Section D

Credit Curves

chapter 33 Getting Short the Long End

October 10, 2003

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As credit derivatives markets have developed over the past several years, there has been at least one important disconnection with the corporate bond market. Banking institutions spurred the growth of five-year maturities in credit default swaps, while long liabilities at insurance companies and pension funds have continued to keep corporate bonds a much longer maturity market. This maturity mismatch has discouraged some investors from becoming involved in both markets.

While a complete term structure in default swaps has yet to fully develop, market participants are taking steps in the right direction. This has obvious implications in the single-name world. In addition, we find a similar significant effect on the structured credit and CDO markets, where cash CDOs tend to carry longer maturities than typical synthetic structures. With trading on a 10-year TRAC-X product commencing, we now have an important liquidity point in the market, which we can in turn use to formulate investment ideas. At approximately 10 bp, the 5s-10s CDS curve in TRAC-X seems too flat to us, from a default risk perspective. In this chapter, we provide analysis that supports our view, and we recommend trading strategies in TRAC-X and tranches of TRAC-X.

DEVELOPING TERM STRUCTURE

A 10-year liquidity point is developing in the credit derivatives market at an odd time, historically. The 5s-10s curve in Treasuries is at 110 bp, a historically steep level that was previously reached in 1992; before that, the last time we reached this point was in 1977. To make up for this steepness, swap curves are flat 5s-10s. Corporate spreads are relatively flat to slightly inverted, as well. We calculate a "same-issuer" 5s-10s curve to be -15 bp on a Treasury basis, or +7 bp on a Libor basis.

All-in yield buyers of corporate bonds appear quite happy with the Treasury curve steepness and have not demanded additional steepness in spreads. In fact, cash-rich life insurance companies are likely to continue this trend (see Greg Peters' October 6, 2003, *Credit Basis Report*, "Springs of Frustration"). Total-return-oriented buyers of corporate bonds should be a bit more worried about not being compensated for the additional default risk associated with a longer maturity, but technicals are working against this logic, as well. Pension funds need duration, and the shrinking supply of 30-year corporate debt puts even more demand on 10-year bonds.

IT'S ALL ABOUT DEFAULT RISK

Given all the flatness that we see in corporate spreads, one might believe that 10 bp of steepness in the newly created TRAC-X 5s-10s curve is decent value. That's not where we come out, though. The factors we mentioned above that drive spread and all-in-yield relationships in the cash markets may not exist in default swaps, which are simpler instruments where users are more focused on default risk.

If we focus purely on default risk, we can quantify what curve steepness should be, given assumptions about future default behavior. For example, if we assume that default risk is

constant over time, then we calculate that a 5s-10s curve should be worth only 2 bp, given today's five-year TRAC-X level of about 70 bp and yield curve shape. Yet default risk (and therefore spreads) is not constant over time, so this analysis is too simple.

exhibit 1 Default Risk Rises Over Time – Cumulative Default Rates (1920-2002, Annl Avg)

				First 5 Years vs Last 5 Years	
Rating	5-Year Annualized	10-Year Annualized	Last 5 Years Annualized	Difference in bp	Percentage Increase
Aaa	0.04%	0.10%	0.17%	0.13%	339%
Aa	0.17%	0.28%	0.39%	0.22%	130%
A	0.26%	0.35%	0.44%	0.18%	70%
Baa	0.73%	0.83%	0.93%	0.20%	28%
All IG	0.39%	0.48%	0.57%	0.18%	47%

Source: Morgan Stanley, Moody's

Historically, ratings migration has been a net negative phenomenon in investment grade credit. This implies that, for highly rated credits, relative default risk increases over time. Using data from Moody's (for 82 years), when tracking credits over a 10-year period, we estimate that there is on average 47% more default risk in the last five years than the first five years (see Exhibit 1). What is this worth in spread? If we assume that the first five years is worth 70 bp (where five-year TRAC-X trades now), then the last five years is worth an additional 14 bp (which is 20% more spread). If spreads move wider, clearly this measure of curve steepness will move wider as well.

exhibit 2 Economic Cycles are Important – Default Rates Immediately Following Recessions

				First 5 Years vs Last 5 Years	
Rating	5-Year Annualized	10-Year Annualized	Last 5 Years Annualized	Difference in bp	Percentage Increase
1991-93	0.02%	0.10%	0.17%	0.15%	1113%
1981-83	0.28%	0.48%	0.68%	0.40%	143%
1975-77	0.06%	0.22%	0.37%	0.31%	556%
Average					604%

Source: Morgan Stanley, Moody's

DEFAULT RATES ARE CYCLICAL

We note that the above analysis is based on average cumulative default experience. However, default rates are very economically cyclical. Today's tight five-year spread levels tell us that market participants expect a medium-term expansionary period in the US. But expansionary periods generally do not last 10 years. If we consider the early 1990s as an example, investment grade default rates were extremely tame for the first five years, and then much worse for the last five years, as we all painfully remember (see Exhibit 2). In fact, we looked back at the beginning of the last three US

expansionary periods and concluded that back-five-year default risk was on average 604% higher than front-five-year default risk. If we combine today's spread levels with a historically conservative assumption that the back five years are 150% as risky as the front, we find the implied steepness for 5s-10s to be about 40 bp.

IMPLEMENTING THE VIEW – STRAIGHT CURVE PLAYS

Given our supporting arguments, we favor steepening or short forward credit risk trades in TRAC-X. In Exhibit 3 we outline two basic strategies involving selling five-year protection and buying 10-year protection. If equally weighted, the trade has negative carry (-15 bp), but the offsetting positions result in no default exposure for the first five years. The trade would benefit from both curve steepening and spread widening. Curve flattening would hurt the trade.

The second strategy is the same trade with duration-weighting, which results in positive carry. It will also benefit from curve steepening and spread widening, but the payoffs are a bit more muted, given the weighting (see Exhibit 4 for both strategies). A duration-weighting, however, results in an incomplete default risk hedge in the first five years, leaving the investor exposed to roughly 40% of the notional default exposure of the long credit position.

exhibit 3 TRAC-X 5s-10s Steepening Strategies

		Long Position		Short Position
Strategy 1				
Notional/Tranche	25MM	TRAC-X II 5 Year	25MM	TRAC-X II 10 Year
Recent Spread		67		83
Net Carry (bp)*		-15		
Strategy 2				
Tranche	25MM	TRAC-X II 5 Year	15MM	TRAC-X II 10 Year
Recent Spread		67		83
Net Carry (bp)*		17		
Strategy 3				
Tranche	10MM	0-3% 5 Year	60MM	TRAC-X II 10 Year
Recent Spread		500 + 49% Upfront		83
Net Carry (bp)*		1717		
Strategy 4				
Tranche	10MM	0-3% 5 Year	17MM	10-15% 10 Year
Recent Spread		500 + 49% Upfront		175
Net Carry (bp)*		1917		

Note: Carry is based on running yield equivalents, not on cash flows.
Source: Morgan Stanley

IMPLEMENTING THE VIEW – TRANCHED STRATEGIES

In past research, we have discussed the merits of a tranched trading strategy involving a long credit position in the subordinate tranche of TRAC-X (0-3%), combined with a short credit position in the underlying (TRAC-X) or a senior tranche of the underlying (10-15%, see "The Long and Short of It," August 22, 2003). The trading strategies result in both positive carry and significantly positive convexity, in exchange for first loss exposure and a long correlation position. We revisit this trading strategy with the 10-year TRAC-X instrument, as the additional spread duration for going out 10 years offers some interesting performance characteristics (see Exhibit 4).

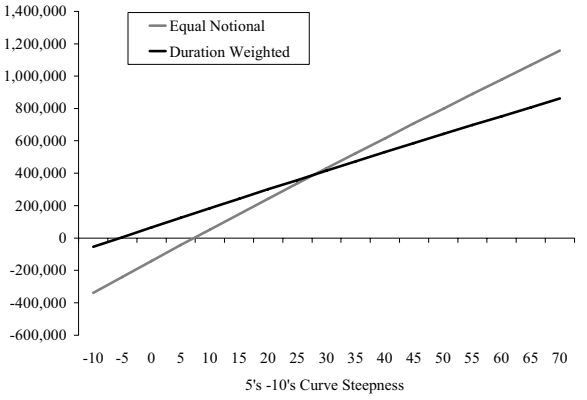
Combining a long credit position in a five-year 0-3% tranche with a delta hedge in straight 10-year TRAC-X results in a strategy that has slight negative carry and benefits from a steepening spread curve, combined with either widening or tightening of spreads. When compared to a delta hedge in five-year TRAC-X, the 10-year hedge results in greater convexity and better performance at near current spread levels, offset by less carry and 9% greater notional default exposure.

Finally, if we use the 10-15% tranche of 10-year TRAC-X as the short credit instrument, the long correlation strategy is even more positively convex; however, it does have increased first-loss exposure, compared to simply buying protection in 10-year TRAC-X outright.

The performance for both of the above strategies can be seen in Exhibit 5. While we assume the 5s-10s curve is fixed at 11 bp in this exhibit, both strategies would also benefit from a steepening in the 5s-10s curve.

exhibit 4

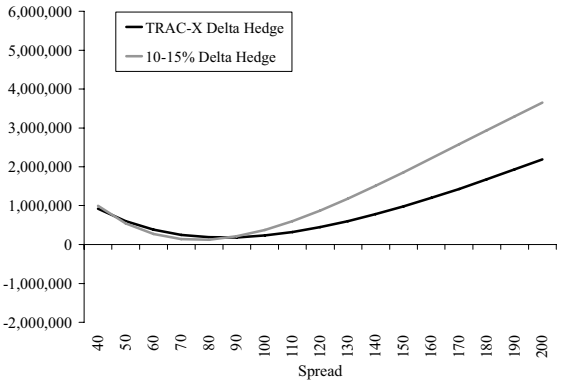
Sell 5-Year, Buy 10-Year Protection



Source: Morgan Stanley

exhibit 5

Steepeners with Spread Convexity – Long 5-Year 0-3% Risk, Short 10-Year Risk



Source: Morgan Stanley

chapter 34 Basis Trading with Steep Credit Curves

June 25, 2004

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Basis trading, in its many flavors, continues to be a reasonably active focus area for credit investors, despite a basis regime that has changed so radically over the past year. When the basis was negative last year (bonds trading wider than default swaps), long bond vs. long protection trades were all the vogue. For the most part, those trades worked out, although how investors chose to hedge interest rate risk made a difference (paying fixed on swaps was probably the best approach, in retrospect). In Chapter 25, we focused on how the opportunity set in high yield was ripe for "convexity trades," where investors position for large moves in a credit (in either direction) by buying long-dated bonds (at a discount) versus short-dated protection.

In investment grade markets, a steep credit curve environment is one of the most important basis trading themes in today's markets. There is strong fundamental support for steep curves in the short end today, as healthy corporate balance sheets with high cash balances make near-term default risk seem low. Flows in both cash and derivatives markets support this phenomenon, although the reasons are more technical than fundamental.

exhibit 1
The Steep Short End – BBB Cash 2s-5s Curve

Source: Morgan Stanley

Steep credit curves have important relative value implications for corporate bonds in general, and basis trades in particular. The Z-Spread measure, which has become a household term recently, assumes that credit curves are flat. Yet, given both the liquidity and steepness of default swap curves, ignoring curve shape results in a misleading relative value picture. When we adjust Z-Spread measures for steep curves,

we find the relative value implications interesting, which in turn impacts basis trading opportunities. In this chapter, we review this curve adjustment and explore ideas in the short end that build on this phenomenon and take advantage of technical flows.

A MARKET MATURES – SO SHOULD RELATIVE VALUE MEASURES

A year ago, we argued that Z-Spread was a simple, intuitive relative value measure for a corporate bond that takes into consideration the timing of cash flows and the discount or premium price of a bond.[1] In bond math terms, Z-Spread is simply the fixed spread (over a zero Libor curve) that equates the present value of a bond's coupon and principal payments with its price. It has certainly gained popularity over the past year and is used in many ways, including in basis calculations. However, in that same report we pointed out that Z-Spread measures ignore the shape of credit curves, which we were comfortable doing in the market environment one year ago.

Times have changed, though, and credit curves in default swaps have both gained liquidity and steepened rather dramatically over the past several months. As such, this valuable market information should not be ignored. We highlighted this theme in the TMT sector late last year, where steep credit curves and high dollar prices (at the time) were important considerations.[2] Today, this theme is applicable to most of the investment grade market.

ADJUSTING Z-SPREAD FOR CURVE SHAPE

Default swap curves give us simple, yet important information on issuer default probabilities for a given term. In theory, corporate bond markets can give us the same, but this information is clouded by the fact that bonds have different coupons, trade at different prices, and have associated interest rate risk. If we mix things up a bit, we can get the best of both worlds, or a Z-Spread-like measure where each cash flow is adjusted by the probability of default for that term (assuming a fixed recovery rate). Note that we use default swap markets for curve *shape* information only. Bond prices still determine the yield of the bond.

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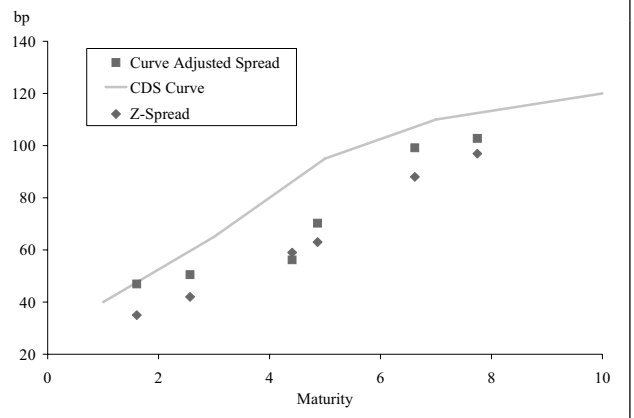
[1] *Please refer to Chapter 9.*
[2] *Please refer to Chapter 23.*

chapter 34

exhibit 2

Sprint – Bonds Cheaper Than Z-Spread Suggests



Source: Morgan Stanley

ILLUSTRATING THE NEW RELATIVE VALUE MEASURE

From the perspective of valuing a bond, a steep credit curve means that early cash flows are less risky than later cash flows as compared to an identical credit with a flat curve. Compared to a regular Z-Spread, a curve-adjusted spread will be higher, implying that the bonds are more attractive than a regular Z-Spread may suggest. As an example, Sprint has a fairly steep credit curve (30 bp between 3 and 5 years), so for most of the bonds highlighted in Exhibit 2, the Z-Spread is lower than the curve-adjusted spreads, suggesting that the bonds are cheaper than implied by the Z-Spread.

WHAT DOES THIS MEAN FOR THE BASIS?

The basis, as most calculate it (including us) represents a "practical" way of implementing a bond versus default swap trade. In a nutshell, an investor, buys (or sells) a bond, hedges the interest rate risk (with swaps), and buys (or sells) equivalent maturity protection. The dollar price of the bond determines the notional amounts, as would the desired default P/L exposure. For bonds trading at a premium, additional protection can be used to hedge this additional zero-recovery exposure, which will pull to par over time.

The problems in today's simple basis calculations are two-fold. First, as we highlighted above, Z-Spread may be misleading if credit curves are relatively steep (especially for wider trading credits). Second, the technical differences between both markets may be as important as the carry, particularly in a strong fundamental environment. Don't be scared of negative carry trades.

SHORT-END CURVE STEEPNESS – FUNDAMENTAL AND TECHNICAL PICTURE

Given corporate America's strong balance sheets – including high cash balances – near-term default risk does indeed seem low, so a steep short-end curve is justified. But there are technical reasons behind the steepness as well. In default swaps, the market appears to be very much one-way for two- and three-year maturities, with flows mainly from those taking on short-dated credit risk or continuing the unwinding of original 5-year protection positions purchased in the 2001-2002 period. In the cash markets, there is a strong cultural bid for short-dated paper from the large universe of short-corporate buyers, which keeps the curve generally steep during times of low default risk (see Exhibit 1).

In Exhibit 3, we illustrate curve shape differences between default swaps and corporate bonds for several issuers, using our curve-adjusted spread measure. Relationships like these can help to better navigate basis opportunities, including positioning for steeper curves in one market versus another.

LIVING WITH STEEP CREDIT CURVES

To summarize our thoughts from above in a more actionable framework, we find several themes that should help credit investors position in a steep credit curve environment. In particular, for at least a handful of issuers, we support the idea of going long five-year credit risk in bonds and buying short-dated protection, for the following reasons.

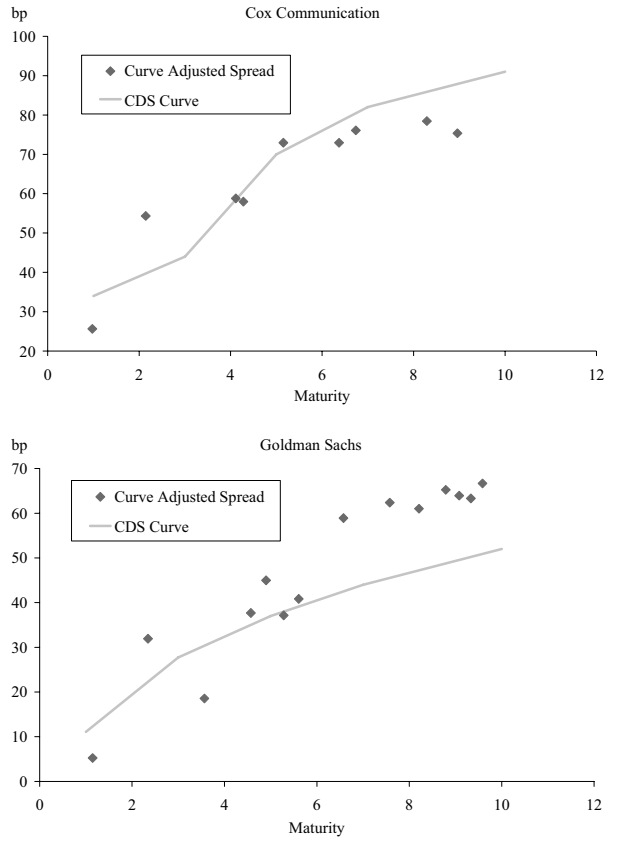
- If credit curves remain steep, then owning five-year credit risk and positioning for the roll down is attractive.
- If credit curves flatten, owning five-year paper versus shorter-dated risk makes sense.
- Over a medium-term horizon, five-year bonds could outperform five-year default swaps (even if they are lower spread today) because of the strong technical demand for short-dated corporate paper. Our curve shape implied relative value measures demonstrate this richness today.
- The short end of the default swap market continues to be one way (takers of credit risk), so buyers of protection would be easily welcomed.

We find numerous examples where investors are paid well for owning the back two years of five-year credit risk (i.e., 2-year risk, three years forward).

chapter 34

exhibit 3

Basis Relative Value Picture



Source: Morgan Stanley

exhibit 4 Paid Well to Own the Back Years of Default Risk?

				Implied Spreads			
Ticker	Instrument	Maturity	Spread	Hedged Period	Unhedged Period	Weighted Average	Forward Period
GS	6.65's of 2009	4.9	45				
	3 Year CDS*	3.0	29				
	Net	*1.9*		*16*	*45*	*27*	*70*
FON	7.625's of 2011	6.6	99				
	3 Year CDS*	3.0	72				
	Net	*3.6*		*27*	*99*	*66*	*121*

**CDS premium is notionally adjusted to bond dollar price*
Source: Morgan Stanley

We list two opportunities in Exhibit 4, where taking 5-year like risk in bonds may benefit from curve shape, and furthermore, the use of 3-year protection would create attractive payouts for owning just the back end of credit risk (i.e., forward long). For example, in Goldman Sachs, 5-year bonds versus 3-year protection would earn 16 bp for the hedged period (3 years) and 45 bp for the unhedged period (last 2 years). The weighted average of those premiums is 27 bp (for 5 years), or 70 bp for the back two years.

chapter 35 Painting Credit Curves – Broad Strokes vs. Fine Lines

July 16, 2004

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We continue to believe that both fundamental and technical drivers of credit curve shapes are an important source of relative value in today's cash and default swap markets. Fundamentals argue for very steep curves in the long end (up to 10 years), and technical drivers in the market are pushing flows in the same direction, albeit for different reasons. Default risk between 5- and 10-year points can increase dramatically if the trough of the next US recessionary period falls within that period, which in turn lends fundamental support to the argument for a steep curve. Flows from the hedge fund community have been consistent with this view, but, more recently, the flattening of the Treasury curve has forced all-in-yield buyers to do the same.[1]

In the short end of the curve, technicals and fundamentals are also moving curves in the same direction. As we have discussed before, with strong corporate balance sheets and ample cash on hand, there is very little near-term default risk in investment grade corporate America today, arguing for low short-dated spread levels. However, sub-optimal balance sheet structures (from an equity holder's perspective) could lead to credit deterioration going forward. One-way flows in default swaps and the strong cultural bid for short-dated corporate bonds have led to market prices that exacerbate these fundamental drivers.

While the broad strokes of credit curve relationships above are relatively clear, they do hide the finer lines, which is where the opportunity lies. Steep credit curves have important relative value implications for corporate bonds, but the market does not have standardized metrics for measuring this value. Furthermore, default swaps and bonds do not necessarily agree in magnitude, and we find numerous examples where technically related flows may be overdone. In this chapter we focus on three sets of details, following up on an earlier piece.[2] First, we provide additional detail on how to calculate curve-adjusted bond spreads. Second, we compare actual default swap curve steepness for a broad measure of the market with the actively traded indices, which get almost too much attention from market participants these days. Finally, we discuss how today's positive basis (as we measure it) may actually be closer to fair value after factoring in the credit curves, although results vary with sector and maturity.

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[1] *Please refer to Chapter 49.*
[2] *Please refer to Chapter 34.*

CURVE-ADJUSTED BOND SPREADS

The now commonly used Z-spread measure superimposes a flat credit curve shape over Libor for a given credit. Effectively, Z-spread assumes that default risk is uniform from today until maturity, which can result in a very misleading picture of relative value, especially for credits where default risk is lumpy or significantly different over time. We can think of two ways to improve these spread calculations. One method is to extend Z-spread to take curve shape into consideration, and the second utilizes credit derivatives methods and the additional impact of recovery rates.

exhibit 1 Paid Well to Own the Back Years of Default Risk?

