	Health Care	A+
✓		Merck Sharp & Dohme Corp.	589331AE7	Health Care	AA
✓		Microsoft Corp.	594918AB0	Technology	AAA
✓		Morgan Stanley	61747YCE3	Financials	A-

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S&P 150	CDX IG20	Reference Entity	Reference Obligation	Sector	S&P Rating
✓		Newmont Mining Corp	651639AE6	Basic Materials	BBB+
✓		NextEra Energy Capital Holdings, Inc	302570BC9	Financials	A-
✓		NiSource Finance Corp	65473QAL7	Utilities	BBB-
✓		Noble Corporation	G65422AA8	Oil & Gas	BBB+
✓		Northeast Utilities	664397AH9	Utilities	A-
✓		Occidental Petroleum Corp.	674599BM6	Oil & Gas	A
✓		Oneok Inc.	682680AM5	Utilities	BBB
✓		Oracle Corporation	68389XAC9	Technology	A+
✓		Pacific Gas and Electric Company	694308GD3	Utilities	BBB
✓		PepsiCo, Inc.	713448CB2	Consumer Non-Cyclical	A
✓		Philip Morris International Inc.	718172AC3	Consumer Non-Cyclical	A
✓		PNC Financial Services Group, Inc.	635405AQ6	Financials	A-
✓		PPL Energy Supply LLC	69352JAL1	Utilities	BBB
✓		Praxair Inc.	74005PBA1	Basic Materials	A
✓		Procter & Gamble Co	742718DA4	Consumer Cyclical	AA-
✓		Prologis	00163MAB0	Financials	BBB-
✓		Prudential Financial Inc	74432QBC8	Financials	A
✓		PSEG Power LLC	69362BAN2	Utilities	BBB
✓		Republic Services Inc.	760759AL4	Industrials	BBB
✓		SCANA Corp	80589MAB8	Utilities	BBB+
✓		Schlumberger Ltd	806857AD0	Oil & Gas	A+
✓		Southern Company	842587CG0	Utilities	A
✓		Spectra Energy Capital, LLC	84755TAA5	Oil & Gas	BBB+
✓		U.S. Bancorp	91159HGR5	Financials	A+
✓		United Technologies Corp.	913017BM0	Industrials	A
✓		Ventas Realty LP	92276MBA2	Financials	0
✓		Vornado Realty LP	929043AF4	Financials	BBB+
✓		Waste Management Inc.	94106LAR0	Industrials	BBB
✓		WellPoint, Inc.	94973VAM9	Telecommunications	A-
✓		Wells Fargo & Company	949746NA5	Financials	A+
✓		Williams Companies, Inc./The	969457BB5	Oil & Gas	BBB
✓		Wisconsin Energy Corp	976657AG1	Utilities	A-
✓		Xcel Energy Inc	98389BAM2	Utilities	A-

Appendix D

Average Spread versus Index Intrinsic Spread

A simple example using a two name "index" with dramatically different spreads for the two names will illustrate the point.

Assume the index has only XOM at 20 bps and Alcoa at 290 bps. The simple average would be 155 bps, but that is not the correct answer.

CDS trades on a "SNAC" basis. A value is calculated for each traded price. The index "intrinsic value" is the value that creates that same total value.

Source: Bloomberg

This Bloomberg screen shot shows that someone selling $10MM of XOM protection at 20 bps, would have to pay $411,965 to the buyer of protection (the seller pays because the traded spread is below the SNAC spread of 100).

If this same investor was to sell $10MM of Alcoa at 290 bps, they would receive $850,770 (because the traded spread is above the SNAC spread of 100). So the seller of protection $10MM XOM at 20 bps and $10MM AA at 290 bps on July 15th could expect to receive a total of $438,812.

Source: Bloomberg

The “intrinsic” or “fair” spread on the index would be the spread that generates $438,812 on a sale of $20 million of the 2 name index.

Source: Bloomberg

It turns out that the “intrinsic” or “fair value” spread of this simple index is 147.25 rather than the simple average of 155.

Basically, as CDS spreads widen on a particular name, the impact on the “intrinsic” value decreases for every basis point because more likelihood of default is being priced in. This “convexity” is an important part of CDS and an important reason why the SNAC protocol was adopted by the industry.

Appendix E

The Basis

There is a "basis" between the index "intrinsic" or "fair value" spread and traded index spreads. The focus in this example has to be on the CDX indices as they have an observable historical basis.

Source: Bloomberg

This is the "basis" for the IG19 index from Bloomberg using CMA data.

The IG19 index was created on September 20th, 2012 and went "off the run" on March 20th, 2013 but shows how the basis and traded spread do not exactly track.

The basis can move. For much of last year and this year the basis was negative, or the index was trading "rich" or tighter than fair value. In the recent sell-off it was trading wider.

There are several things that affect the "basis"

- The most important factor is the accuracy of the single name CDS prices used to calculate the fair value. Most people use “mid-market” spreads to determine the fair value. There is a strong lag effect in that mid-market quotes often lag the real movement. That is why you often see the basis moving in the same direction of the index. Effectively the fair value just isn’t accurate without taking bid/ask into consideration.
- Rolls affect the fair value as when the index is trading to the “on the run” date, the 5 year CDS spreads can be used. When the CDX indices are trading to off the run, some form of interpolation is used to calculate single name spreads, which can have an impact.

Historically, the basis was even greater prior to the SNAC protocol because

- Indices traded NR while single names were MR creating real risk.
- Indices already traded on a “price” basis where 100 bps was the fixed rate paid and used to calculate price, whereas the single names traded on a “spread” basis where fixed rate was the spread at which the trade was executed and unwinds were often complicated and negotiated affairs if spreads had move significantly since the original trade.

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