	Price	Loss In Default	Price	Loss In Default
7/15/2004	90.0	50.0	110.0	70.0
7/15/2005	91.7	51.7	108.3	68.3
7/15/2006	93.6	53.6	106.4	66.4
7/15/2007	95.6	55.6	104.4	64.4
7/15/2008	97.7	57.7	102.3	62.3
7/15/2009	100.0	60.0	100.0	60.0

Source: Morgan Stanley

EXTENDING Z-SPREAD TO INCORPORATE CREDIT CURVES

Extending the Z-spread measure involves identifying a reference credit curve (we use default swaps) and calculating the absolute difference between spreads of different maturities as a curve shape assumption. We then use this curve shape and the dollar price of a bond to derive a Z-spread curve such that the present value of the cash flows (discounted by Libor + Z-spread for that date) equals the bond's price. Finally, a single curve-adjusted Z-spread for the bond is calculated by interpolating the value along the Z-spread curve to match the bond's maturity.

For par instruments, this may be sufficient. However, the world is not so simple. Any seasoned corporate bond investor can quickly see how this Z-spread measure is biased for bonds trading at a discount or premium to par. Consider a five-year bond with a $90 price today, which we assume will accrete to par (on a constant yield basis). In Exhibit 1, we have summarized the implied loss given default at the end of each year, assuming a constant 40% of par recovery. The exhibit highlights the fact that the severity of loss increases with time as the bond approaches maturity and the price pulls to par. This implies that even if default probability is fixed over time, default "risk" is actually increasing. Similarly, we have summarized the loss given default for a $110 price bond for which severity declines as we approach maturity and the bond pulls to par (see Exhibit 1).

chapter 35

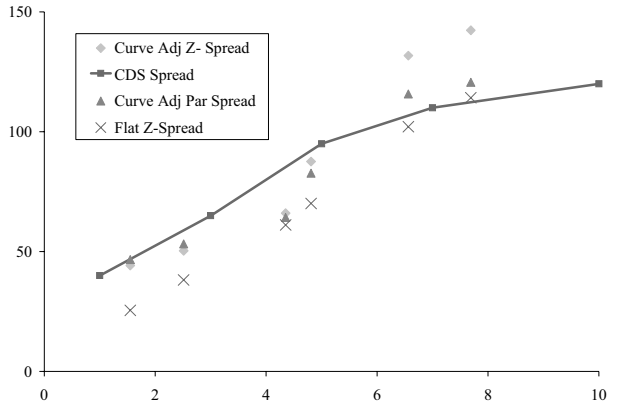
A MORE GENERALIZED CURVE-ADJUSTED SPREAD

In a nutshell, our curve-adjusted Z-spread reflects the change in probability but not the change in loss severity. We address this additional hurdle by switching to a credit derivative pricing framework to value the bonds. This framework allows us to make an explicit recovery assumption (as a percentage of par), thereby reflecting both the discount/premium nature of cash instruments and default probability curve over the life of the bond. We call this curve-adjusted par spread (CAPS).

In Exhibit 2 we summarize four spread measures for the Sprint Corp. credit curve: CDS premium, flat Z-spread (calculated from Bloomberg), curve-adjusted Z-spread, and the CAPS. The CDS curve is clearly upward sloping and all of the bonds are premium instruments. The graph highlights the fact that using a flat Z-spread makes bonds appear richer than both curve-adjusted measures. The difference between the two curve-adjusted spread measures is driven by the specific recovery assumption made in the curve-adjusted par spread (we can think of Z-spread as a measure that effectively assumes a zero recovery rate).

exhibit 2

Sprint Corp. – Curve Shape and Dollar Price Matter



Source: Morgan Stanley

HOW STEEP? HYPER LIQUIDITY VS. THE REST OF THE MARKET

There is a lot of fairly valuable information in default swap credit curves today, as we see from the above analysis. Yet, when making broad statements about the market, there is too much focus by market participants on the indices, given how easy it is to glance at the numerous Bloomberg runs. While it is true that the indices capture a reasonable portion of the market, we should not ignore the fact they also exclude a significant part of the market. Furthermore, the liquidity differences between single names and the indices have important valuation implications.

exhibit 3 Varying Steepness – Default Swap Credit Curve Shape

Sector	5-Year CDS	CDS 3s-5s Curve	CDS 5s-10s Curve
Consumer Discretionary	54	10	15
Consumer Staples	41	5	15
Energy	46	9	12
Financial: Banks	31	8	12
Financial: Non-banks	64	7	10
Health Care	39	6	13
Industrials	43	9	12
Information Technology	61	13	17
Materials	45	12	15
Telecommunication Services	86	25	25
Utilities	59	10	12
Total	**52**	**9**	**14**
Dow Jones CDX	**61**	**NA**	**20**

Note: 225 name universe
Source: Morgan Stanley

One exercise we find intriguing is actually comparing the hyper liquid indices with the rest of the market. For example, using a universe of approximately 225 credits, we find that the 5s-10s curve is a bit flatter (14 bp mid-market, see Exhibit 3) than in CDX (where it is 20 bp and markets trade almost locked). The same is true if we just focus on the 125 CDX single names against the traded index, although bid-offer can make the arbitrage uneconomical.

chapter 35

SECTOR CREDIT CURVE THEMES

Among sectors captured in the 225-name universe summarized in Exhibit 3, Telecom is the steepest at 25 bp, although it is also the widest in average spread. AT&T's curve accounts for 4 of the 25 bp. The remaining sectors have very little dispersion, which we believe is related to poorer liquidity at the 10-year point. The 3s-5s curve is about 10 bp on average. Telecom is the significant outlier here as well (at 25 bp with AT&T accounting for 7 of the 25 bp). Consumer Staples is the flattest curve, which we argue is related to absolute spread level and the sector's non-cyclical nature.

BONDS VS. DEFAULT SWAPS

One of the most important applications of the curve-adjusted spread methodology that we described above is in relative value opportunities between bonds and default swaps. For a universe of 100 issuers, we show the CAPS basis relationship (CDS premium minus CAPS) at different maturity points in Exhibit 4. At the 5-year point, the CAPS basis is actually closer to fair value (at 3bp) than our official basis calculation (at 11bp). This difference implies that at the 5-year point, bonds are not as rich relative to default swaps as they may appear (which is what we would expect given curve steepness). At the 3- and 10-year point, bonds appear slightly richer (with a basis of 6 bp and 9 bp, respectively), while cash and default swaps appear near fair value at the 7-year point. This downward sloping basis curve with a jump up in the 10-year basis is present in several of the sectors as well.

exhibit 4 A Basis Term Structure

	CDS Spread MINUS Curve Adjusted Par Spread			
Sector	**3 Year**	**5 Year**	**7 Year**	**10 Year**
Consumer Discretionary	7	(1)	0	9
Consumer Staples	9	11	1	21
Energy	1	(5)	(11)	20
Financial: Banks	2	4	(7)	(5)
Financial: Non-banks	6	6	3	2
Health Care	11	21	(2)	16
Industrials	8	1	8	13
Information Technology	(4)	19	(4)	NA
Materials	12	(2)	(10)	16
Telecommunication Services	0	(8)	(16)	NA
Utilities	9	3	14	19
All Issuers	**6**	**3**	**0**	**9**

Source: Morgan Stanley

THE BIG PICTURE – BITE OFF AS MUCH AS YOU CAN CHEW

If there is one point we would like our readers to take away from this piece, it is that credit curves are both gaining liquidity and steepening rather dramatically today, and the implications of this phenomenon are profound, even if it appears like too much analysis. For anyone willing to bite even more off at this point, the details are both interesting and potentially rewarding. We continue to recommend that investors look across the curves in both markets to find the best relative value point to implement a particular credit view and to get a clearer picture of how default swap and cash markets are pricing risk through time at the sector level. Hiding behind the broad strokes are many important finer lines.

chapter 36 Curve Lessons from High Yield

August 6, 2004

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In the single-name credit derivatives space, if there is a topic that is becoming a key theme for the year, credit curves would get our vote. The development and standardization in the index market helped jump-start credit curve trading, but macroeconomic forces and credit fundamentals have taken it to the next level. To those who regularly follow our published research, we may seem obsessed with credit curves, but our fascination stems from our view that curves are an important source of relative value in today's credit environment.

We have discussed recently that the steepness in investment grade curves is a situation driven by technical flows and supported by credit fundamentals for many issuers.[1] Near-term default risk seems low for the market at large, given cash-rich balance sheets, and long-run default risk ought to be much higher, as a turn in the economic cycle (at some point) would bring back memories of 2001 and 2002.

When do credit curve shapes represent opportunities? Beyond the macro themes, the real relative value involves taking a much closer look at a company's operating environment, along with its debt maturity profile and any expected changes in this capital structure. In this respect, investment grade investors may be able to learn a lot from the high yield market, which exhibits a fair amount of dispersion in credit curve shapes, driven by, among other things, dissimilar debt term structures.

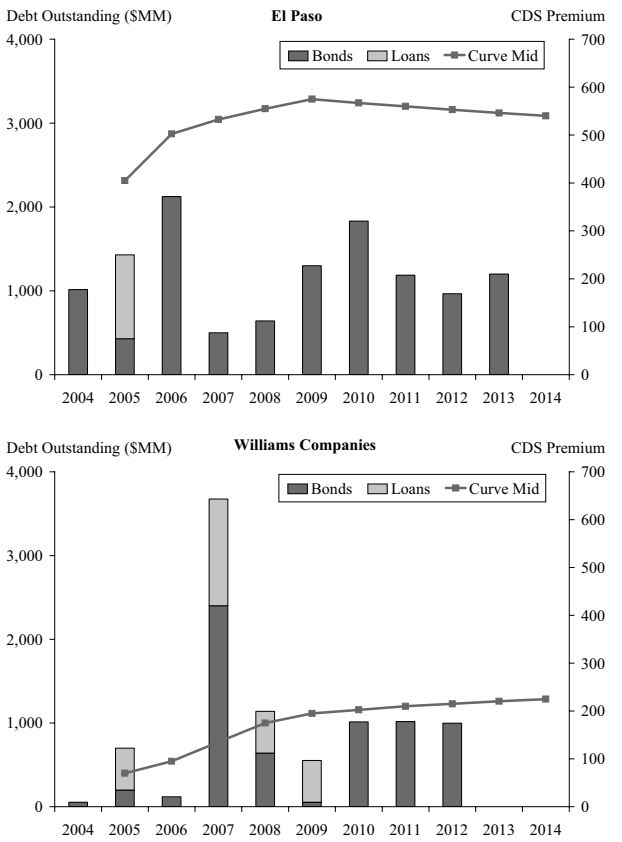
[1] *Please refer to Chapter 34.*

PIPELINE CURVES IN HIGH YIELD

We highlight the following curve shape relationships in high yield to provide insight into the effect debt maturity has on curve shapes. Pipeline companies El Paso (B3/B-) and Williams Companies (B3/B+) trade at very different zip codes in 5-year default swaps (500 versus 200 area), and their credit curves take dramatically dissimilar shapes as well (see Exhibit 1). El Paso has a very flat curve after 2006, with a bit of a hump in the 4- to 5-year maturity. The market is very focused on 2005 debt payments (bonds and loans) and a busted long-dated convertible bond that can be "put" to the issuer in 2006. The slight downward-sloping curve beyond these dates reflects the sentiment, popular for stressed credits – if they make it in the near term, they will make it in the long term.

exhibit 1

Flat and Steep Pipelines – El Paso and Williams Cos.



Source: Morgan Stanley, Bloomberg, Company Reports

Williams Cos. makes for an interesting story, as well, as the company recently tendered much of its near-term debt. Default swap curves steepened immediately (as they should), given the radically different near-term risk for the company. On a relative basis, the curve is significantly steeper than El Paso's. Williams also announced a tender offer for 2010 maturity, which may cause the curve to steepen from that maturity point forward.

chapter 36

HIGH-YIELDING PAPER CURVES

Abitibi (Ba2/BB) and Bowater (Ba2/BB) are natural comparables in the paper sector as they trade at similar 5-year CDS levels and have the same ratings and leverage levels. Yet their debt maturity profiles are very different. Abitibi has relatively evenly distributed debt maturity over the next few years. After recent refinancings, Bowater has no debt due until 2009, which explains its steeper curve relative to Abitibi (30 bp for three years, and nearly 50 bp for two years). Yet one could argue that the curve should be even steeper, given the stark differences in debt maturity profile between the two issuers. But that's not the whole story.

A poorer relative operating model for Bowater may be the force that prevents the curve from getting as steep as the debt maturity profile would imply. Away from the credits we have highlighted, there is much focus on debt payments, in general, in high yield default swap curves. The airline space is an obvious sector, given the focus by investors on a given company's ability to survive beyond certain debt maturities.[2]

ENTER INVESTMENT GRADE

As we have addressed in previous research, credit curve relationships in investment grade can be very technical and are, in general, very steep today in both cash and default swaps. Flows in short-dated default swaps tend to be one-way (sellers of protection). In the cash markets, there has traditionally been a strong cultural bid in the US for short-dated paper.

Within our universe of 220 investment grade credits, 3- to 5-year default swap curves for 200 issuers are upward-sloping, with the rest being flat. The average steepness is 12 bp, with half the universe steeper than 10 bp (for just two years of incremental default risk). Not all credits, though, are worthy of such steep curves.

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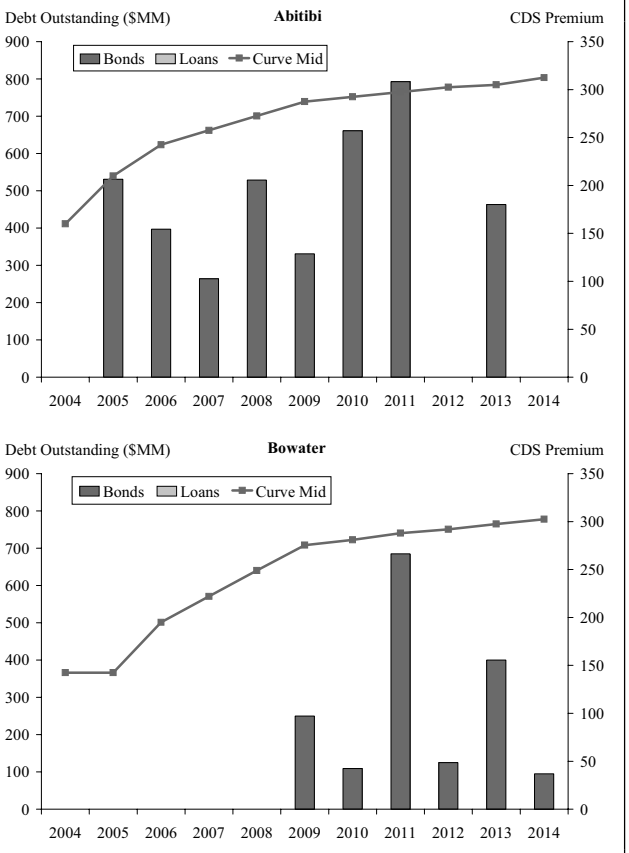
[2] *Please refer to Chapter 27.*

exhibit 2

Flat and Steep Paper – Abitibi and Bowater



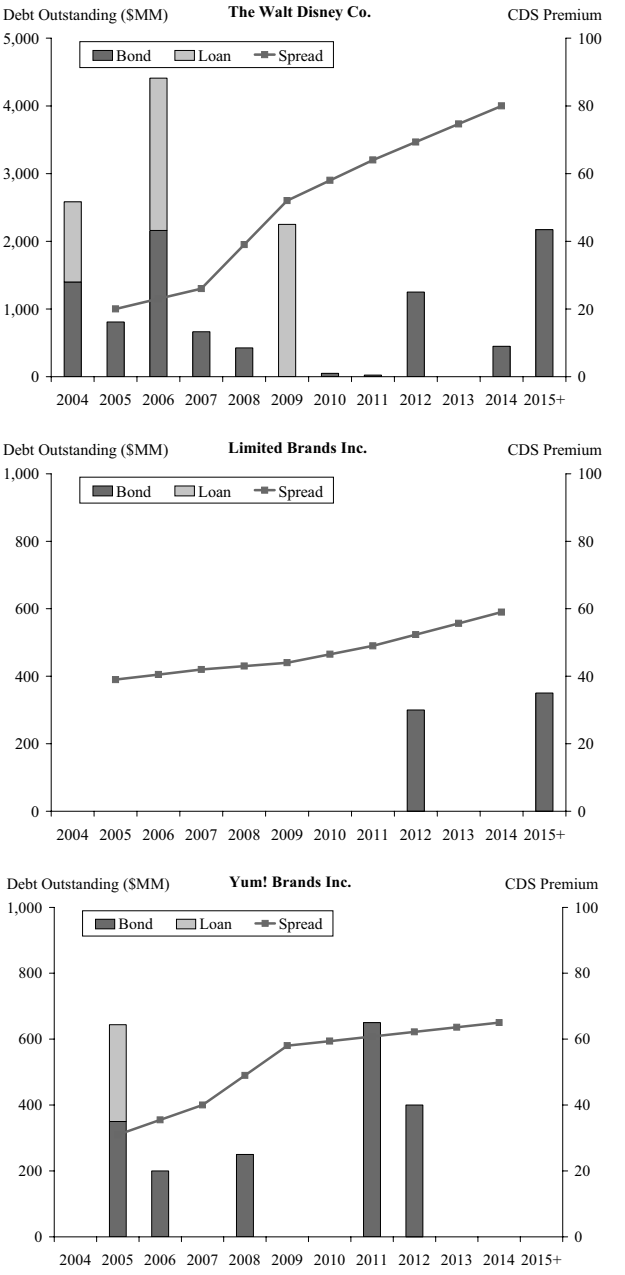
Source: Morgan Stanley, Bloomberg, Company Reports

As an example, the credit curve of (the now investment grade) Yum! Brands (Baa3/BBB-) is relatively steep between three and five years (see Exhibit 3). Yet, Yum has a partially drawn loan facility and bonds maturing in 2005 – and then only a few small maturities before 2011-12, which we believe is an argument for a much flatter curve. Disney (Baa1/BBB+) provides another example of a credit with significant shorter-dated maturities and a meaningfully steep credit curve. On the other side of the spectrum, we find Limited Brands (Baa1/BBB+), which has no debt due before 2012 (aside from an as-yet-undrawn loan facility) and yet has a relatively flat credit curve in the same period (see Exhibit 3).

chapter 36

exhibit 3

Investment Grade Credits – Curves and Debt Maturities



Source: Morgan Stanley, Bloomberg, Company Reports

TAKING A LESSON FROM HIGH YIELD

In all these investment grade cases, the absolute level of credit risk is a key consideration, as low spread levels invite technical factors to become a dominant force in relative pricing. We argue that fundamentally oriented investment grade investors can use the opportunity to dig deeper into specific debt maturity profiles to get a better sense of whether they are being adequately compensated (or too well compensated) for default risk along the curve.

chapter 37 Steep Curves, Technical Bids and the Basis

October 8, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA
Anisha Ambardar

While 10-year Treasury rates have gyrated this year, sending mixed signals to investors about the strength of the current US expansionary period, the information we gather from curve changes has been clear and consistent. In the Treasury market, the 2s-5s curve has flattened over 50 bp since April 2004, in almost a straight-line manner. In the credit markets, short-end credit curves continue to steepen remarkably in both cash and default swaps, and the early steepness in the 5s-10s default swap curves has synchronized, for the most part, with the cash markets.

We have written in past research that steeper credit curves make sense at this point in the cycle, fundamentally. Near-term default risk appears quite low to us for the investment grade markets, given the cash-rich balance sheets. Fundamentals almost have to worsen over the medium term from today's cash-rich state, if Corporate America wants to build optimal capital structures from an equityholder's perspective. This supports the steep short-end curves. Much uncertainty is associated with the 10-year point in credit curves, given that the economic cycle is likely to turn before then, at least based on the length of past cycles. This argues for a steep long-end curve, as well. From a technical perspective, all-in-yield buyers of corporate bonds have pushed spread curves steeper in the cash markets as Treasury curves have flattened.

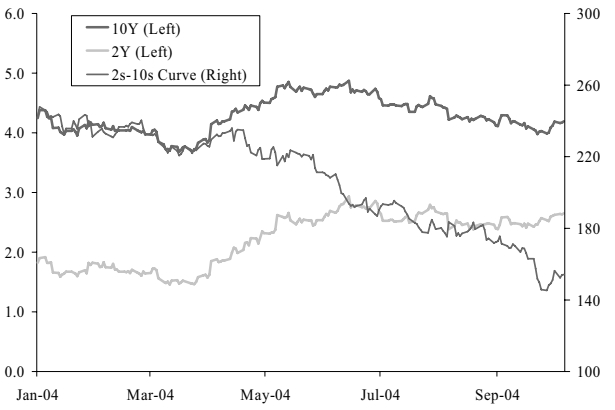
We continue to believe that credit curves are an important source of relative value in today's markets. Furthermore, while basis trades are simple, common ways of implementing technical views, the shape of curves impacts the true relative value. As we dig deeper, two themes emerge. First, the short end in both cash and default swaps has steepened even more over the past two months, and the recent standardized trading activity across the curve for the indices offers curve transparency and opportunities to implement views at a broad-market level. Second, the structured credit bid has quietly had a meaningful impact on basis opportunities. As we see it, cash bonds now trade wider than default swaps across a broad universe, when we take into consideration fair-value spreads based on credit curves.

THE BASIC SIGNALS

While watching the absolute level of the 10-year note would give the average investor whiplash, the shape of the Treasury curve has provided a consistent signal over the last six months (see Exhibit 1). The path of the yield of the 10-year note has roamed in nearly a 100 bp range, and the curve has consistently flattened throughout the year, particularly since April 2004, when Fed activity became imminent. Similarly, in the credit markets, spreads have moved around in a range, while default swap curves have steadily steepened throughout the year (see Exhibit 2). Cash curves have followed suit, although the timing of the steepening has been closely aligned with the flattening in the Treasury curve.

exhibit 1

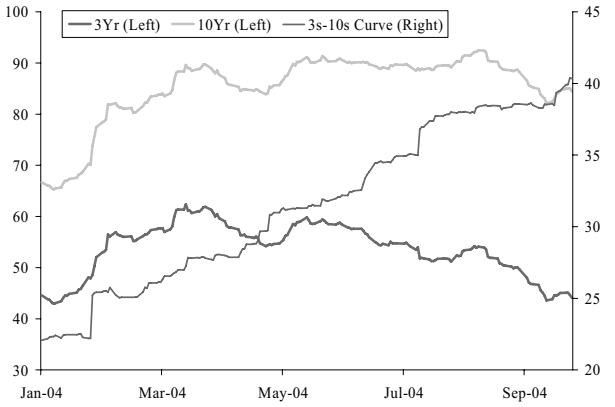
Treasuries: 10-Year Gyrates, But Curve Consistently Flattens



Source: Morgan Stanley

exhibit 2

Credit Curves Consistently Steeper



Source: Morgan Stanley

chapter 37

IMPLEMENTING MARKET-WIDE CURVE VIEWS

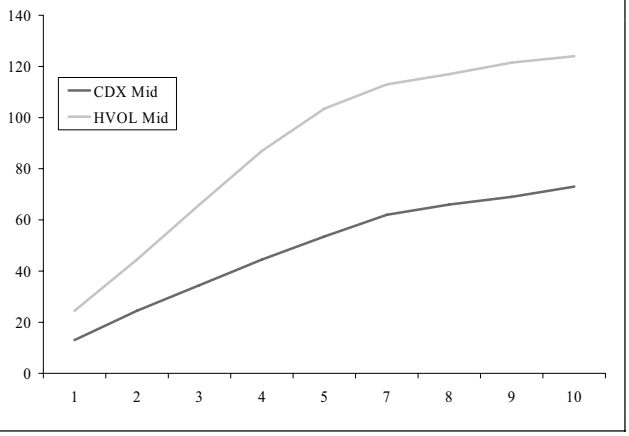
For credit curve junkies like us, seeing two-way markets across the complete CDX and HVOL maturity spectrum is quite exciting, even if liquidity still has some growing to do. The remarkable steepness in credit curves is now loud and clear, particularly in the short end. The CDX curve is almost a perfect linear 10 bp per year for all of the trading points (1, 2, 3, 4, 5, 7, and 10 years – see Exhibit 3), with HVOL proportionately steep in the short end (about 20 bp per year up to five years).

Some of the early flows in the new index curve market have included short-end flattening trades in CDX, as well as takers of short-dated risk in the HVOL index (where 3-year risk is 10 bp wider than 5-year CDX risk). Further out on the curve, several investors bought 7-year protection versus selling shorter-dated protection as a way of leaning against some of the longer-dated structured credit bid recently. Additionally, almost from a convenience perspective, bank loan groups appear more attracted to the 7-year point on the curve as a source of protection, to avoid some of the frequent rolling of 5-year protection.

DIGGING DEEPER – THE BASIS

As we have addressed in detail in previous research, steep credit curves have important basis implications, particularly in a tight spread environment.[1] The now popular Z-spread measure assumes that credit curves are flat, and we have found many market participants using relative value measures that do incorporate curve shape.

exhibit 3
CDX and HVOL – Complete Curves Now Trade



Source: Morgan Stanley

[1] *Please refer to Chapter 35.*

When we look at the basis using this measure, we find that it is indeed negative once again across sectors and maturities (see Exhibit 4). This negative basis is a fairly significant change from the July period, when most of these relationships were positive (default swaps traded wider than bonds).

exhibit 4 Fair Value Basis Goes Negative, Across the Curve

	Fair Value Basis (CDS minus Cash)			
Sector	**3 Years**	**5 Years**	**7 Years**	**10 Years**
Basic Materials	2	(5)	(8)	20
Communications	(14)	(2)	(2)	14
Consumer, Cyclical	(10)	0	(15)	(4)
Consumer, Non-cyclical	2	3	(3)	4
Energy	(16)	(17)	(5)	NA
Financial	(3)	(7)	(10)	(8)
Industrial	(5)	(3)	(4)	6
Technology	15	14	1	NA
Utilities	(1)	8	(11)	NA
Aggregate Basis (Today)	**(4)**	**(3)**	**(7)**	**(2)**
Aggregate Basis (July 16)	**6**	**3**	**0**	**9**

Source: Morgan Stanley

What has driven the basis shift this time? The structured credit bid is certainly a key factor; and we note that the most negative point in our basis curve is in 7 years, an area of fairly active structured credit activity this year. It was also the richest point in the basis curve in July.

It is also interesting to note some of the dynamics between cash and default swap curves, which can be highlighted by this basis, as well. In July, when the 5-year basis was 3 bp and the 10-year basis was 9 bp, we argued that bonds appeared richer in 10 years than in 5. Today, the 5- and 10-year points on the basis curve are nearly flat to one another, indicating that neither point on the curve appears meaningfully more or less attractive than the other (relative to default swaps). This underperformance in 10-year cash bonds could be a result of the flattening of the Treasury curve and the subsequent demand for additional spread from all-in-yield buyers.

CONCLUSION – TECHNICAL INFLUENCES MAKE BONDS CHEAPER

The technical effect of the structured credit bid has significantly impacted the credit markets, but we argue that the more subtle relative value opportunities across the curves have been impacted meaningfully, as well. These flows are difficult to lean against, but they have made cash bonds cheaper relative to default swaps for those investors in a position to take advantage of these relationships.

Section E

Options and Embedded Options

chapter 38 Watching Volatility, Trading Volatility

July 18, 2003

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Anisha Ambardar

Credit investors are accustomed to watching credit spread volatility and reacting to it. The emergence of a spread options market allows for the more formal analysis and trading of spread volatility, which can have interesting portfolio management implications. Strategies where investors have the right, but not the obligation, to get short or long the market can be used to implement directional views of the market more efficiently than default swaps alone.

The current market environment is a good example. Fundamentally, the market seems tight to us, but we respect the technical conditions that have driven credit spreads tighter. For investors who don't want to fight these technicals, getting long tight-trading credits using default swaps can be a risky proposition. Options on synthetic TRACERS^{SM} can be used both to implement a long credit view (with protection against downside moves) or as a calculated strategy to balance an established short credit view. In this chapter we explore this and other simple spread option strategies, with the goal of helping investors think outside of the box when implementing market directional views.

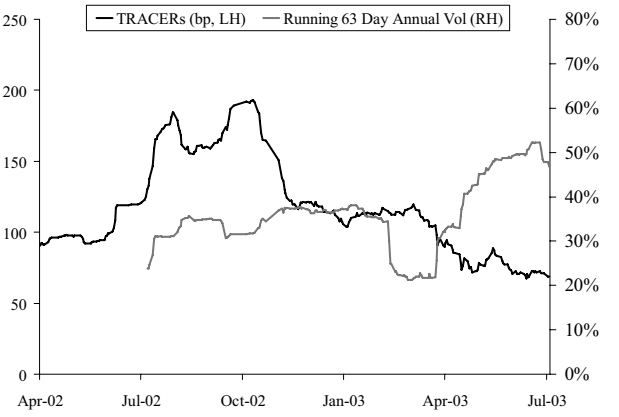
ABSOLUTE PRICING – VOLATILITY AND MECHANICS

As this is a very new market, we begin with some simple explanations of pricing. Spread options can be valued using a model based on the standard Black-Scholes framework used to price equity and interest rate options. As interest rates are not a key driver in the pricing of a spread option, the volatility used in the models is a very simple number, based only on spread movements rather than the more complicated spread and interest rate co-movements necessary for bond options. By our measures, historical 60-day volatility on synthetic TRACERS^{SM} has ranged from 20% to above 50% over the past year. This compares to the implied volatilities in recent pricing of TRACERS^{SM} options of 40-50%.

Another important point in the absolute pricing of the synthetic TRACERS^{SM} options is that the buyer of an option to buy protection implicitly owns protection for the term of the option. The buyer of this option also has the right to extend his or her ownership of protection beyond the option term, at the strike price. As such, we must divide the upfront premium into two components: the premium for protection until the option expiry and the true option value. For the first option in Exhibit 2, we use an assumption of a 5-month synthetic TRACERS^{SM} spread of 15 bp to estimate the premium for owning 5 months of protection costs 6.25 bp (roughly equal to 15*(5/12), excluding discount effects), so the true offered side option premium is 66 bp.

exhibit 1

Wide-Ranging Spread Volatility



Source: Morgan Stanley

WHAT IS THE SPREAD OPTIONS MARKET TELLING US?

As the market for spread options on synthetic TRACERS[SM] develops, we are fortunate to get some very valuable information on the market-implied likelihood of spread moves. Based on recent pricing – with underlying synthetic TRACERS[SM] at 72 bp mid-market (see Exhibit 2) – an investor would pay 72 bp upfront for the right to buy protection at the 70 strike, but only 34 bp upfront for the right to sell protection at the same strike. Even after adjusting the price of the option to buy protection, this pricing tells us that there is a greater chance of spreads moving wider than tighter over this 5-month period.

exhibit 2

Spread Options on TRACERS[SM] – 72 bp Mid-Market

Expiration	Strike	Option	Upfront Premium (bp)
5 Months	70	Buy Protection	57-72
		Sell Protection	19-34
	75	Buy Protection	46-61
		Sell Protection	29-44

Source: Morgan Stanley

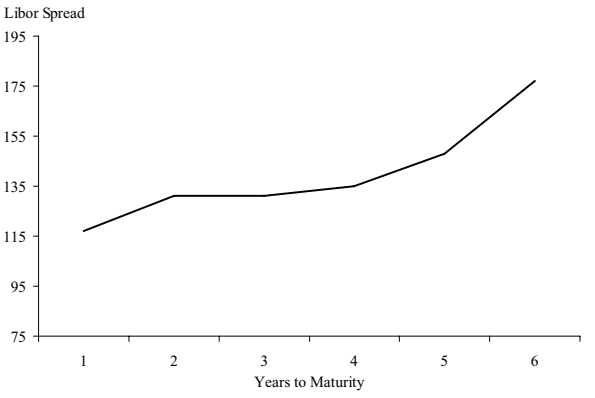
At a 75 bp strike price, the call and put option pricing is relatively close (after adjusting the price of the option to buy protection), which suggests that the options market is implying that these options are closer to at-the-money than the 70 strike options. For a direct investor in default swaps, this is a strong argument for getting short credit.

RELATIVE PRICING – INTUITION VS. OPTION MODELS

There are two important insights we can derive from the relative option pricing. First, as we mentioned above, the market is telling us that spreads are more likely to move wider than tighter from here. This makes intuitive sense to us. Given a 72 bp spread level on synthetic TRACERS[SM], one does not need a PhD in statistics to realize that any reasonable historical distribution of spreads would have more data points higher than 72 bp than lower.

chapter 38

exhibit 3
Steep Credit Curve – BBBs



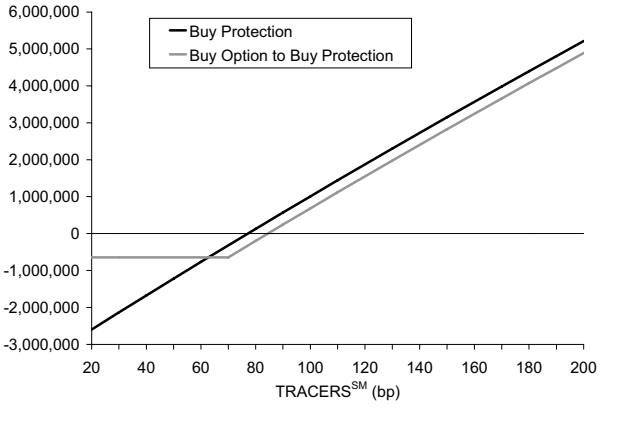
Source: Morgan Stanley

While we believe this phenomenon makes intuitive sense, option models are arriving at this conclusion through another means, which leads us to the second insight. Credit spread curves are steep today, meaning that the implied forward spreads are higher than spot spreads. The pricing we see in Exhibit 2 suggests that a 75 strike is approximately an at-the-money forward option, given similar pricing of options to buy or sell protection. Therefore, the implied 5-month forward spread is approximately 5 bp higher than current levels. To the extent that a credit default swap investor's view of spreads differs from that implied in synthetic TRACERS^{SM} spread options, there may be some interesting positioning opportunities.

IMPLEMENTING DIRECTIONAL SPREAD VIEWS

If an investor wants to get short the credit, is it better to buy the option to buy protection, sell the option to sell protection, or just simply buy protection outright (see Exhibit 4)? We think buying protection outright on relatively tight names is an attractive trade right now, as we highlighted last week. If implied volatility (and thus option price) declines or spreads move wider (on tight names), it may make better sense to implement a short view with options.

exhibit 4
Option Payoff Diagram: Buy Option to Buy Protection

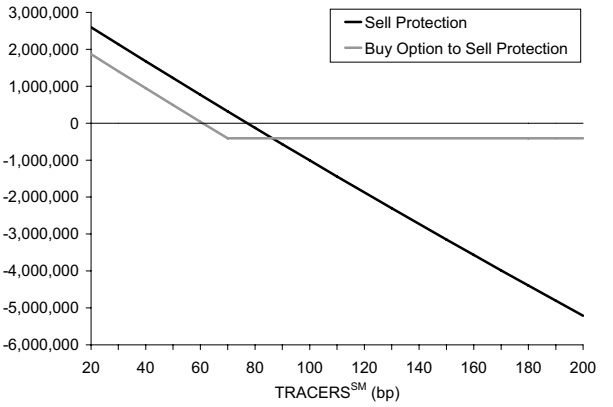


Source: Morgan Stanley

On the other hand, if an investor wants to get long tight-trading credits today, an option strategy may be more attractive than the outright sale of protection. Selling protection at these levels carries a lot of downside risk, but buying the option to sell protection, especially if it is near-the-money (forward), protects losses on the downside and can be relatively cheap, given the implied spread widening in the credit curve. We view this as an attractive alternative, but encourage investors to get comfortable with the volatility and implications before stepping forward (see Exhibit 5).

exhibit 5

Option Payoff Diagram: Buy Option to Sell Protection



Source: Morgan Stanley

IMPLEMENTING VIEWS ON VOLATILITY

Given the relatively high level of implied volatility today as compared to actual volatility over the past year (a rather volatile year for spreads), a relevant application of options comes from the view that we could live in a low volatility world going forward, and any incremental implied volatility should be monetized now to add yield to a portfolio. For investors with this view, implied synthetic TRACERS^{SM} volatility levels are attractive. For example, selling the 5-month option to buy protection at 75 bp today generates 46 bp upfront, or the equivalent of 110 bp running. Assuming the option is exercised, the seller will generate a forward spread of 75 on TRACERS^{SM} plus 110 bp in the initial option period versus generating 72 bp by selling protection today. The key risk in this position is a spread tightening beyond the approximate 4 bp of buffer created by the monetization of volatility.

Taking the low volatility view one step further, investors could combine this position with the sale of an option to sell protection struck at 70 (creating a spread strangle), thereby generating 65 bp upfront or the equivalent of approximately 156 bp running, while bearing the risk of spreads moving outside the 70-75 range.

chapter 39 Spread Volatility – Finally Something to Smile About

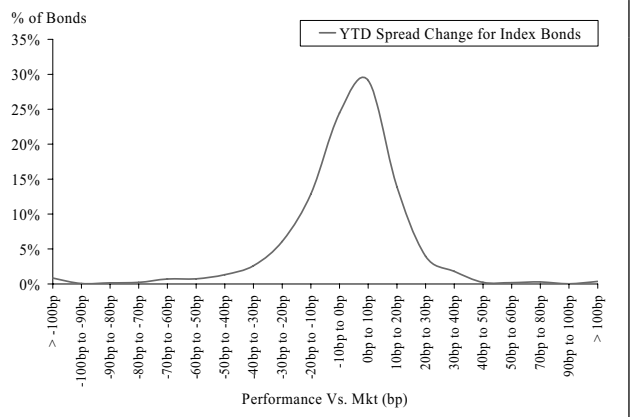
July 9, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Anisha Ambardar
Angira Apte

A year ago, credit investors had their first opportunities to trade spread volatility at the market level with the development of spread options on the then-popular default swap indices. At that time, credit markets were coming off a huge rally, and realized volatility on the indices was high (40% to 50%). Index spread options started trading at 40% volatility and quickly moved significantly higher as pent-up demand brought buyers of options into the market, particularly from the macro hedge fund community. Implied volatility fell off quite dramatically afterward as more investors became involved, but the market remained somewhat fragmented, as liquidity was scattered among different indices and only a handful of investors.

With one index family and a deeper investor community today, the spread options market has matured, and we argue that the most significant evidence is the emergence of volatility skew. In fact, the infamous "volatility smile" that is commonplace in many mature options markets has now emerged in the liquid credit indices in the US, although the actual smile is more of a smirk (i.e., relatively flat). On an absolute basis, implied volatility continues to fall and today is very much in line with realized volatility. We reiterate that much of the activity in the index spread options market is directional, implying that investors are using options as investment management tools rather than trying to arbitrage volatility (see "Trading Volatility or Market Direction?" January 30, 2004).

exhibit 1
Thin Right Tails Could Imply Cheap Options



Source: Morgan Stanley, Salomon Analytics

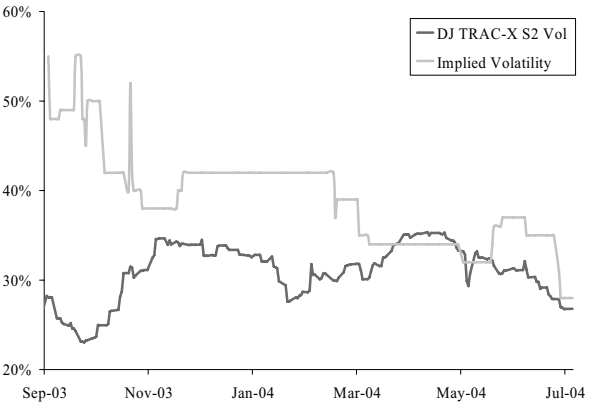
While a low volatility credit world supports outright option selling strategies, we contend that tight spread levels, combined with event risks, associated asymmetric

Morgan Stanley

outcomes and actual levels of implied volatility, are arguments for selling the left tail (tighter spreads) while buying the right (wider spreads). These classic "risk-reversal" strategies entail buying options to protect against significant spread widening and at least partially funding that with the sale of options to get long the market at tighter levels. We consider these strategies good investment tools for credit portfolios today, even if odds are that they do not trigger.

exhibit 2

Falling Volatility – Implied Finally Converges with Realized



Source: Morgan Stanley

ABSOLUTE VOLATILITY LEVELS

Despite a default swap market that has had much more of a negative tone than cash (the basis has widened 16 bp this year), realized volatility on the indices has been in the mid-20% to mid-30% range this year (rolling 60-day basis, see Exhibit 2). At-the-money implied volatility on index options was dislocated with respect to realized volatility for most of 2003 but ultimately converged earlier this year. Since then, implied volatility levels have continued to trade lower, but at a slower, more orderly pace. Current levels of approximately 30% on DJ CDX have reached all-time lows (albeit after only one year of history).

SOMETHING TO SMILE ABOUT

A derivatives market where options (with varying strikes and/or expiries) price to the same volatility is either perfectly efficient from a textbook perspective, or still somewhat immature and illiquid from a more practical perspective. Needless to say, we concur with the latter. Most liquid options markets have complex volatility surfaces that are both an indication of technical factors and the source of relative value. A volatility smile (where out-of-the-money options on both sides trade at higher implied volatilities than at-the-money options) is common.

There are numerous explanations for why volatility smiles exist in many options markets. From a credit perspective, two arguments, one fundamental and one technical, make the most sense to us:

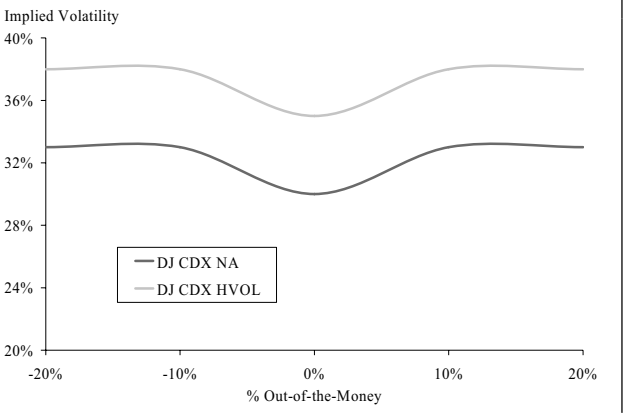
- Fundamentally, credit returns are more "skewed" or asymmetric than implied by the "normal" distributions that tend to be used in basic options models. Thus, both long-dated and out-of-the-money options are likely more valuable than these

models imply, hence implied volatilities (from pricing) are higher. This is particularly true for wider strikes, given today's spread levels.

- Technically, investors use options to either position for or hedge against large moves, even if their "expectations" are otherwise. As such, demand for out-of-the-money options drives volatility higher. Also, as we mentioned above, most options users in the credit space are not trading volatility per se, which further supports this technical argument.

There is a slight volatility smile today in the index spread options space. For September 2004 expiries, implied volatility is about 2 to 3 points higher for strikes that are approximately 10% out-of-the-money, although volatility is fairly flat after that. Also, longer-dated options (December 2004) trade higher volatilities as well (again, about 2 to 3 points higher). The DJ CDX HVOL index (30 "high beta" issuers) has a similar smile to the CDX NA index, but starts about 5 volatility points higher.

exhibit 3
Finally Something to Smile About



Source: Morgan Stanley

AWAY FROM THE CORE INDICES – FOCUS IS ON THE RIGHT TAIL

In the high yield space, index spread option activity has been much more scattered, although that could be partially blamed on a fragmented index market that is converging as we write. Nevertheless, most of the anecdotal activity we see is in out-of-the-money options at wider spread levels. Also, much like high yield bonds themselves, the market for options appears more "price-based" than volatility-based, with actual implied volatilities ranging from the high 30% range to nearly 60%. One argument for this market behavior is that options to buy protection could have somewhat less sticker shock than buying protection outright (even if annualized numbers are comparable), so implied volatility becomes a less important variable.

In the single-name option space, investor interest is mainly from the hedge fund community, with much of the activity directional and again focused on spread widening. Wider trading and more volatile names have been the most active, including Ford Motor Credit, AT&T and Toys 'R Us.

POSITIONING VOLATILITY TODAY –THINK ABOUT THE ASYMMETRY

Today's generally strong credit fundamentals, combined with a Fed that is acting at a "measured" pace, can be an argument for selling out-of-the-money options on credit. The slower summer months may further support this idea, but we caution that event risk, in particular idiosyncratic or geopolitical, combined with already tight spread levels and low implied volatility, makes the blind sale of options somewhat of a dangerous business. We encourage market participants to remind themselves how asymmetric investment grade credit can be, even if the "expected" outcome is for markets to stay the way they are. Our European credit strategy team has discussed the merits of "risk-reversal" strategies in previous research, where investors protect against asymmetric performance by buying options to buy protection at wide strikes while funding some of that with the sale of options to sell protection at tighter levels (see Viktor Hjort's "It's Now or Later – A Credit Risk-Reversal," November 14, 2003).

In Exhibit 4, we show the premium payout and break-even levels for one risk-reversal strategy on the DJ CDX index, although we encourage investors to design strategies that best suit their spread fears and carry concerns. Assuming a current level of 63.5 bp on the index (at-the-money forward level would be 65 bp), buying the option to buy protection at a 75 strike (September 20, 2004, expiry) would cost 12 bp of premium upfront. The break-even on this leg of the trade would be less than 3 bp of widening beyond the 75 strike. If we combine that with the sale of an option to sell protection at a 60 strike, the net cost of carry would lower to 7 bp, which reduces the breakeven to less than 2 bp, although it obviously introduces risk on the other side, as well.

exhibit 4 Sell the Option to Sell, Buy the Option to Buy (DJ CDX at 63.5 bp)

	Option	Strike	Expiry	Premium	Breakeven
Buy	Buyer	75	Sep 04	0.12%	< 3 bp
Sell	Seller	60	Sep 04	0.05%	
Net				0.07%	

Source: Morgan Stanley

Strategies like this make sense for investors who are running underlying credit portfolios that are either overweight with respect to their benchmarks, or higher beta in nature. For investors who prefer long-dated options, or much further out-of-the-money strikes, we encourage buying protection on index tranches (such as 7-10% or 10-15%). The pricing and convexity of such tranches makes them behave like options in significantly wider markets, as we have addressed in previous research (see "Correlation Conversations, Convexity Ideas," August 1, 2003).

Finally, as an aside, one of the most confusing aspects of the index options market is the terminology. We like to think of it as simply buying or selling options to buy or sell protection. Options to buy protection are also called buyer options, payer options or sometimes puts. Similarly, options to sell protection are also called seller options, receiver options or sometimes calls.

chapter 40 Selling Tomorrow's Tightening Today

May 7, 2004

Primary Analyst: Sivan Mahadevan
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Anisha Ambardar
Angira Apte

We argued several months ago that the use of single-name options, undoubtedly the most basic of textbook derivatives strategies, would take some time to gain acceptance in the credit markets. To investors outside of our markets, it may seem a bit odd that a simple call or put option on a company's credit is a much less popular derivative instrument than, say, a 7-10% tranche on a 125-name portfolio that requires a sophisticated correlation model to value properly. However, the popularity of correlation instruments stems from the long history of the CDO market and all the reasons investors continue to use it. Basic options strategies, on the other hand, are very new to credit investors, and will continue to take some time to garner broad acceptance.

The cancelable default swaps segment of the credit options space may seem the most intuitive to many credit investors, given the analogies one can make with callable bonds. In such a swap, the buyer of protection has the right to cancel the swap (after some non-call period), and the seller of protection gets paid additional premium to be "short" this option. The natural buyers of this protection include those who need to be short credit as a matter of business, but fear tightening spreads (bank loan hedgers), as well as those who hedge long credit positions with uncertain maturities (e.g., banks, convertible bond users, high yield investors). The natural sellers of cancelable protection include those who need to be long credit as a matter of business but do not expect a significant tightening of spreads. In a sense, selling cancelable protection is a way of forming a neutral-to-bearish view on credit spreads in the future, from the long side.

THE MECHANICS OF A CANCELABLE DEFAULT SWAP

A cancelable default swap (also known as a callable default swap) is simply a credit default swap (with standard credit events) where the buyer of protection has the right to cancel the protection after a non-call period. Such a feature is not unique to credit derivatives; it exists in the interest rate derivatives world, as well. From the seller of protection's perspective, one can think of a cancelable default swap as a covered call strategy, similar to a callable bond, where the seller of protection is "short" a call option that is not exercisable until the non-call period ends. The performance of selling callable protection has the typical hockey stick shape associated with instruments with embedded options (when the non-call period is over – see Exhibit 1).

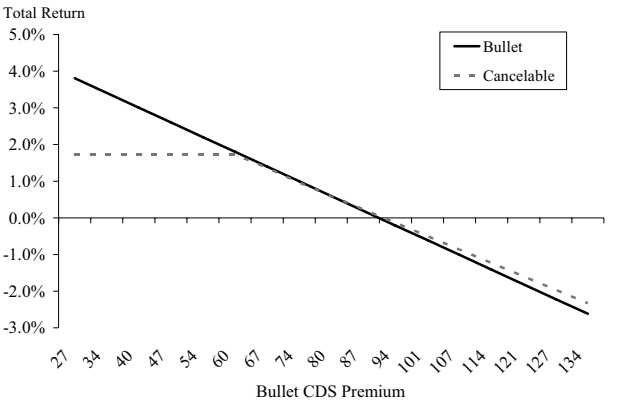
Unlike a callable bond, there is no explicit strike price in a cancelable default swap. Protection buyers will cancel the protection when they no longer need it. The economic incentive to do this is when spreads are tighter than the par spread on the swap, but there could be other reasons why a buyer chooses to cancel protection – for example, when an associated long credit position prepays or gets called away.

In a pure options sense, the option embedded in a cancelable default swap is less valuable than the option in a callable bond, at least based on historical volatility

differences. For example, the volatility of investment grade spread movements is less than one-third the volatility of interest rate movements over the past 2 ½ years (35 bp versus 118 bp).

exhibit 1

Cancelable vs. Bullet CDS – The Hockey Stick



Source: Morgan Stanley

THE MARKET, VALUATION AND SENSITIVITY

Though market activity is limited for cancelable default swaps, we do have some pricing information from which we can better understand both valuation and sensitivity. For the credits in Exhibit 2 (ranging from 25 bp to 255 bp bid side), cancelable protection trades on average 19% wider, reflecting the value of the embedded option (and any additional liquidity premium).

exhibit 2

Cancelable (5nc2) vs. Bullet CDS – Market Levels

	CDS Bid	Cancelable CDS Bid	Difference (bp)	Difference (%)
IBM	25	30	5	20%
WHR	30	37	7	23%
VZ	47	56	9	19%
VLO	55	63	8	15%
TXU	67	73	6	9%
SWY	68	87	19	28%
TYC	80	97	17	21%
GMAC	150	175	25	17%
FCC	162	193	31	19%
EDS	255	315	60	24%
Average				**19%**

Source: Morgan Stanley

Typical factors affecting the pricing of options also impact the valuation of cancelable default swaps (volatility, maturity and interest rates). However, we consider the maturity of the swap and the shape of credit curve especially important.

For a five-year credit trading at 60 bp, a flat curve assumption would result in an additional cancelable premium of 14 to 28 bp for being short the option (assuming reasonable volatility levels and a two-year non-call period – see Exhibit 3). We can think of this as compensation for being short an option that is currently expected to be in-the-money until maturity (because of the flat curve and strike price above the current par spread). Based on both realized and implied data from single-name options markets, spread volatility for investment grade names resides in the 50% to 100% range for non-story credits.

However, most credits today have an upward sloping credit curve, and cancelable protection for such credits is worth less because the expected three-year spread (two years forward) is greater than the current five-year spread. As such, the option is expected to be closer to at-the-money during the exercise period than a similar option sense of whether they are being adequately compensated (or too well compensated) for default risk along the curve.

exhibit 3 Cancelable CDS Premiums for a Credit at 60 bp

	Volatility		
Curve Shape	**40%**	**60%**	**80%**
Flat Curve	**74**	**81**	**88**
Steep Curve (6 bp/Yr)	68	75	84
Steeper Curve (9 bp/Yr)	67	73	81
Inverted Curve (6 bp/Yr)	83	89	96
More Inverted Curve (9 bp/Yr)	90	95	100

Source: Morgan Stanley

WHY BUY CANCELABLE PROTECTION?

Buying cancelable protection makes intuitive sense for many types of investors. Partially hedged bank loan portfolios are exposed to prepayment risks and a tightening spread environment (because protection is marked to market while loans are not). As such, owning the right to cancel protection is very valuable to a bank loan hedger.

In the high yield market, over 60% of outstanding bonds are callable, so trading default swaps against long bond positions can involve some amount of prepayment or extension risk.[1] Cancelable default swaps can mitigate some of the risk associated with uncertain maturities. Convertible arbitrage hedge funds, which frequently use credit protection, would be natural buyers of cancelable protection for the same reasons, as many convertible bonds are callable.

WHY SELL CANCELABLE PROTECTION?

Why sell cancelable protection, when, in theory, even a one-basis-point rally is enough to call the protection? From a strategic perspective, the length of the non-call period is critical, as are views on the direction of spreads and related company-specific factors.

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[1] *Please refer to Chapter 43.*

In general, if an investor has a neutral-to-bearish view on credit spreads, then selling cancelable protection has advantages over selling plain bullet protection because of the additional premium earned. Why? Let's consider the scenarios, comparing selling 5nc2 cancelable protection with bullet protection:

- If spreads rally during the first two years, the seller of cancelable protection gives up some of the upside relative to bullet protection, because the cancel option becomes more of a certainty. At the extreme, the cancelable swap would trade on a spread-to-worst basis and act like two-year protection.
- If spreads rally after the initial two-year period, the seller of protection would get called away immediately.
- If spreads were to widen substantially (before or after the two-year non-call period), the bullet and cancelable protection would converge in value since the cancel feature would become much less valuable. Clearly, selling cancelable protection would outperform in this scenario (because of the additional premium and smaller relative widening due to convergence).

While these scenarios should be relatively clear, there is an obvious question to ask: If an investor is neutral-to-bearish on credit today (or two years forward), why buy five-year credit exposure at all? In fact, why not simply buy two-year risk or avoid credit risk altogether? As with many things, the answer is that the world is not so simple.

LONG CREDIT AS A MATTER OF BUSINESS

We live in a world where many investors need to be long credit as a matter of business. Insurance companies and benchmarked money managers are the natural examples. Feeling negative on an asset class is not always a good enough reason to get out completely. Selling cancelable protection is a way of implementing an underweight position in credit today (because spread durations are lower), and getting paid in yield terms to do so (because premiums are higher). But even more powerful, selling cancelable protection is a way of playing credit cycles, because investors are effectively selling away the scenario where spreads tighten at some point in the future. The motivation behind this strategy would be fear of increased corporate leverage in the future as the US economy continues to expand, or simply a turn in the cycle at that point.

Of course, buying two-year risk instead of five-year risk is another way to express forward fears of increased leverage or turning cycles. Yet, given today's steep credit curve (in the short end), the additional premium of 5nc2 protection over two-year protection is substantial. One has to be extremely negative on credit over the next two years to make the premium give-up worthwhile.

SELLING TOMORROW'S TIGHTENING TODAY

Away from the structural reasons supporting the buying and selling of cancelable protection, we favor the idea of positioning for a neutral-to-weaker credit environment later on in this economic expansionary period, given the cyclical nature of credit and corporate leverage. Although there are many ways to express these views using long/short strategies, selling cancelable protection is a natural way to implement them from the long side. However, we caution that this nascent market still needs to grow from both a breadth and depth perspective.

chapter 41 Understanding Corporate Bond Options – Valuation Issues and Portfolio Applications

June 11, 2003

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj

INTRODUCTION

Options on corporate bonds, the right to buy or sell a bond at the strike price during a specific period, were among the earliest credit derivative instruments in the credit markets. Most outstanding corporate bond options are embedded in corporate bonds and are thus implicitly held by either bond issuers (for call options) or bond investors (for put options). As the market for separately traded corporate bond options develops, we focus our research efforts on understanding their investment characteristics, application in credit portfolios and valuation.

The corporate bond options that trade in the secondary market are typically sourced from simple structured credit transactions in which investors, issuers or underwriters write options on bonds to create desired investment characteristics or additional yield. The options are then redistributed and traded in the secondary market. Examples of structured credit transactions that result in new options written include:

- Repackagings of corporate bonds into trusts, in which end investors write call options for additional yield and reductions in average life
- Repackagings of putable corporate bonds into bullet securities, in which the investor would sell a call option with an exercise date equal to the exercise date of the embedded put option
- Writing of at-the-money options by investors who want to protect gains made in bullet securities prior to a rising rate environment (writing covered calls)

It is important to note a few points with respect to outstanding options. First, while corporate issuers are the largest holders of call options on corporate bonds, they typically do not redistribute this risk, although in theory they could. Issuers who hold call options may not exercise them whenever it makes economic sense (i.e., they may not act as rational market participants in the academic sense). The reasons for this behavior may include corporate capital structure issues, funding costs and liquidity in the primary markets. End investors who hold options will likely act more rationally, in the academic sense.

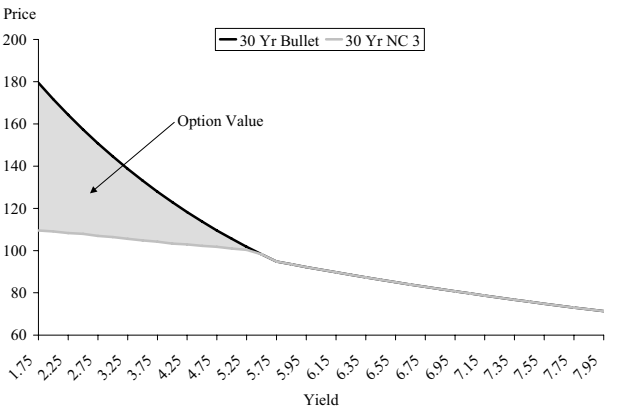
In this chapter we first explore the investment characteristics of corporate bond options, discussing both portfolio applications and trading strategies. We then propose a valuation framework based on traditional swaption market practices but taking into consideration differences in volatility and the likelihood of default. We conclude with some discussion of practical issues for investors that may affect how investors can incorporate these instruments into portfolios to help achieve investment objectives.

Investment Characteristics, Portfolio Applications and Trading Strategies

Since callable corporate bonds are a common instrument in the credit markets (5% of index-eligible investment grade corporate bonds are callable, representing $55 billion of debt), we begin our discussion of corporate bond options with a comparison of the price sensitivity of a bullet bond with that of a callable bond with the same terms. In Exhibit 1 we show the price changes relative to yield changes for a bullet bond with a 30-year maturity, along with those of a similar instrument that is callable after three years. The holder of a callable bond (who has written a call to the issuer) effectively gives up the positive performance of the highlighted region when compared to the performance of the bullet security.

exhibit 1

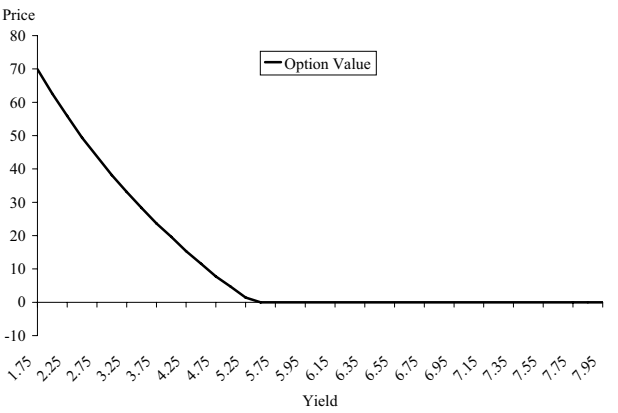
The Call Option Region



Source: Morgan Stanley

exhibit 2

Call Option Isolated: Convexity and Duration



Source: Morgan Stanley

This highlighted region is the option payout diagram (shown in isolation in Exhibit 2) for the owner of the call option, which is an extremely convex instrument. The option

is also very sensitive to changes in rates, implying that it has both a long interest rate and spread duration.

PORTFOLIO APPLICATIONS: DURATION AND CONVEXITY

At a time when traditional corporate bond portfolio managers are beginning to explore the application of nontraditional instruments such as credit default swaps, baskets and CDO tranches in portfolios, we suggest adding corporate bond options to this list of novel tools. In fact, corporate bond options are likely more "traditional" than the others, given that nearly every asset-liability or total return portfolio already has short exposure to call options through callable bonds.

In a nutshell, call options are instruments that are much more sensitive to interest rate (and spread) changes than bonds. As such, their high duration and convexity characteristics can be beneficial to investors seeking to adjust interest rate and spread sensitivity in portfolios. Investors can view corporate bond options as a tool with duration and convexity "leverage" to help achieve portfolio goals. We discuss the application of both below.

DURATION EXTENSION

Portfolio managers may choose to increase the duration of their portfolios to match benchmarks or implement active views. At the asset allocation level, our Global Pension Group has done extensive research showing that a significant increase in the dollar duration of fixed income portfolios is necessary to optimally fund defined benefit pensions.[1] Since this seminal work, many public and private pension funds have reworked their asset allocation schemas in an asset-liability framework (as opposed to an asset-only framework), which has generally resulted in extending the duration of their fixed income portfolios. To implement these duration extension programs, portfolio managers have considered a variety of long-duration interest rate products (e.g., zero coupon bonds or Treasury futures overlays), and we believe that corporate bond options can be used for similar reasons.

WHY CONVEXITY? PROTECTING PORTFOLIOS AT THE TAILS

Why is convexity a good attribute to have in a portfolio? Simply put, a positively convex instrument benefits portfolios during extreme movements in interest rates or spreads. When portfolios are interest rate hedged versus their liabilities or benchmarks, convexity (or excess convexity) can provide a substantial return cushion at the tails of the interest rate or spread distributions. We view this as being a natural use of positively convex instruments in corporate bond portfolios; but adding convexity generally comes at a cost (less yield for a given duration).

Furthermore, it is important to note that many fixed income portfolios have negatively convex instruments (e.g., mortgages) or instruments that are only slightly positively convex (e.g., callable corporate bonds), which can result in significant underperformance versus benchmarks or mismatches versus liabilities at the tails of the distributions. We are living in one such tail environment today (see Exhibit 3): the options written by many callable bond investors are significantly in-the-money to issuers, resulting in a large cost to many portfolios. Positively convex instruments can be used to offset some of this risk.

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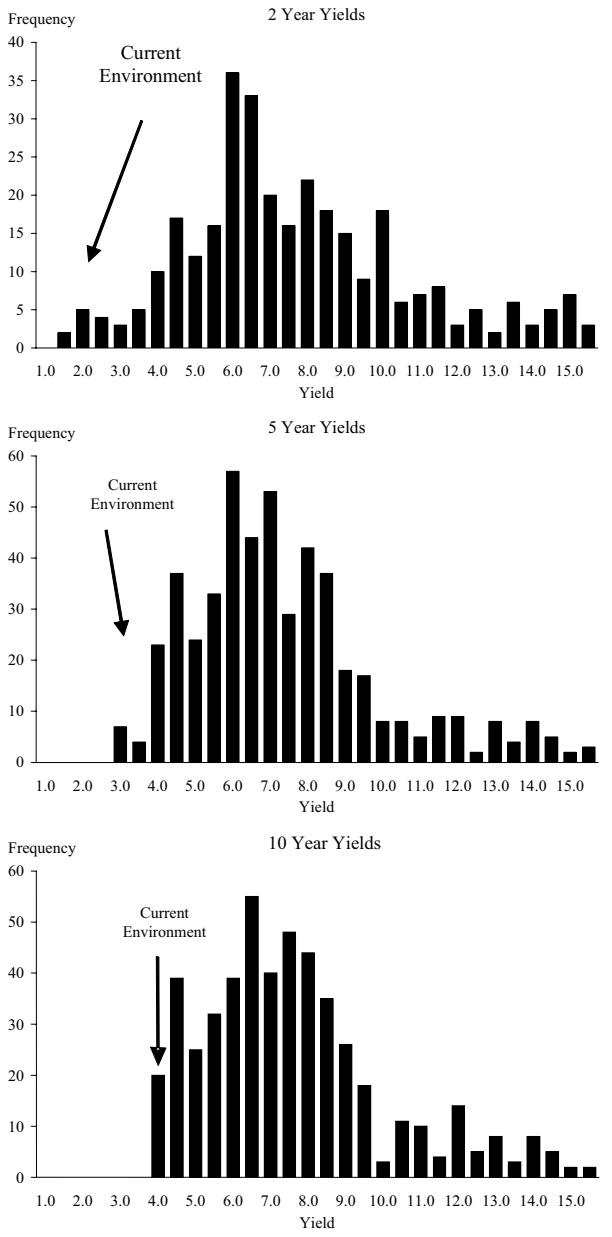
[1] *"Asset Liability Management Within A Corporate Finance Framework," Morgan Stanley Global Pension Quarterly, July 1998.*

exhibit 3

The Tails of Interest Rates (40-Year History)



Source: Morgan Stanley

A bullet bond has positive convexity, something most fixed income investors learned their first day on the job. As the graph in Exhibit 2 illustrates, on a relative basis the positive convexity of a call option is significantly greater than that of the long-dated bullet bond in a falling interest rate environment. However, the bullet bond's price sensitivity is positively convex at the other extreme as well, whereas the option's value

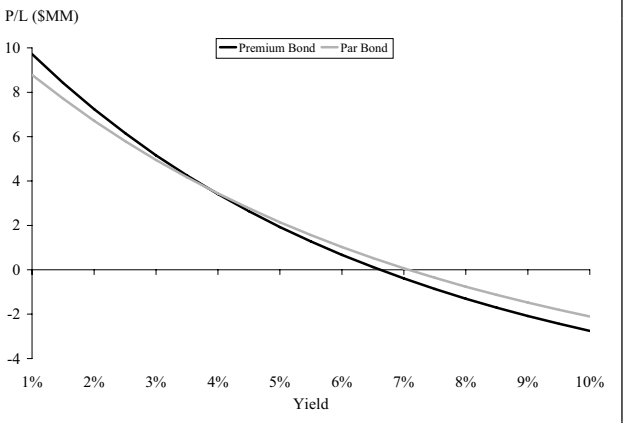
is flat (zero convexity) at that extreme. How can investors use call options to create truly convex instruments in all interest rate and spread environments?

PORTFOLIO APPLICATION I: THE CONVEXITY BARBELL

In Exhibits 4-7 we show an example that is very applicable in today's interest rate environment. The fundamental premise is that a premium bond is more convex than a duration equivalent par bond (all else being equal) in a rallying interest rate environment but less convex in a rising interest rate environment (Exhibit 4). Investors can combine a par bond with a call option and create an instrument that has equivalent duration but is truly more convex than the premium bond alone.

exhibit 4

Convexity Comparison: Equal Duration Premium and Par Bonds



Source: Morgan Stanley

In Exhibit 5 we show two hypothetical examples in which the investor sells a premium bond to buy a par bond and an in-the-money option on the premium bond.

The first trade is structured to be both duration and proceeds neutral, but has a give-up in yield of 72 bp in exchange for the pickup in convexity based on our fair value approximation for the option. This trade structure is effectively a convexity barbell. Note, however, that anomalies can exist, given the relatively nascent market for traded corporate bond options, that may make a transaction like this more attractive from a yield perspective.

exhibit 5 The Convexity Barbell: Two Hypothetical Trades

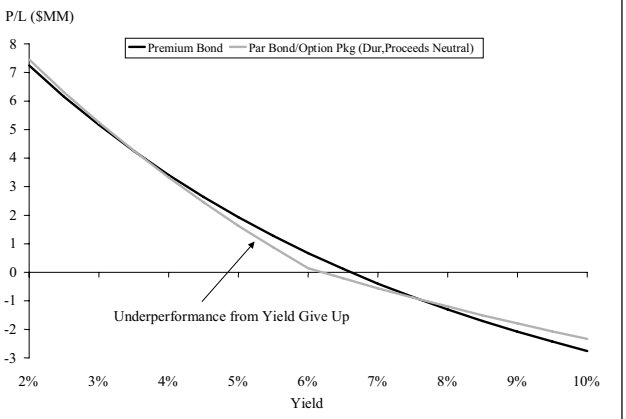
	Size ($MM)	Security	Coupon	Price	Yield to Mat	Eff Dur	Eff Convx	Proceeds ($MM)
Sell	10.0	23-Year Premium Bond	6.00%	112.15	5.11%	13.2	244.8	11.5
Buy	10.4	13-Year Par Bond	4.75%	100.71	4.68%	9.6	114.7	10.8
Buy	5.7	Call Option: 3.5-Yr Exp, 100 Strike on 23-Year Bond	-	12.62	-	65.8	3988.1	0.7
Diff	--				*-0.72%*	*0.0*	*357.3*	*0.0*
Sell	10.0	23-Year Premium Bond	6.00%	112.15	5.11%	13.2	244.8	11.5
Buy	10.0	13-Year Par Bond	4.75%	100.71	4.68%	9.6	114.7	10.3
Buy	5.5	Call Option: 3-Yr Exp, 100 Strike on 23-Year Bond		12.62		65.8	3988.1	0.7
Diff					*-0.86%*	*0.0*	*357.3*	*0.5*

Source: Morgan Stanley

As structured, the trade's convexity advantage is illustrated in Exhibit 6 (which shows total return at option maturity for changes in yield). The yield give-up results in underperformance over a wide range of yield distributions (approximately 250 bp), which investors could view as a large price to pay for convexity.

exhibit 6

The Convexity Barbell: Sell Premium Bond, Buy Par Bond/Options Package (Duration and Proceeds Neutral)

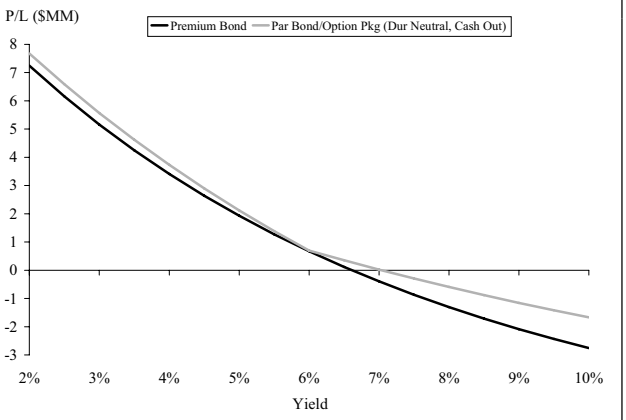


Source: Morgan Stanley

A second alternative is to take cash out of the transaction. In Exhibit 5, we show a second example trade, in which we fix the par amount of the par bond to be equal to that of the premium bond and adjust the option notional amount until the trade is duration equivalent. This structure results in a sharper barbell without any underperformance region, assuming the option is valued at our fair value approximation (see Exhibit 7).

exhibit 7

The Convexity Barbell: Sell Premium Bond, Buy Par Bond/Options Package (Duration Neutral, Take Out Cash)



Source: Morgan Stanley

Note that while the example trades are duration neutral, they do express a yield curve view, which is not depicted in the P/L graphs above, as yield changes are assumed to be parallel. In particular, given the sale of a long-dated bond to buy a shorter-dated

bond, curve flattening would hurt the trade while curve steepening would benefit the trade. The option's value is independent of curve shape.

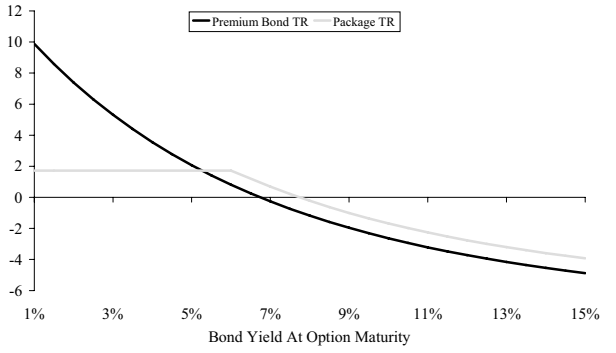
PORTFOLIO APPLICATION II: WRITING COVERED CALLS

Another application of bond options that is relevant in today's environment is the idea of writing covered calls on premium priced bullet bonds. This structure can be a means to monetize the intrinsic value generated in a long-duration instrument after a rally in rates as well as any value attributable to the volatility of rates in the future. The structure can be used to express a view that rates will be relatively unchanged to higher in the future. The structure is equivalent to selling a premium bond to buy a callable bond of the same issuer and term and realizing the difference in price as a gain.

Consider the situation of the 23-year premium bond in Exhibit 5. Because of its long duration and convexity, this bond will depreciate quickly in an environment of rising rates. One way to protect the value in this instrument without giving up current yield is to sell a call option on the bond struck at the at-the-money yield.

Exhibit 8 illustrates the advantage of this structure (a combination of the premium bond and written call option) over holding the long-dated premium bond alone. For widening of rates up to approximately 6%, the covered call strategy effectively immunizes the position from interest rate movements and hence performs better than the bond alone. For a widening of rates in excess of 6%, the strategy continues to outperform by a fixed amount driven by the option premium received at inception of the trade. The covered call strategy clearly underperforms if the yield on the bond falls below this, much like the performance of a callable bond.

exhibit 8
Covered Calls – Monetizing Volatility



Source: Morgan Stanley

The above examples are two of numerous applications whereby investors can use the duration and convexity of corporate bond options to alter the interest rate and spread sensitivity of fixed income portfolios to meet investment objectives.

TRADING STRATEGIES – ISOLATING THE COMPONENTS OF RISK

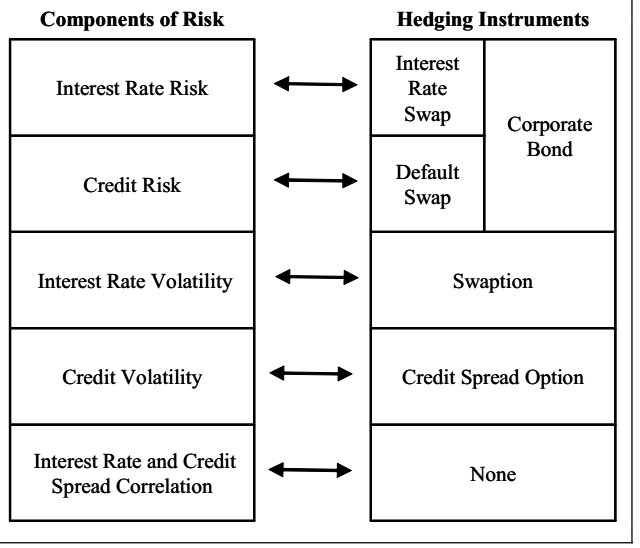
While many investors will find value in long or short option positions within their credit portfolios, other investors may wish to isolate certain aspects of corporate bond option risks to express particular views. We break the factors that drive the pricing of

corporate bond options into five components, namely credit volatility, credit risk, interest rate volatility, interest rate risk, and interest rate and credit spread correlation (see Exhibit 9, left side).

While asset-liability and total return-oriented investors may desire all five risks, given the goal of matching or outperforming benchmarks or liability schedules, other investors may wish to isolate and/or mitigate one or more of these risks to achieve investment objectives.

In Exhibit 9 (right side) we show the instruments that can be used to hedge these risks, from which we can derive trading strategies as shown in Exhibit 10. Investors can use these strategies to express views on a company without being forced to implement an explicit view on interest rates (or volatility of rates) or credit risk.

exhibit 9
Components of Risk and Hedging Instruments



Source: Morgan Stanley

exhibit 10 Corporate Bond Option Trading Strategies

Trading Strategy	Package	Rationale
Long credit volatility	Long option, long credit protection, short swaption, pay fixed in swap	Pure long credit volatility play; expresses a view that company's valuation becomes markedly less certain
Long credit volatility and credit risk	Long option, short swaption, pay fixed in swap	A levered long credit position; implements a view that company rallies strongly
Long credit and interest rate volatility, credit risk	Long option, pay fixed in swap	Option position without interest rate risk; expresses view that company does well independent of economic cycle
Long credit and interest rate volatility	Long option, long credit protection, pay fixed in swap	Pure long credit and interest rate volatility play; implements an "uncertain" economic view on a cyclical or interest rate sensitive company
Long credit and interest rate volatility, interest rate risk	Long option, long credit protection	Option position without credit risk; expresses an increasingly uncertain credit view combined with a view on rates
Long credit volatility and interest rate risk	Long option, long protection, short swaption	Expresses a weak-economy view combined with increased credit uncertainty
Long credit and interest rate risk, credit and interest rate volatility	Long option	Original option position with duration and convexity applications

Source: Morgan Stanley

chapter 41

Valuing Corporate Bond Options

There are several variants to traditional option pricing models that are used to price fixed income options. The most liquid market by far is the swaption market, which we suggest using as both a frame of reference and a source of implied volatility in corporate bond option valuations. The holder of a swaption has the right to enter into an interest rate swap on a specified date (European option) or a range of dates (American or Bermudan option).

There are two components of the valuation process for a call option on a corporate bond that differ from the valuation of options on a credit risk-free instrument like an interest rate swap. First, the volatility input must take into consideration the volatility of the credit risk (in addition to the interest rate risk), and second, a scenario in which the issuer defaults prior to option maturity must be factored in as well. We address both issues in this section, building on a swaption valuation framework, and provide some pricing examples as well. While much research has been published on understanding the valuation of options related to fixed income instruments, research discussing options on credit risky instruments has been more recent. We refer readers to Duffie and Singleton 2003 for a more detailed analysis.[2]

THE RELATIONSHIP OF INTEREST RATES AND CREDIT SPREADS

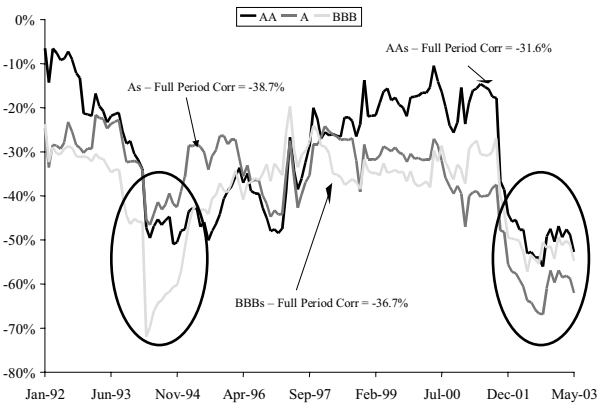
Given that the secondary market for corporate bond options is still developing, it is difficult to observe implied volatility; therefore, appropriate volatility inputs to option pricing models must be derived by other means. An approach we suggest is to observe implied volatility in the swaption market and then "add in" volatility from credit markets based both on historical spread volatility and the correlation of spreads with swap rates. Given an adjustment for correlation, we assume that these two volatility measures are indeed additive. Default is modeled separately below.

To get a better sense of the relationship of interest rates and credit spreads, we observed the historical correlation of credit spreads (over Libor) and swap rates over a 14-year period. In Exhibit 11, we show the results by credit quality, with overall correlation ranging from –31.6% to –38.7%. On a three-year rolling basis, the correlation values are always negative for all three credit quality sectors, and have fallen to as low as –70%.

[2] *Credit Risk, Duffie, D., and Singleton, K., Princeton University Press, 2003.*

exhibit 11

Always Negative – Rolling Correlation of Swap Rates with Credit Spreads

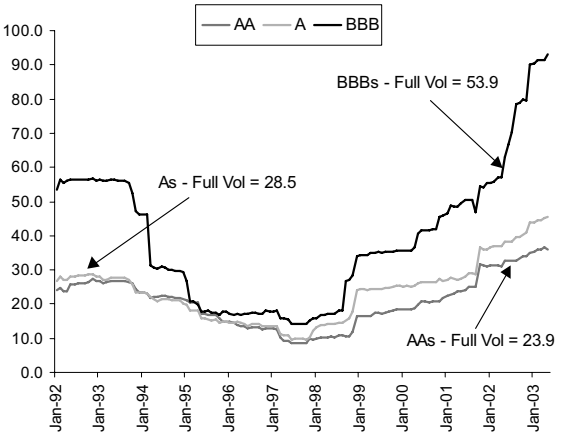


Source: Morgan Stanley, Salomon Analytics

The overall values are intuitive, given the general sensitivity of corporate credit risk to economic cycles. Both periods of highly negative correlation occur during coinciding periods of stress in both the interest rate and credit spread markets.

exhibit 12

Rolling Volatility (in bp) of Credit Quality Sectors



Source: Morgan Stanley, Salomon Analytics

In addition to this correlation, it is useful to observe historical credit spread volatility in formulating an appropriate volatility input into an option pricing model. In Exhibit 12 we show historical volatility over the same period for AA, A, and BBB rated corporate debt. On an absolute basis, the volatility rises with credit quality risk (as we would expect). On a three-year rolling basis, AA and A credits were relatively stable, while the BBB rolling volatility was much more volatile itself, rising to a current level of over 90.

VALUING THE OPTION

With this background, we discuss below one method for valuing corporate bond options struck near par, based on the standard Black swaption framework. Given the inherent complexities in valuing American/Bermudan options on bonds, we have concentrated on the issues related to valuing European options here. This valuation could therefore be viewed as a floor on Bermudan or American options. In particular, we focus on three points:

- Determining an expected forward risky rate (or price) at option expiry
- Calculating an appropriate volatility given implied swaption volatility and assumptions for credit spread volatility and correlation
- Modeling the likelihood of default

EXPECTED FORWARD CREDIT RISKY RATE AT OPTION EXPIRATION

The prevailing risky rate applicable to a corporate bond at the time of option expiration can be divided into the future prevailing swap rate and the Libor credit spread for the appropriate maturity.

The current forward swap rate can be observed directly from the prevailing swap curve today. We use this forward rate as an approximation of the expected future swap rate.

The expected future credit spread can potentially be derived in a manner similar to that of the swap rate if the credit has instruments with a variety of maturities. Alternatively, one can use current credit spreads to approximate the forward credit spread in a variety of ways. The methodology used and level of rigor with which the future credit spread is derived should weigh the absolute level of spreads and the impact on option valuation. Generally, the wider the credit spread, the greater the impact of the spread assumption on the option valuation.

The expected future credit risky rate can then be computed and utilized in the option valuation.

DETERMINING VOLATILITY

Moving from volatility of swap rates to volatility of risky rates within the framework of the Black model is a challenge. In order to make use of the forward looking swap rate volatility data available from the swaption market, we rely on the assumption of lognormal swap rates. However, in order to use the Black framework to value the option on a default risky bond, we rely on the assumption that risky rates are also lognormal.

The method we employ allows us to approximate the expected value and variance of forward credit spreads and to calculate the expected value and volatility for the risky rate. We rely on the assumption that credit spreads are distributed in such a way that when added to a lognormal distribution, the result is once again lognormal.

The variance of the risky rate is derived using the following basic formulation:

$$V_{RiskyRate} = V_{Swap} + V_{CreditSpread} + 2\rho\sqrt{V_{Swap}V_{CreditSpread}}$$

Where:

$$V_{Swap} = F_{Swap}^2(e^{\sigma_{Swap}^2} - 1)$$

σ_{Swap} = swaption implied volatility (generally at the money; can be adjusted for skew)

ρ = correlation between the level of the swap rate and the level of credit spread

F_{Swap} = Forward swap rate from option expiration through bond maturity

Finally, the $\sigma_{RiskyRate}$ parameter is calculated based on inverting the formula above:

$$\sigma_{RiskyRate} = \sqrt{Ln\left(\frac{V_{RiskyRate}}{F_{RiskyRate}^2} + 1\right)}$$

Exhibit 13 illustrates the sensitivity of the risky rate volatility (the $\sigma_{RiskyRate}$ parameter) for various credit spread and credit spread volatility assumptions for a given swap rate, swap volatility and correlation. We find that for reasonable combinations of credit spread and credit spread volatility, the impact of varying correlation within the range from –10% to –40% results in relatively small changes in volatility for typical investment grade spread levels. Exhibit 14 illustrates the sensitivity of the risky rate volatility across a broad range of correlation for a credit with a spread of 100 bp.

chapter 41

exhibit 13 Risky Rate Volatility

(Swap = 5%, σ_{Swap} = 15%, ρ = -30%)

Credit Spread Standard Deviation (bp)	Credit Spread (bp) 10	50	100	150	200
10	14.3%	13.2%	12.1%	11.2%	10.4%
30	14.1%	13.1%	12.0%	11.1%	10.3%
50	15.0%	13.9%	12.8%	11.8%	11.0%
70	16.8%	15.6%	14.3%	13.2%	12.3%
90	19.2%	17.8%	16.3%	15.1%	14.0%
110	21.9%	20.4%	18.7%	17.3%	16.1%
130	24.9%	23.2%	21.3%	19.7%	18.3%
150	28.1%	26.1%	24.0%	22.2%	20.7%
170	31.4%	29.2%	26.8%	24.8%	23.1%
190	34.7%	32.3%	29.7%	27.5%	25.6%
210	37.9%	35.4%	32.6%	30.2%	28.1%

Source: Morgan Stanley

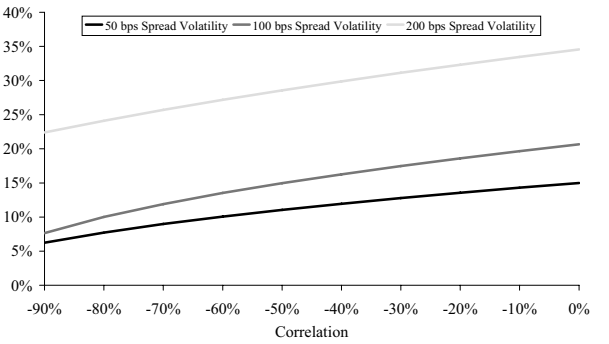
exhibit 14

Risky Rate Volatility

(Swap = 5%,

σ_{Swap} = 15%,

Spread = 100)



Source: Morgan Stanley

DEALING WITH DEFAULT

In order to deal with default risk within this framework, we have made the assumption that the distribution of forward rates at option maturity is conditional on no default occurrence before option expiry.

The probability of default is explicitly incorporated through a default hazard rate, which is built into the discount factors used in the valuation. The hazard rate can be derived from credit default swap or bond spreads using a risk neutral framework or can be readily approximated with the following formulation:

$H_t = CDS_t / (1 - \text{Recovery Rate})$

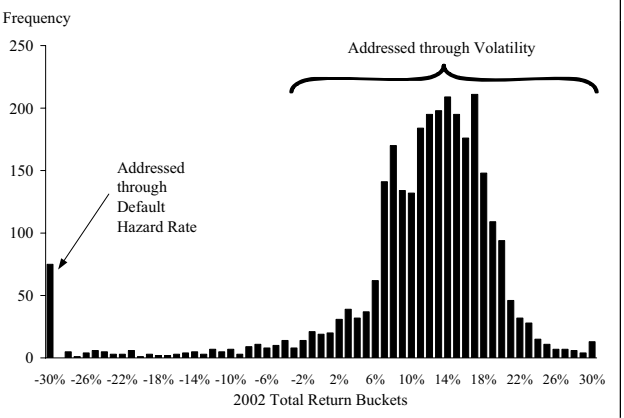
H_t is defined as the annualized default hazard rate applicable throughout the period before option expiry and CDS_t is the credit default swap spread for a swap maturing at option expiry. The hazard rate is incorporated into the our model by modifying the definition of the discount factor PV(0,t) to be $e^{-(r+Ht)*t}$. The implication of this approach is that the value of the option is zero in default scenarios. For call options with strike prices significantly below par as well as put options, further adjustment to the valuation may be required to reflect the possibility of a positive return on the option in a default scenario.

Conceptually, one can think of the complete distribution of forward risky rates as being comprised of two components, which our approach assumes are independent of one another:

1. The distribution of rates given default does not occur before option expiry and
2. The portion of the distribution due to default occurrence before option expiry

Exhibit 15 illustrates this conceptual framework in the context of bond total returns in 2002.

exhibit 15
The Performance Skew in Investment Grade Credit (2002)



Source: Morgan Stanley

The result of this approach is to effectively "discount" the payoff of the option for default occurrence. Therefore, valuations are generally lower than for equivalent default risk-free options. This effect of this discount is minor for short-dated options but can be dramatic for long-dated options.

OPTIONS WITH MORE COMPLEX STRUCTURES

Some bond options have additional structural features that make them much more complex to value than standard European options. Characteristics such as multiple exercise dates and varying exercise prices, combined with the nature of bond price dynamics relative to changes in rates, make such features extremely complex to evaluate without moving to a framework in which we generate a complete distribution for the full maturity range of forward rates.

While lattice-pricing structures can address some of these issues, an approximate floor can readily be found for complex option values using multiple applications of the methodology presented above. We take advantage of the fact that the value of a complex option with multiple exercise dates must be at least that of a European option exercisable on one of those dates. We construct a portfolio of European options expiring at various points in the exercise period. We value these options based on the methodology above and approximate a floor valuation of the more complex option as the maximum of these.

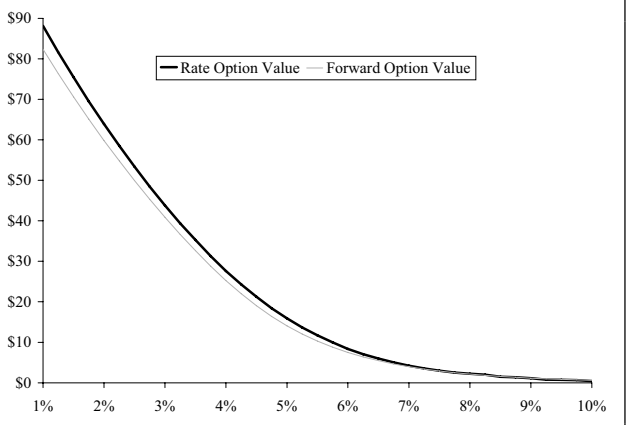
Through the adjustment of the input parameters we are able to reflect the varying relationship between yield and price volatility at different points in time and the "pull to par nature" of bonds and varying exercise terms through time.

A CLOSED FORM APPROXIMATION

While the standard Black swaption model allows for a closed form solution, we use the framework to simulate forward rates and calculate bond prices to derive an option valuation. Relaxing the theoretical framework we have used above, one can derive a closed form approximation by modeling the risky bond forward price directly in a forward price option model (with adjustment for default). The expected yield can be mapped into an expected price and the volatility calculated above can be used to approximate the forward price volatility using an adjustment based on duration of the bond at option expiry. We find that this approximation generally understates value under equivalent assumptions.

Exhibit 16 shows a comparison of the option valuation for the option described in Exhibit 5 based on the forward rate simulation methodology and the forward price closed form approximation. We find that for near at-the-money options (expected forward rates between 4.25% and 6.00% in this case) the closed form underestimates the value of options by 10-12%, with error declining in percentage terms for options heavily in or out of the money.

exhibit 16
Closed Form Approximation



Source: Morgan Stanley

Conclusion – Practical Issues

In this chapter we have described attributes of corporate bond options and their application to credit portfolios and presented several trading strategies that investors may find useful to implement views on the market and individual credits. We have also discussed valuation issues in a swaption framework, taking credit-specific risk into consideration. We conclude with a brief summary of some of the practical issues that market participants must address to value and invest in these instruments.

On the valuation front, we have based our proposed valuation framework on a standard European swaption model (Black) with adjustments for credit volatility and default scenarios. However, corporate bond options can be Bermudan- or American-style, which will make options more valuable but also complicates the computation process. European-style option analysis can be used as a "floor" on the valuation for American and Bermudan options. Other bond-level issues can complicate the process as well, as we touched upon in the previous section.

On the topic of determining credit volatility, we believe our approach is theoretically sound; but, in our experience, very few investors who are valuing options today are using this type of approach in practice. As the still-nascent market for corporate bond options develops, we expect valuation techniques to evolve as well.

On the topic of portfolio applications, there may be significant accounting issues for investors hoping to incorporate corporate bond options in portfolios. An institution's accounting regime will determine how options are treated. Derivative accounting regulations could force mark-to-market for these options (in portfolios that are otherwise not marked to market). The fact that options have no income stream may be an issue as well. Hedge accounting rules may be applicable in situations where short call option positions act as covered calls or where long call option positions are considered hedges against callable bonds. We urge investors to consult their accountants to gain more insight into these accounting issues.

chapter 42 Options for Nothing, Interest Rate Risk for Free

March 26, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Brian Arsenault
Primary Analyst: Peter Polanskyj
Anisha Ambardar

One of the complications in making relative value decisions between bonds and default swaps is dealing with the differences embedded in the various instruments. Default swaps generally have restructuring risk and overwhelmingly trade as bullet instruments (the cancelable CDS market is just beginning). Corporate bonds can have variable coupons (i.e., step-ups) and can be callable as well. In a world of relatively tight spreads, these structural differences become an important factor in determining relative value. One of the most important differences, in our view, is the call risk (or alternatively, the extension risk) in corporate bonds, particularly in high yield, where over 60% of the market is callable.

In Chapter 24, we introduced our high yield basis (between CDS and cash) and discussed the idea that the basis for callable bonds can be very volatile, depending on how much the call option is "in the money." For investors deciding between selling bullet protection or buying callable bonds, the market does not provide much help.

However, the relationship between callable bonds and CDS provides us with a framework to imply a value for the options callable bond investors are writing. As such, we find the comparison to be a useful relative value exercise when deciding between callable bonds and default swaps (or bullet bonds). High yield market convention is to quote callable bonds on a "to-worst" basis, partly because it is difficult to make good volatility assumptions for option-adjusted calculations.

Using our simple framework, there are numerous examples of callable bonds where investors are not being adequately compensated for the call risk, in our view. As such, we question whether the high yield basis is really negative for many issuers, when considering a "fairer value" for the optionality of callable bonds.

THE BASIC METHODOLOGY – OAS MAKES A COMEBACK

The approach we use to determine relative value between bullet default swaps and callable bonds is fairly straightforward, and is based on the notion of option-adjusted spread (for those who are new to the credit markets, this is a 1980s concept that does not get a lot of attention today). The end game is to value the call option that the callable bond investor is writing, based on where the bullet protection trades. For example, if the resulting implied volatility/option price seems low, then the bond holder is writing the option too cheaply, which tells us that selling protection is better value.

Implementing what we just described above is fairly simple, requiring one Bloomberg screen (OAS1) to compute the implied volatility given a bond's dollar price and the assumed credit spread curve (which is used to shift the swap curve to reflect the default risk inherent in all the cash flows). Forming an opinion on this implied volatility requires a bit more intuition, as there is both an interest rate and credit component to it. We go through some historical examples in the next section.

This approach may seem like it brings too much quantitative analysis to a market that really trades on credit fundamentals, but we find many situations where the relative value information is strikingly clear and very intuitive. Furthermore, the extension risk in many callable high yield bonds can really be driven by interest rate movements at today's spread levels, not credit fundamentals, which is a risk that does not appear to be adequately priced into the high yield market.

VOLATILITY AND INTEREST RATE RISK – IMPLICATIONS FOR CALLABLE HIGH YIELD BONDS

Going down the path we propose above has the risk of introducing a lot of volatility confusion, as one thinks about various measures. To keep things simple, we highlight a few points with respect to volatility that are important to understand in this context.

- The volatility that a callable bond investor is exposed to is related to price movements for the bond. This volatility, therefore, has both an interest rate component and a credit spread component.
- Combining both interest rate and credit spread volatility requires making assumptions about how they are related. In general, we have found they are negatively correlated, but corporate bonds are still more volatile on an absolute basis, particularly for wider trading credits.[1]
- We find that average high yield realized volatility (for a selected universe of 16 bullet instruments) has been greater than the realized volatility in the swap market in recent history. Today, these two markets appear to be near parity in terms of volatility (see Exhibit 1).
- Callable high yield bonds today can have significant extension risk related to interest rate movements, given the absolute level of spreads, high dollar prices, and the idea that an inflection point in interest rates may not be that far away. This risk is not captured by measures like spread-to-worst.

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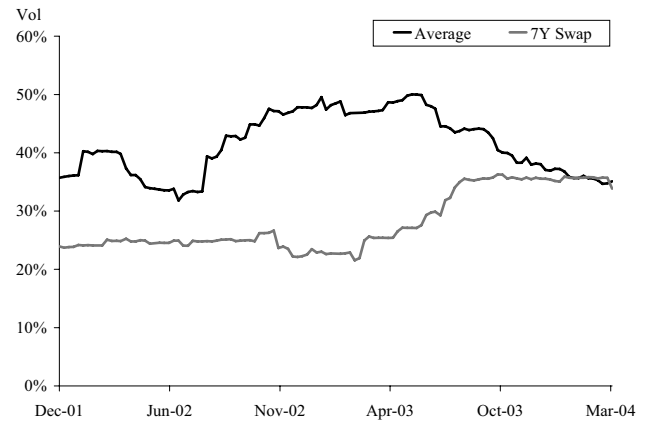
[1] *Please refer to Chapter 41.*

chapter 42

exhibit 1
High Yield Volatility Approaches Swap Volatility Levels



Source: Morgan Stanley, Bloomberg, Salomon Analytics

UNCOVERING THE RELATIVE VALUE

We apply our simple relative value approach to a dozen callable high yield bonds to see how the market is pricing in the call risk (see Exhibit 2). We find that callable issues for DirectTV, Echostar and Williams Companies have implied volatilities and option pricing that seem reasonable to us, given the risks. DirectTV's callable 2013 bond, for example, trades 153 bp wider than CDS on a Z-spread-to-worst basis (mid-market), but this spread cushion results in an option value of 8.72 points, which appears relatively fair compared to a 30% volatility assumption.

For several other credits, we find pricing on callable bonds that ascribes very little or even negative value to the option the bond holder is writing. For example, Host Marriot's 2013 callable bonds trade 32 bp tighter than CDS (on a mid-market Libor basis), implying a negative option value (i.e., the bond investor is paying to be short the option). Therefore, an investor can pick up spread and eliminate the short option position by swapping from the callable bonds into CDS.

While it is hard to calculate what the real volatility for a callable high yield bond ought to be, we take comfort in using swaption levels as a conservative measure for two reasons. First, credit-related issues, positive or negative, can have at least as large an impact on a bond's price as sharp interest rate moves. Second, the options investors are writing on high yield bonds are American in nature (with multiple dates) and are difficult to accurately model, but are more expensive intuitively.

exhibit 2 Valuing the Call Option – Comparing Callable Bonds to Bullet Instruments

Ticker	Coupon	Maturity	Recent Price	Z Spread	Bullet Z Spread	CDS Mid	Implied Vol (%)	Implied Option Price	Option Price at 30% Vol	Comments
WMB	8.625	6/1/2010	110.250	356	255		29%	3.53	3.65	Reasonable Valuation
AW	7.875	4/15/2013	109.000	353	272	290	N/A	Less than zero	4.70	Callable Too Rich
NXTL	6.875	10/31/2013	106.625	258		175	14%	1.53	4.40	
DISH	9.125	1/15/2009	113.375	212		180	20%	5.21	6.06	Reasonable Valuation
LYO	9.5	12/15/2008	99.500	574		675	N/A	Less than zero	1.60	Callable Too Rich
HMT	7.125	11/1/2013	103.500	293	269	325	N/A	Less than zero	3.54	Callable Too Rich
XRX	7.625	6/15/2013	106.500	296	254	255	12%	1.20	4.51	
EQCHEM	10.625	5/1/2011	105.500	628	556		17%	2.11	4.22	
AMT	7.25	12/1/2011	102.000	365		425	N/A	Less than zero	2.00	Callable Too Rich
AMKR	7.75	5/15/2013	101.500	399	353		8%	0.23	3.62	Callable Too Rich
DTV	8.375	3/15/2013	113.125	296		143	35%	8.72	7.75	Reasonable Valuation

Source: Morgan Stanley, Bloomberg

chapter 43 Getting a Handle on High Yield Call Risk

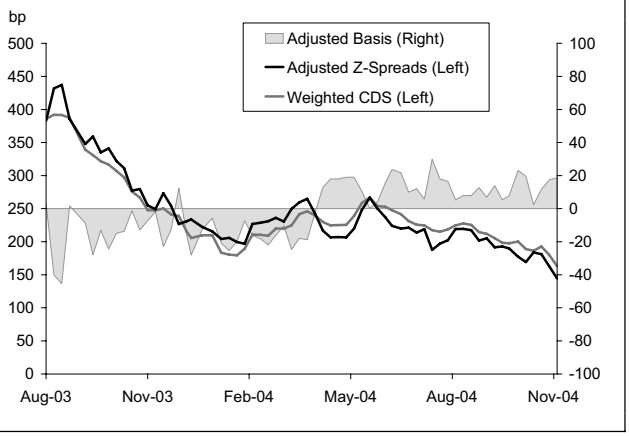
November 12, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA

With the elections behind us, a feel-good jobs report, oil prices well off their highs, and a Fed continuing to use the "measured" language, the risk of rising rates, even if it is gradual, comes back into the forefront for credit investors. We have argued in previous research that investors in many high yield callable bonds have not been adequately compensated for the call option that they have sold to the issuer, which can be influenced by interest rate moves as much as spread moves.

We first addressed this issue in March of this year, and then were fortunate to have an opportunity to observe bond performance in the subsequent two months, when interest rates rose significantly higher (90 bp on the ten-year note). We found that for many of the bonds where investors were not being paid well (or paid at all) for the extension risk, the bonds underperformed the market, all else being equal.[1]

exhibit 1
High Yield Bonds Get Richer – CDS Basis Moves Wider



Source: Morgan Stanley

Since then, the ten-year note has retraced much of its rise in yield, although it is now about 20 bp higher than the October lows. We continue to find many examples of bonds where investors are not adequately compensated for the call risk. We now take a closer look, commenting on some of the factors that influence these option values. In particular, the interest rate and spread driven economics behind a call option are not the only factors influencing an issuer's actions, although pricing today may suggest that it is. Today's positive basis between cash and default swaps (default swaps trading wider) has implied even richer relative value for callable bonds than earlier in the year. Yet we

[1] *Please refer to Chapters 25 and 42.*

do find some callable bonds where option valuations are much closer to being fair relative to default swaps, suggesting that there is a growing minority of investors who can play one market against the other in a relative value context.

THE CALL OPTION – NOT ALWAYS ECONOMICALLY DRIVEN

Basic derivatives pricing theory suggests that an option holder will always exercise the option when it is beneficial to do so. For an issuer that has continuous access to the capital markets, calling an outstanding issue when the debt can be refinanced at a slightly lower interest cost would be enough of a reason to move forward. However, in the corporate credit world, there are other factors that are at least equally as important, particularly for high yield companies. Fluid access to capital markets cannot be assumed to be true all of the time. Even if issuers feel that access is good, they may not be willing to risk testing it. Furthermore, there may be other debt that is more beneficial to call, such as subordinate (i.e., higher interest cost) bonds, or even convertible bonds where tax and balance sheet issues can come into play (debt treatment vs. equity treatment).

TODAY'S MACRO ENVIRONMENT FOR CALL RISK

With low rates, tight spreads, and little risk premium associated with callable high yield bonds, market pricing tells us that issuers are likely to exercise their call rights. Moreover, most high yield bonds are still pricing to early worst dates, further supporting this sentiment. This situation is fraught with risks, though, at either extreme of the macroeconomic outcome. If the economy falls off a cliff, high yield companies will likely suffer, and spreads could widen, driving callable bonds to extend both for yield and access to capital markets reasons. If the economy accelerates dramatically, spreads could remain in their current zip code but increases in long-term rates could again make calling bonds an unattractive option. In the comfortable middle, where spreads remain benign and rates do not make any jumpy movements, refinancing will remain easy.

WHAT IS THE RIGHT PRICE FOR A HIGH YIELD CALL OPTION?

The simple answer is that we do not know, because each situation is very credit specific. Given how fundamentally driven the high yield market is, it likely does a good job at "pricing" the subjective aspects of issuers exercising their call options, particularly when it is driven by ability to access the capital markets or issuer motivation. Clearly, high yield investors are quite confident about the capital markets environment currently.

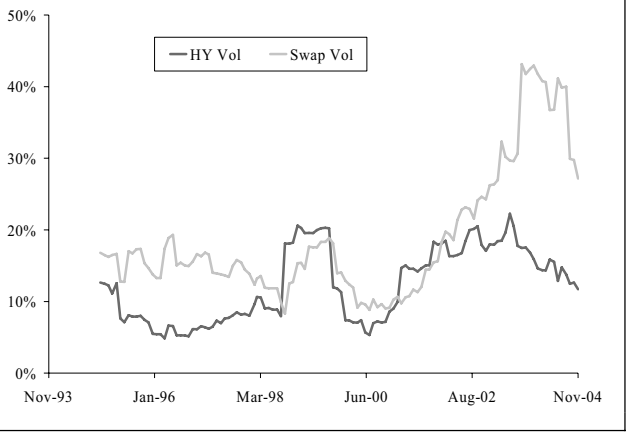
We had hoped to gather some information from the convertible market, as many converts are indeed callable, and a decent portion of convert issuance goes directly to the hedge fund community which has made a business out of isolating and hedging the various component risks in these structures. Yet, we find that what often triggers the ultimate call in a convert is not the level of rates and spreads, but other more subjective factors, such as tax and accounting treatment. The single-name default swap options markets would be another alternative for getting market information on option prices, but this is still a developing story, particularly in high yield.

chapter 43

HISTORICAL YIELD VOLATILITY IS MUTED

With a lack of market information telling us where implied volatility should trade, we fall back on some historical indicators. If we examine the historical volatility of high yield versus those of interest rate markets, we find some noteworthy relationships. Exhibit 2 shows the rolling 12-month volatility of the yield to worst for the high yield market and the equivalent maturity Libor rate. Of note is the recent disparity between the two measures, which is a trend that is consistent with our prior study of a smaller high yield universe where we saw high yield volatility approaching that of swaps. Today the volatility in high yield has declined sufficiently to run below Libor volatilities. Intuitively, this suggests that higher rates combined with tighter spreads has kept bond price movements muted, driving yield volatility of high yield bonds below those of risk-free instruments, however ironic this may seem. Based on the option values we see, this also seems to be the environment the market is pricing in for the medium term.

exhibit 2
High Yield Volatility Lower Than LIBOR Volatility



Source: Morgan Stanley

THE IMPACT OF A POSITIVE BASIS ON CALL RISK

Our methodology for valuing the option that callable bond investors are effectively writing involves using valuation information from the default swap markets, where protection is in bullet-form. As an extreme example, if a callable bond is trading to a near-term to-worst date and its Libor spread to this date is much tighter than the "equivalent" default swap premium, then the callable bond investor is not being paid for the extension risk in this bond, at least from a default swap perspective. There are reasons, though, why an investor may choose to ignore this information. A further tightening of spreads (or rally in interest rates) could force the bond to shorten even more (if it is not already trading to the closest call date). Also, the bond could get taken out in a tendering, with a tight spread demonstrating the market pricing in this action.

Nevertheless, many of the bonds that we highlight in Exhibit 3 are in fact similar to the extreme case we described above. The demand for credit from cash high yield investors has pushed the basis positive today, which plays a big factor in this valuation exercise. In our limited universe, we do find a handful (three bonds to be precise) where a zero to negative basis gives the bond investors at least some amount of compensation for writing the call option. The names where option pricing appears to be more fair are those trading at the tight end of the high yield spectrum. When we consider the fact that tighter spread names tend to price options more fully, it follows that even in a credit friendly environment there is the potential for callables already trading to their nearest call date to underperform default swaps.

exhibit 3 Comparing Callable Bonds to Default Swaps

Ticker	Coupon	Mat. Date	Recent Price	Z Spread to Worst	5 Year CDS Spread	Implied Option Price	Price Diff for Non Negative Option Value
AMKR	7.75	5/15/2013	89.00	514	725	NA	12
AMT*	7.25	12/1/2011	106.25	179	247	NA	5.25
AMT	7.5	5/1/2012	106.00	209	247	NA	4
AMT	7.125	10/15/2012	102.25	247	247	NA	3.25
AW	7.875	4/15/2013	103.50	294	420	NA	9.5
DTV	8.375	3/15/2013	114.00	133	85	2.56	NA
EQCHEM	10.625	5/1/2011	117.25	177	215	4.95	NA
GP	9.375	2/1/2013	118.75	83	104	4.60	NA
HMT	7.125	11/1/2013	109.25	156	170	NA	4.25
NXTL	6.875	10/31/2013	109.25	105	95	NA	2.75
NXTL	5.95	3/15/2014	102.50	108	95	NA	3
NXTL	7.375	8/1/2015	111.00	129	95	NA	1.5
RAD	8.125	5/1/2010	107.00	245	425	NA	9.5
RAD	9.5	2/15/2011	111.00	274	425	NA	7.5
RAD	9.25	6/1/2013	105.00	400	425	NA	4.5
XRX	7.625	6/15/2013	110.75	162	150	NA	2.75

**AMT CDS trades on a different entity than the bond issue.*
Source: Morgan Stanley

FAVORING DEFAULT SWAPS OVER BONDS

As we have stated in many different ways in our recent research, we continue to have a preference for taking high yield credit risk in default swaps versus cash bonds, for those investors who indeed have a choice. The negative basis phenomenon in the investment grade markets can spill over into high yield, especially higher-quality high yield, if the structured credit bid continues.[2] Furthermore, the asymmetry associated with interest-rate driven extension risk today supports the argument of taking bullet risk instead of callable risk in many credit specific situations in the high yield market.

[2] *Please refer to Chapter 51.*

chapter 44 Covered Calls Aren't Crowded Trades

June 24, 2005

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA

As we approach the mid-point of a year that has been characterized by contrarian events, some fundamentally sound investment strategies have quickly morphed into crowded trades. From shorting the US dollar to shorting interest rates and mezzanine tranches, technicals have dominated fundamentals, and market movements have been surprising.

Long-term Treasury yield movements have perhaps been the most puzzling, as the sell-off that short-sellers welcomed in the first quarter was more than offset by a huge rally in the second quarter. While interest rates have all kinds of implications on credit spreads and bond pricing, one that clearly receives significantly less focus is the pricing of corporate bond options, including bonds with embedded options. The steady and sizable flattening of the Treasury curve and the inherent characteristics of corporate bond options can make them a strategically appealing way to implement credit and interest rate views.

CORPORATE BOND OPTION STRATEGIES

When we first discussed corporate bond options in 2003, the environment appeared ripe for strategies like selling covered calls or swapping premium bonds for par instruments paired with the purchase of call options; 10-year Treasury rates were around 3.5%, and the then on-the-run DJ TRAC-X^{SM} Index traded at 50 bp.[1] Jumping ahead two years, we see a market for corporate bond options that has continued to develop, albeit without the benefit of the hyper-liquidity created by the index and tranched index markets.

The goal of any option-based strategy is to change the carry, duration and convexity profile of a given instrument. As we look beyond the world of structured credit into the broader macro environment, we again see an environment where corporate bond option strategies look attractive to us. Corporate bonds, being hybrid instruments, are affected both by changes in the rate environment and changes in credit spread markets. We examine the importance and impact of the two markets on corporate bond options below.

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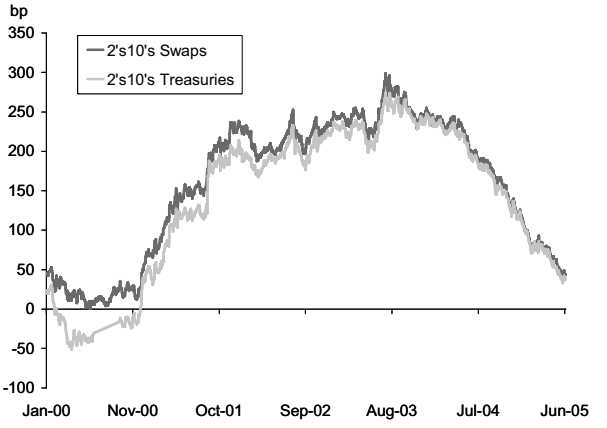
[1] *Please refer to Chapter 41.*

REDEFINING AT-THE-MONEY

In Exhibit 1, we show the 2's-10's curve steepness in both interest rate swap and Treasury markets over the last four years. While we have not reached the flat/inverted curve shape of 2000, the curve has flattened dramatically over the last year, bringing us to territory we have not seen since early 2001. One key implication of a flattening Treasury curve is the level of rates implied for future periods. While in 2002-4, markets implied markedly higher rates (and lower bond prices) several years forward, today's relatively flat curve environment implies rates close to today's levels (and bond prices near today's levels, as well). While this effect will be somewhat offset by the increased steepness of credit curves today, the order of magnitude of interest rate impact is greater than the offsetting spread impact for a typical investment grade credit.

exhibit 1
Flattening Interest Rate Curves



Source: Morgan Stanley

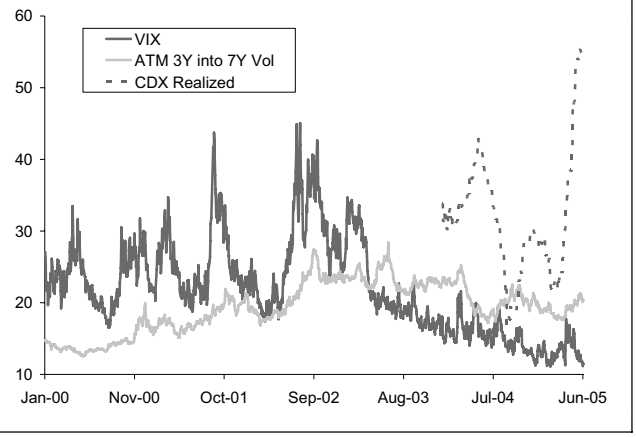
In terms of corporate bond option markets, the effect of a flatter interest rate curve is to change our expectations of the future price of bonds and, by implication, the level at which an option with a given strike is in- or out-of-the-money. While a corporate bond call option struck marginally out-of-the-money in 2004 (compared to the spot price) may have appeared significantly out-of-the-money three years forward, the same option would appear to be much closer to at-the-money (three years forward) today, based solely on the relatively flat forward rates implied by today's yield curve. This has significant valuation implications for the options, which we discuss below.

chapter 44

VOLATILITY – FRIEND OR FOE?

Given all the market chatter about the low levels of volatility across asset classes, the idea of selling optionality may not be attractive to some investors. In Exhibit 2, we compare the VIX to ATM implied volatility for 3- into 7-year swaptions and realized spread volatility, as measured by the DJ TRAC-X and DJ CDX family of indices. While the implied volatility has declined in both equity and interest rate markets, these trends could continue, given the changes in realized volatility in these markets. Reflecting this, our interest rate strategy team has been constructive on opportunities to sell short-dated volatility (see *The Interest Rate Strategist*, June 16, 2005).

exhibit 2
Interest Rate and Equity Implied Volatility



Source: Morgan Stanley

Morgan Stanley

While spread levels and spread volatility are a driver of valuation in bond options, at today's spread levels they may be less likely to be the key driver, given the asymmetry of credit risk and the absolute level of spreads relative to rate levels. At least in terms of volatility, corporate bond option prices on typical investment grade credits should be driven more by interest rate volatility than by spread volatility. To demonstrate this, we show the sensitivity of the implied credit risky rate volatility for a 10-year instrument using the CDX 10-year spread and the current 10-year swap rate (see Exhibit 3). The change in the risky rate volatility for a 1% change in the rate volatility has roughly five times the impact of a 1% change in the spread volatility.

exhibit 3 Relative Impact of Spread & Rate Volatility on Bond Option Volatility

	Correlation (Rates & Spreads)		
	-50%	**-30.0%**	**-10.0%**
1% Change in Rate Vol	0.5%	0.5%	0.6%
1% Change in Spread Vol	0.1%	0.1%	0.1%
Rate Vol Impact /Spread Vol Impact	5.6x	4.8x	4.4x

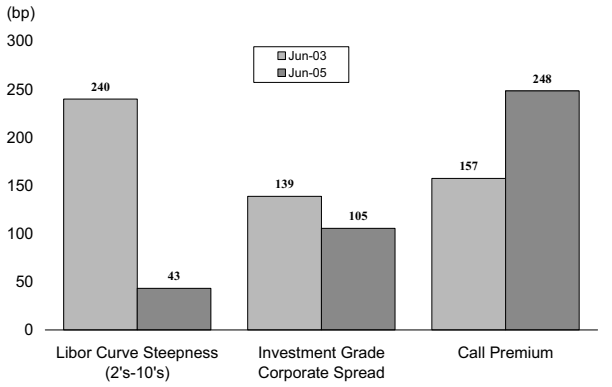
Source: Morgan Stanley

VALUATION IMPLICATIONS

To measure the impact of the vastly different rate environment on the pricing of corporate bond options, we examine the pricing for a hypothetical bond option in two different rate environments (based on the framework in Chapter 41). We analyze pricing in today's prevailing environment, as well as in a hypothetical environment in which the underlying bond would have the same price but the interest rate curves would have the shape we experienced two years ago in June 2003, when we first published our thoughts on this topic.

chapter 44

exhibit 4
The Curve Environment: Implications for Bond Option Prices



Source: Morgan Stanley, The YieldBook

We have summarized the results in Exhibit 4, for a 10-year bond trading at 81 bp above 10-year Libor. (The spread matches the current 10-year CDX level.) The premium for a call option, with the same strike and maturity, is about 60% higher today than in an environment similar to 2003, due largely to the significantly flatter curve, as the 2's and 10's curve has flattened more than 80% from June 2003 levels.

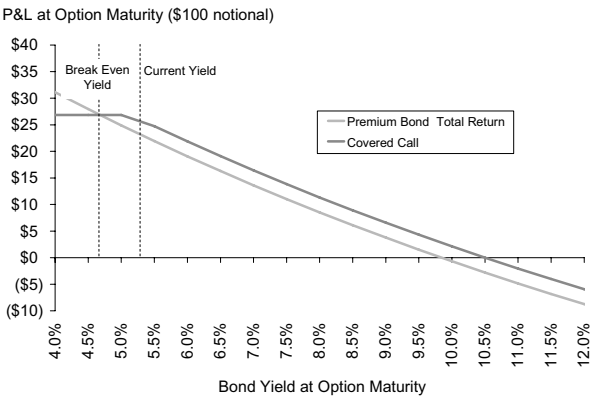
As we mentioned earlier, a steep yield curve (incorporating both interest rate levels and credit curve) for an issuer results in higher implied forward yields and lower implied forward prices, resulting in lower absolute option premiums for call options on bonds. The opposite is true for a relatively flat yield curve and explains the steep increase in the call premium (Exhibit 4).

MOVING THE BREAKEVENS

In Exhibit 5, we show the payoff of a covered call strategy at the maturity of the call option. The option has a 3-year maturity and the underlying bond is a 10-year bond with coupon, spread and dollar price roughly matching that of the typical investment grade credit.

exhibit 5

Covered Call Payoff: Better in More Likely Scenarios



Source: Morgan Stanley

The higher option premium in a covered call strategy results in the callable bond outperforming the comparable bullet for a broader range of yield scenarios. The $2.48 option premium in our example implies that a covered call strategy would outperform a bullet bond in all yield widening scenarios and for tightening scenarios with up to a 64 bp decline in bond yields (see Exhibit 5). This buffer compares to 48 bp of tightening for a comparable option in a steeper environment similar to that in June 2003.

This additional protection, however, is not free of cost. As in any typical covered call strategy, the investor is effectively giving up the return upside beyond the strike price of the call option. This is where the hybrid nature of corporate bond options has some interesting implications. Sellers of corporate bond call options are effectively selling scenarios where both spreads and rates remain at near historic tight levels. From a macro perspective, a very low rate environment could imply credit markets where spreads reflect much more risk than they do today, and a tight spread environment could easily imply a macro scenario where the Fed cannot be as accommodative as it is today. The downside scenarios also appear unlikely from a historical perspective, given where we are in the interest rate and credit cycles. These dynamics can make selling corporate bond options more strategically appealing than similar positions in pure interest rate or spread options.

However, these arguments may not hold for an individual credit, where credit spread tightening may outweigh interest rate moves. In a covered call strategy, the investor is willing to give up some convexity upside in scenarios of lower credit spreads and interest rates, for an overall higher expected total return and enhanced yield. Combining fundamental credit views with the flexibility available in structuring the option terms provides investors a means to customize their exposure to a credit and interest rates in unique ways.

chapter 45 So Much Convexity, So Few Options

January 13, 2006

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Pinar Onur

From a fundamental credit perspective, the potential for convex performance payouts is quite substantial in the credit markets today, from LBO risks across many sectors, to the expectations for increased M&A activity, to the ultimate direction of the autos as the market ponders a potential sale of GMAC. From an investment strategy perspective, a well developed single-name options market would be the best way to implement convexity views on the underlying credits, but the market unfortunately is far from that state today, for a variety of reasons that we will review.

However, there are other investment options (no pun intended) available. We review some strategies to implement single-name views on convexity, including the classic convexity trade (long bond vs. long protection positions), debt capital structure plays, option strategies on the HiVol indices, and even delta-neutral tranche strategies. The degree of the convexity view implied by these trading strategies varies, from medium-sized moves in spreads to much more significant shifts, which necessitates going through all of the ideas.

The most relevant approaches are debt capital structure basis opportunities as well as delta-hedged equity tranche protection strategies, in our view.

CONVEXITY TRADES – ONLY FOR THE EXTREME TAILS

"Convexity trades," market jargon for strategies where investors buy a long-dated bond trading at a substantial discount to par and buy shorter-dated protection, are attractive strategies when the actual survival of a company is to be decided by imminent events. Such strategies have very convex payouts when a credit either rallies strongly (because the trade is long duration) or distresses (trading points up front), with the worst payout when the credit stresses but is still far from default.[1] Opportunities to position names like Unum Provident and Toys R Us in convexity trades in the past have been created because these names faced very specific event risk that put the entire enterprise at risk. Positioning similar strategies in the auto space today would require the belief that in a downside scenario the sector is sufficiently stressed so that protection would trade on an upfront payment (if it doesn't already). In the context of a convexity trade an upfront payment is the same payout as if the company defaulted with high recovery.

For investors with beliefs that are not so extreme for auto names or for those looking to play events like LBOs, convexity trades may not be as compelling given the nature and magnitude of potential spread moves. This is particularly true given the likelihood that an LBO could result in a steepening of the credit curves, which would work against a

[1] *Please refer to Chapters 20 and 31.*

convexity package (see Viktor Hjort's report "LBOs and Credit Curves: A Short End Steepening Story," October 21, 2005).

CAPITAL STRUCTURE PLAYS AS OPTIONS ON SPREADS

In past research, we have addressed the theoretical relationships between prices of credit instruments of varying seniority.[2] One of the implications of this type of analysis is that given a recovery rate relationship between two parts of a capital structure, the spread differential between the two should remain approximately the same (on a percentage basis) even if spreads move fairly dramatically (see Exhibit 1, which shows implied subordinate spreads, given senior spreads and a fixed recovery differential).

exhibit 1 Senior Spreads and Implied Sub Spreads (bp)

Senior Spread	Implied Subordinated Spread	Spread Differential	Spread Differential (% of Senior)
50	75	**25**	50%
100	150	**50**	50%
150	225	**75**	50%
200	300	**100**	50%
250	375	**125**	50%

Note: Based on senior recovery of 40%, Sub recovery of 10%.
Source: Morgan Stanley

However, investors do not live in a relative world and the increasing absolute difference in spread offers some insight into the option-like characteristics of senior/sub relationships. In fact, the senior/sub basis should behave like an option of the absolute spread levels of the entity assuming that the default events in both parts of the capital structure are linked and the market's perception of recovery is stable.

THE REAL WORLD CAN BE EVEN MORE EXTREME

We have also observed that senior and subordinated securities often trade in the market at levels significantly different from these theoretical expected values. The auto company and credit subsidiary spreads serve as just one of the many examples of this.

In Exhibits 2 and 3, we graph the observed difference between parent company and credit subsidiary spreads versus the parent company spread for both GM and Ford. While this spread has been volatile it has roughly followed the expected relationship. We regressed the GMAC spread against the GM spread and the results were highly significant and generally explained 70% of the spread differential (90% for Ford). Interestingly, the actual data showed a higher than expected spread differential when spreads were wider and a tighter than expected differential when spread levels were tighter.

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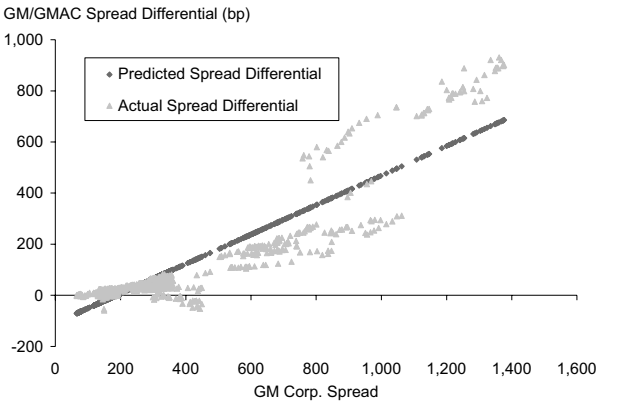
[2] *Please refer to Chapter 13.*

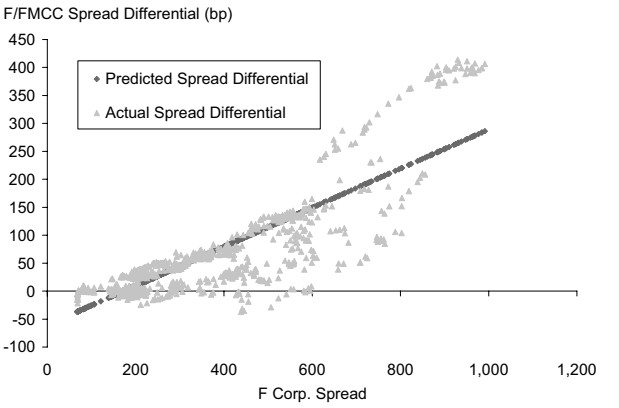
We do point out that most of the data above the regression line for GM are recent and likely are affected by the potential for corporate action. It is possible that spreads today reflect the potential diverging paths of the credit subsidiaries and the parents given the market talk of credit subsidiary sales. Another explanation for this price action is that when spreads are tight, investors simply do not focus on recovery differentials as much as they do when spreads are much wider and implied default probability much higher.

exhibit 2
GM vs. GM/GMAC Spread Differential



Source: Morgan Stanley

exhibit 3
Ford vs. F/FMCC Spread Differential



Source: Morgan Stanley

All this serves to illustrate that these capital structure positions have been more convex than we would initially expect, behaving more like options on spreads. For those with a bullish view on Ford spreads, selling 5 year protection on the parent and buying it on the credit subsidiary results in 400 bp of carry and is an option on the compression of the two. Assuming the fates of both entities are tied together, the market is already pricing in a recovery differential in the high twenties. A similar trade in 3 year GM would offer a pick-up of 15 points plus 85 bp of carry and positions a similar view but carries the significant risk that GMAC is sold to a high quality buyer and GM spreads remain at distressed levels.

Within the high yield space, the development of secured loan CDS will encourage capital structure basis trades with unsecured credit, which by the same token could be a trade with option-like payouts in a widening spread environment (selling secured protection and buying unsecured protection), given today's tighter spread levels.

IDIOSYNCRATIC CONVEXITY PLAYS, USING BROADER INSTRUMENTS

While the single-name space offers a way to play single-name views, there are also opportunities to play sector or financial engineering themes (like LBOs) in the broader market. Given that selecting delta hedges for tranche positions is akin to hedging specific scenarios, it seems reasonable that we could position for large moves using tranches, which are essentially options on the losses in a portfolio. This sentiment is most notable in junior tranches, which can be driven by big moves in a few credits.

exhibit 4 Remember Spring 2005? Delta-Hedged Long Tranche Returns (5/1/05 – 5/31/05)

	IG 5 Year	IG 10 Year
0-3%	-2.27%	-2.75%
3-7%	4.26%	-8.49%
7-10%	1.03%	6.92%
10-15%	0.58%	4.51%
15-30%	0.10%	1.27%

Source: Morgan Stanley

In Exhibit 4, we examine the delta neutral performance of benchmark index tranches during the auto sector turmoil in the spring of 2005. We define the index delta as that predicted by moving all the spreads in the portfolio by one basis point. As we pointed out at the time, long equity-short index DV01 delta positions performed worse in that market environment versus other reasonable hedging strategies (see "Tranches – Navigating the Auto Storm," April 29, 2005). We also highlight that 10 year 3-7% tranches performed the worst of all investment grade tranches during the period, driven by "correlation" repricing, despite their subordination.

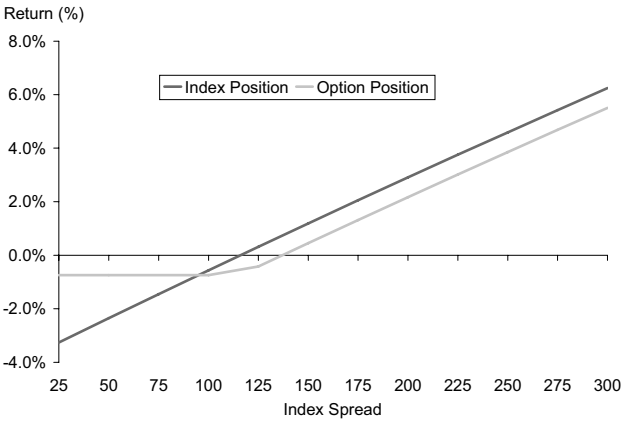
While the events at the time were exacerbated by market technicals, it seems reasonable to assume that in a similar market environment being short equity or equity like mezzanine tranches versus a DV01 index delta is equivalent to buying options on a concentrated set of names widening rather dramatically. In May of 2005 it was the auto names in CDX 3 and 4, but in 2006 the driver could be a widening in the LBO names present in CDX 5, or, in fact, big moves in the auto names in the off-the-run indices. We do caution that general tranche market sentiment could reduce or enhance the performance of these strategies as it effectively imbeds an implied correlation view.

chapter 45

ARE OPTIONS A REAL OPTION?

While we have spent the bulk of our effort in this chapter trying to devise investment strategies that have option-like qualities, it is probably worth exploring a real options solution as well. The DJ CDX HiVol index comprises 30 names, and series 4 has auto exposure while series 5 has LBO exposure. Buying options to buy and sell protection on HiVol (a straddle or better yet a strangle if one can find OTM quotes) is a natural strategy to implement convexity views, and positive payouts can happen for medium-sized moves in spread for the names in question. Yet, at implied volatilities near 40% (similar for iTraxx HiVol), this volatility play is not necessarily cheap. We estimate that positioning a short view in CDX HiVol 4 costs approximately 50% more for 5 months in spread options than in the index directly (while protecting yourself from the downside of credit tightening). Whether this is worth it depends on one's view of how extreme the spread moves will be, but it amounts to an additional 11 bp of widening on the underlying index to break even on the trade. If we assume a move is concentrated in the auto names, this maps to about 80 bp of spread widening for each of the 4 auto names.

exhibit 5
HiVol Options Are Not Cheap



Source: Morgan Stanley

SINGLE-NAME OPTIONS MARKETS – WALK BEFORE YOU CAN RUN

Finally, a word on the single-name options market seems appropriate at this point. As we said at the outset, a well-developed market would make credit convexity plays much simpler, but we are not there yet for a variety of reasons. Risk-managing a single-name option is much more difficult than an index option, mainly because of the increased likelihood of jump risk in one name versus a large portfolio of names. This jump risk makes typical distributions (which are important parts of options pricing models) much less relevant. There are "jump-diffusion" models out there, but even with those, the risk-management issues remain.

While the development of an index option market is a necessary first step, even a well-developed index option market is not enough to jump-start (no pun, again) single-name options – but we remain hopeful, despite the structural issues that have hampered the development to date.

In absence of an options market, the most relevant approaches are the debt capital structure basis opportunities (which are arguably limited in investment grade and still developing in high yield), and delta-hedged equity tranche protection strategies.

Section F

Credit Market Themes

chapter 46 Finding Comfort on the Short Side

July 11, 2003

Investment grade credit investors have grown accustomed to being paid well for default risk. Default rates implied by spreads are typically much higher than actual default experience, even during the extreme 2000-2002 period. This is the essence of the CDO "arbitrage." Yet in today's tight spread environment, many credits trade at market-implied default rates that are below average historical rates. In this chapter, we discuss how default swaps with premiums at or below 40 bp for single-A and BBB credits can be interesting instruments for getting short credit, supported both from a historical odds-on-default perspective and from bonds and default swap dynamics. Yet investors need to weigh this opportunity with the possibility that the market could be right, given that investment grade default rates have been extremely low historically during expansionary economic periods.

WHAT IS THE MARKET TELLING US?

Comparing market implied default rates to historical levels can be a good measure of the default risk "arbitrage" phenomenon. Given a recovery rate assumption, we can easily convert a CDS premium to a market-implied default rate using a risk-neutral framework which can be approximated by the following relationship.

$$DefaultRate = \frac{Premium}{(1 - RecovRate)}$$

For example, a credit trading at a premium of 40 bp has a market-implied default rate of 0.67% if we assume a 40% recovery rate. Investors have been used to the "arbitrage" phenomenon in the credit markets for some time, namely that market-implied default rates tend to be much higher than actual default experience.[1] The phenomenon exists because day-to-day credit investors demand additional premium (above that for default risk) to compensate for liquidity, price volatility and the expense of running a credit portfolio (e.g., research costs, where such costs are typically less for other sectors of the fixed income markets). Investors who are less sensitive to these risks can "lock in" the additional premium in a CDO structure with the hope that the market is right.

Yet, in today's market environment, we find a "reverse arbitrage" situation in some cases. That is, many credits trade so tight that their market-implied default rates are lower than historical averages implied by ratings. In Exhibit 1 we show market-implied default rates versus recovery rate assumptions for credits trading at 20, 30 and 40 bp premiums. When comparing these values to both issuer and volume-weighted historical averages (Moody's annualized five-year default rates for Baa credits), we find evidence for the point we are making. The average historical market-implied default rate for BBBs ranges from 1.1% to 2.7% for a series of recovery rates, based on an average Libor spread of 108 bp. We view the argument for buying protection on BBB-rated names at sub-40 bp levels to be strong, given this comparative analysis. We illustrate a similar analysis for A-rated credits in Exhibit 2, which we find compelling as well, but not as strong as the BBB case.

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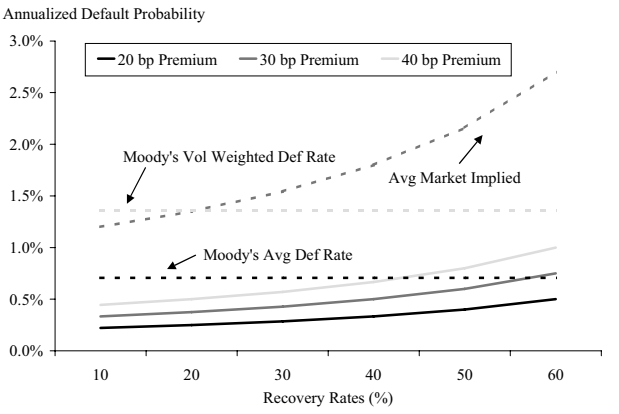
[1] *Please refer to Chapter 8.*

exhibit 1

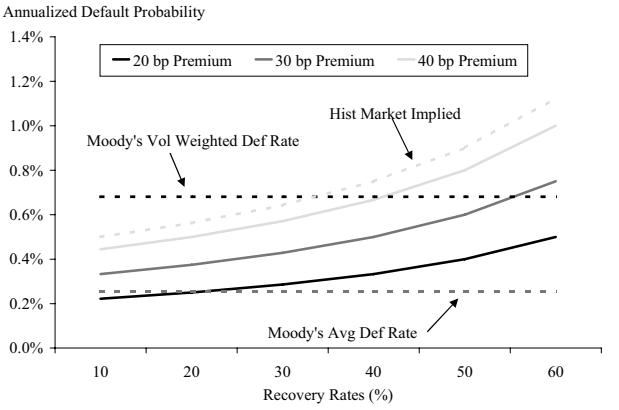
Getting Paid to Get Short: BBB Credits



Source: Morgan Stanley, Moody's

exhibit 2

Getting Paid to Get Short: A-Rated Credits



Source: Morgan Stanley, Moody's

WHAT ABOUT ECONOMIC CYCLES AND RATINGS MIGRATION?

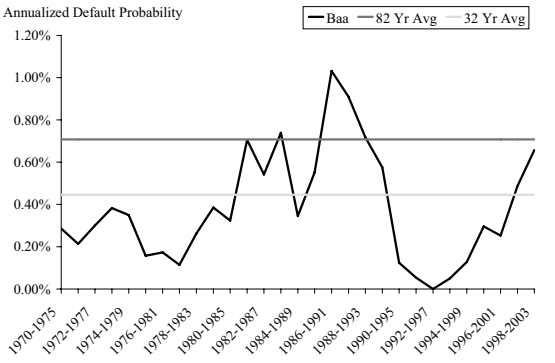
Comparing market-implied default rates to historical averages can be misleading because the path of default rates changes dramatically with economic cycles (see Exhibit 3, for a 32-year period analysis). In fact, five-year default rates for Baa-rated debt have ranged from 0% (1992-1997, an expansionary period) to 1.03% (1986-1991, a period including a recession). The default rate was 0.66% during the most recent five-year period.

While we feel that sub-40 bp premiums are interesting levels to purchase protection on BBB-rated credits, the historical study suggests that there is an implied economic view in these numbers that an investor must disagree with to make the protection attractive. Credit-specific views are obviously important as well, an issue we address in the last section.

chapter 46

exhibit 3

The Path of Default Rates: Annual Cohorts, 5-Year Periods



Source: Morgan Stanley, Moody's

FINDING COMFORT ON THE SHORT SIDE: THE CDS FLOOR

Further support for the argument that sub-40 bp premiums are attractive protection levels comes from the natural divergence of bonds and default swaps when spread levels contract. Default swaps have outpaced bonds in the 2003 rally, leaving the basis between the two negative today.[2] We attribute some of this phenomenon to dollar price anxiety among cash investors, and the basis could become less negative if rates continue to rise or we witness a very strong economic rebound. Further, this environment allows protection buyers to benefit from higher beta instruments (on the short side) at lower cost.

As such, it is important to note that default swap premiums are floored at some small positive number, while bonds have more room to rally and theoretically can trade through Libor. The tightest corporate name in our CDS universe today is Aa3/AA- rated Procter & Gamble, trading at 9 bp mid-market levels. An extreme case of the situation we described is common in many non-corporate names. The Agencies and some highly rated European sovereigns trade through Libor consistently in the cash markets, but also have active default swap markets. Protection sellers in the names are attracted by the spread pickup versus bonds, while protection buyers view the swaps as low premium options on default (a bit like catastrophe insurance).

IMPLEMENTING THE VIEW: FOCUSING ON CREDITS

In Exhibit 4, we list 37 credits rated single-A or BBB whose five-year CDS trades 40 bp or tighter on the offered side.

Another interesting way to implement this trade is to consider buying protection on the portfolio of low spread names from the 100-name synthetic TRACERS index, given the product's liquidity. The 60 "low-spread" names in this basket (see Exhibit 5) can trade as a unit with protection currently offered in the low 40s. Fifty-five of the 60 names are rated single-A or lower. From a derivatives perspective, we encourage investors to consider building long protection positions on credits trading in this range, either individually or at the portfolio level.

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[2] *Please refer to Chapter 22.*

exhibit 4 A and Baa Names Trading Below 40 bp CDS Premium

Issuer	Moody's	S&P	CDS Offer (bp)
Dell Computer	A3	A-	24
Emerson Electric	A2	A	25
Praxair	A3	A-	25
Air Products and Chemicals	A2	A	25
Apache	A3	A-	27
Applied Materials	A3	A-	28
Bank One	Aa3	A	28
Baker Hughes	A2	A-	30
Sonoco Products	A2	A-	30
Wachovia Bank	Aa3	A	30
Gannett	A2	A	31
Burlington Resources	Baa1	BBB+	35
Hewlett-Packard	A3	A-	32
Viacom	A3	A-	34
Wells Fargo	Aa2 /*+	A+	34
Con. Edison Company of New York	A1	NA	35
Rohm and Haas	A3	BBB+	35
Danaher	A2	A+	35
Sherwin-Williams	A2	A	35
TRW	Baa3	BBB- /*+	35
Caterpillar Inc.	A2	A	35
Bear Stearns	A2 /*+	A	38
International Business Machines	A1	A+	35
Conoco-Phillips	A3	A-	37
Lowe's	A3	A	37
MetLife	A2	A	38
Cargill Inc.	A1	A+	38
Anadarko Petroleum	Baa1	BBB+	40
Fedex	Baa2	BBB	40
Ingersoll-Rand	A3	BBB+	40
Kohl's	A3	A-	40
Lockheed Martin	Baa2	BBB	40
TJX	A3	A	40
Computer Sciences	A2	A	40
Diamond Offshore	A3	A	40
Global Marine	Baa1	A-	40
Target	A2	A+	40

Source: Morgan Stanley

chapter 46

exhibit 5 Low Spread TRACERS Subcomponent

Reference Credit	Moody's Rating	Offer Spread
Alcoa Inc.	A2	35
American International Group, Inc.	Aaa	30
Amgen Inc.	A2	23
Anadarko Petroleum Corporation	Baa1	33
American Express Company	A1	26
Boeing Company	A2	53
Baxter International Inc.	A3	31
BellSouth Corporation	A1	40
Borg Warner Inc.	Baa2	47
Caterpillar Inc.	A2	23
Chubb Corporation	A1	41
Carnival Corporation	A3 /*-	74
CIT Group Inc.	A2	90
Cingular Wireless LLC	A3	52
Conoco Phillips	A3	31
Campbell Soup Company	A3	24
Computer Sciences Corporation	A2	33
CSX Corporation	Baa2	41
CenturyTel, Inc.	Baa2	46
Dominion Resources, Inc.	Baa1	53
E.I. du Pont de Nemours and Company	Aa3	17
Deere & Company	A3	42
Dell Computer Corporation	A3	23
Danaher Corporation	A2	38
Dow Chemical Company	A3	80
Devon Energy Corporation	Baa2	45
Emerson Electric Co.	A2	22
Fleet Boston Financial Corporation	A1	40
Federal Home Loan Mortgage Corp.	Aaa	31
Federal National Mortgage Association	Aaa	26
General Electric Capital Corporation	Aaa	45
General Mills, Inc.	Baa2	48
Household Finance Corporation	A1	47
Honeywell International Inc.	A2	42
IBM Corporation	A1	33
Ingersoll-Rand Company	A3	33
Nordstrom, Inc.	NA	51
Kraft Foods Inc.	A3	70
Lowe's Companies, Inc.	A3	30
Masco Corporation	Baa1	41

exhibit 5 Low Spread TRACERS Subcomponent (continued)

Reference Credit	Moody's Rating	Offer Spread
Mattel, Inc.	Baa2	23
May Department Stores Company	Baa1	57
McDonald's Corporation	A2	37
Medtronic, Inc.	A1	29
Nabors Industries, Inc.	NA	38
National Rural Utilities Cooperative Finance Corporation	A2	43
Newell Rubbermaid, Inc.	Baa1	31
Omnicom Group Inc.	Baa1	61
Occidental Petroleum Corporation	Baa2 /*+	38
Transocean Inc.	Baa2	43
SAFECO Corporation	Baa1	36
SBC Communications Inc.	A1	49
Sempra Energy	Baa1	58
Target Corporation	A2	36
Textron Inc.	A3	59
Viacom Inc.	A3	29
Verizon Global Funding Corp.	A2	50
Weatherford International, Inc.	Baa1	28
Washington Mutual, Inc.	A3	58
XL Capital Ltd	A1	80

Source: Morgan Stanley

chapter 47 Manic Compression

March 12, 2004

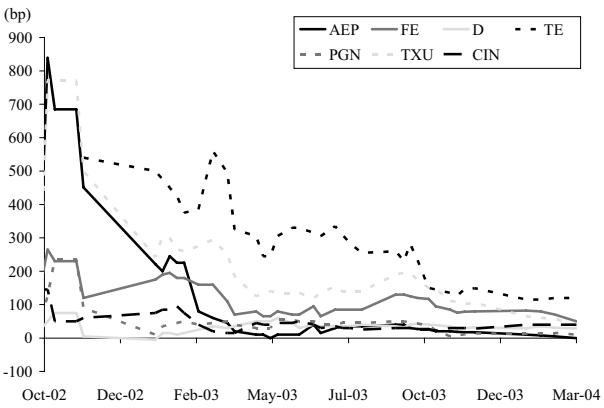
As investors have hunted for and eventually reached for yield in this relatively tight spread environment, we find that relative value relationships in many debt capital structures are getting stretched. In particular, there are numerous examples of subordinate paper trading "rich" to seniors, when we compare the likely recovery rate differences with where the debt instruments trade. Rich valuation, though, is a matter of debate, as many investors consider default to be an extremely unlikely event today (certainly more unlikely than implied by market spreads, for example).

In this chapter, we explore the valuation landscape and compression of valuations between senior and subordinated securities that has been left in the wake of the credit rally that started in late 2002. We then examine what effect varying recovery rates have on the appropriate discount at which subordinated securities should trade relative to senior securities. Finally, we suggest that selected structured credit market senior/sub relationships do not look out of line despite movements in the underlying single-name markets.

EXAMINING HOLDCO VERSUS OPCO UTILITY VALUATIONS

Over the past year, utility credit investors have become more comfortable with default risk in the sector, as many of the liquidity issues faced by problem credits in the group have been alleviated through revolver, bank line, and commercial paper refinancings and term-outs in the public credit markets. So, with default risk perceptions on the decline, the narrowing difference between holding company and operating company securities (typically closer to assets in bankruptcy, with associated higher recoveries) is a rational outcome. In Exhibit 1, we track the basis between several selected utility holding company and operating company securities, which exhibit a notable valuation compression since experiencing the most distressed levels of October 2002.

exhibit 1
Now Little Differentiation Between Utility HoldCo and OpCo Spread Valuations



Source: Morgan Stanley

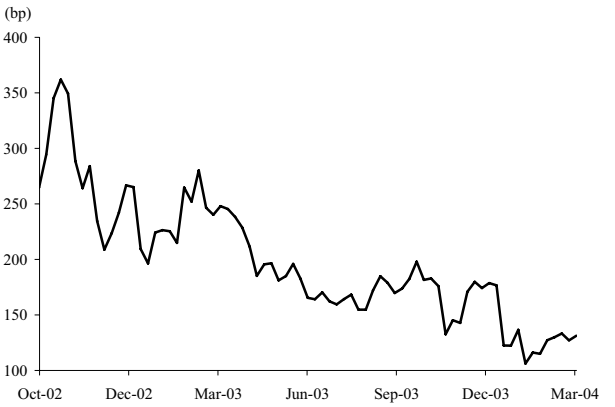
Morgan Stanley

REACH FOR YIELD IN SUBORDINATED PAPER IN LAST STAGES?

Indeed, much has been made of the reach for additional yield down into the high yield market. Our credit strategist, Greg Peters, has opined in the past that the higher-quality portion of the high yield market serves as a fertile investment ground for crossover and "core-plus" investors in an improving default environment, while the middle tier of the high yield market looks relatively fully valued. Furthermore, within the high yield space, there has certainly been a fair amount of compression within capital structures, with subordinated paper performance outpacing senior issues, as we show in Exhibit 2. Admittedly, the data capturing relative senior and subordinated performance is far from complete for the market, but we believe it is at least indicative of the broader trend at work as investors dip down the capital structure in search of yield.

exhibit 2

High Yield Subs Outperforming Seniors – More to Go? (Differential Between Subordinated and Senior Yields)



Note: Differential is average difference between subordinated and senior securities of similar maturities of DRRA, DXME, HTN, LYO, URI.
Source: Morgan Stanley

We should note that an informal poll of our high yield credit team finds a stated preference for senior securities (including bank loans) in many capital structures at current valuations, including those at Houghton Mifflin, United Rentals, Charter Communications and SBA Communications.

WHAT WOULD THE RISK-NEUTRAL MODELS SAY?

Thinking about the senior/subordinate basis in the context of credit derivative pricing can provide some useful insight into relative valuations, given the compression we've shown above. Based on the debt capital structure arbitrage framework we first highlighted in Chapter 13, we can generate an implied basis relationship from recovery rate assumptions for both levels of the capital structure (relying on the idea that the default events at both the senior and sub levels are highly correlated). In Exhibit 3, we summarize the implied basis for subordinate instruments for a credit with a senior CDS spread of 25 and 50 bp.

Assuming that senior/sub relationships are at fair value today, the exhibit clearly illustrates the risk inherent to the strategy of buying subordinate notes at today's levels in a reach for yield. As an example, we assume a senior recovery of 60% and a subordinate recovery of 30% for a credit with a senior spread of 25 bp and find the

implied senior/sub basis is 19 bp. If the senior spread widens to 50, all else equal, the implied senior/sub basis doubles to 38 bp. This widening of the basis can be further exacerbated by the current richness in many subordinate securities and the high-beta nature of subordinate securities in times of credit stress and illiquidity, as we observed in late 2002. As a simplistic example in the utility space, consider that opco protection for a host of names trades around 60 bp. Assuming a 100% opco recovery, and an estimated 30% lower recovery for holdco paper, an analysis similar to Exhibit 3 would yield a 30 bp holdco-opco spread, just about within the context of the discount in markets seen today.

exhibit 3 Subordinate Basis Sensitivity to Varying Recovery Assumptions (bp)

Senior Spread = 25 bp

	Sub Recovery						
Senior Recovery	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**
20%	-						
30%	4	-					
40%	8	4	-				
50%	15	10	5	-			
60%	25	19	13	6	-		
70%	42	33	25	17	8	-	
80%	75	63	50	38	25	13	-

Senior Spread = 50 bp

	Sub Recovery						
Senior Recovery	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**
20%	-						
30%	7	-					
40%	17	8	-				
50%	30	20	10	-			
60%	50	38	25	13	-		
70%	83	67	50	33	17	-	
80%	150	125	100	75	50	25	-

Source: Morgan Stanley

WHERE THE OPPORTUNITIES LIE

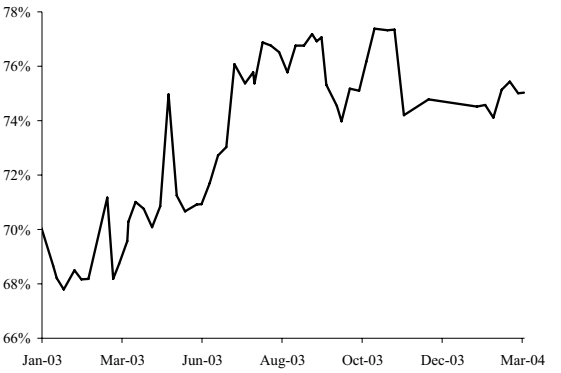
The market dynamics that have driven single-name senior/ sub compression in both cash and CDS markets have not necessarily had the same effect on structured credit products. As a check of relative spread movement in structured credit, we examined the average percentage of total basket spread for our benchmark first to default baskets. If compression were driving pricing in this space, we would expect to find a declining percentage of total spread (and higher implied correlation) for these baskets.

In Exhibit 4, we find that the data actually indicate an increase in the percentage of total premium offered and hence little evidence of compression, in our view. At least a portion of this apparent dislocation can be ascribed to the nature of the analysis

required to understand credit risk in basket products relative to the well developed credit analysis techniques driving single name valuations.

exhibit 4

Compression Missing In FTD Baskets (FTD Premium as % of Total Basket Premium)

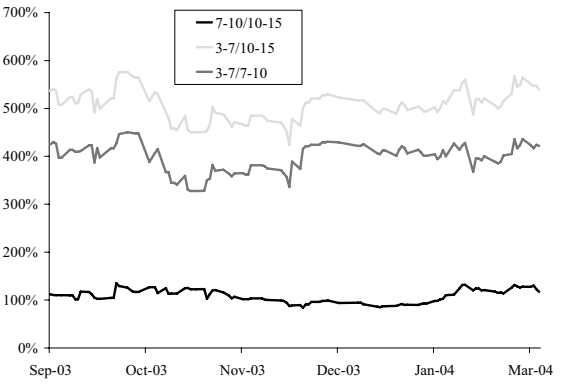


Source: Morgan Stanley

Similar results can be seen in the tranched Dow Jones TRAC-X market where we examined the average spread differentials of various benchmark tranches relative to the underlying TRAC-X spread. Again, we would expect the differentials to decline if spread decompression were rampant. Exhibit 5 shows that the ratios have actually remained relatively flat, suggesting the tranched market has not experienced a severe compression in relative pricing.

exhibit 5

Tranched TRAC-X Spreads Not Compressed Either (Difference in Tranche Spreads as % of TRAC-X Spread)



Source: Morgan Stanley

Given the compression evident in the market for single-name risk, we encourage investors to consider both small and large basket products as an alternative to reaching into subordinate portions of corporate capital structures at compressed valuations.

chapter 48 Follow the Flows, Trade the Technicals

April 23, 2004

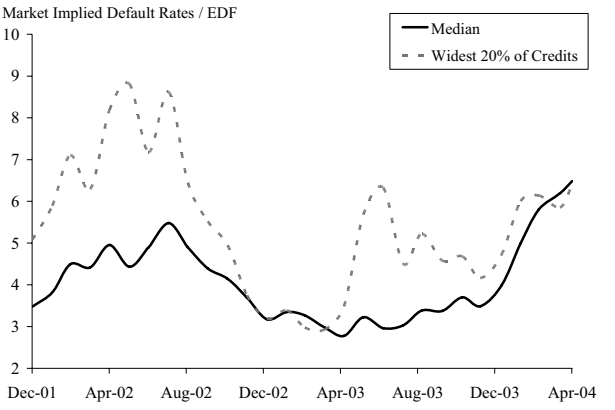
Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Anisha Ambardar

Fundamental drivers of credit risk are pointing to a rather benign environment over the medium term, as Corporate America continues to maintain good balance sheet discipline in the backdrop of an improving economy on all fronts. At the same time, the changing interest rate environment, and the resulting flows that go with it, are setting a technical tone for the market that should dominate valuations and opportunities in the near term, in our view. In particular, a potentially active Fed and the associated Treasury curve shifts may give corporate bonds (on a spread basis) room to outperform default swaps, leading to an even more positive basis between the two markets. Moreover, the resulting credit flows from "real" and "levered" money may further exaggerate this phenomenon.

From a default risk perspective, the tone seems technical as well. As measured by Merton models, equity and credit markets continue to have fairly different opinions about the magnitude of default risk, however little it may ultimately be. And in another example of technically driven differences, credit curves in cash and default swaps appear disconnected, although both have steepened meaningfully from last year's levels (between 5 and 10 years).

How should credit investors be positioned for a potentially technically dominated environment going forward? Our suggestion is to follow the flows and trade the technicals.

exhibit 1
A Difference of Opinion – Credit Markets Imply More Default Risk Than Equities



Source: Morgan Stanley, Moody's KMV

Morgan Stanley

CREDIT VS. EQUITY – A DIFFERENCE OF OPINION

Earlier this year we wrote about the apparent disconnection between equity and credit markets, when looked at from a Merton model perspective.[1] Rallying equity markets, falling equity volatility, and a deleveraging of balance sheets were the equivalent of the sun, moon, and stars all being aligned, resulting in miniscule amounts of forecasted default risk. Default swap premiums, on the other hand, were somewhat wider at the time. At the risk of mixing methodologies (not to mention markets), comparing default risk implied by both markets provides a reasonable measure of how much equity and credit markets agree.

Today, the ratio of credit-market-implied default risk to equity-market-implied default risk is higher than it has been since we have tracked it (see Exhibit 1), telling us that credit markets are implying a riskier credit environment. What we find interesting is that this ratio was very stable during the rally of 2003, suggesting that equity and credit markets were roughly "in sync" despite the significant price movements in both markets. Yet, since the end of the year, the themes of deleveraging and generally low levels of equity volatility continue, while spreads appear to have hit a technical floor, at least in default swaps.

Why are the two markets so disconnected today? We caution investors that the last time we were in such an environment (mid-1990s) was years before we could make a comparison like this, so it is not clear that this apparent disconnection between equity and credit markets is a "new" phenomenon. While credit market pricing may seem very attractive to those who like Merton models, we would advise investors to wait for a better opportunity to add to long credit positions (at least in default swaps), given our thoughts on flows (see next section).

THE TECHNICAL FORCES OF RISING RATES

We spend quite a bit of time listening to both traditional credit investors, many of whom run portfolios relative to fixed-income benchmarks or liabilities, and the newer hedge fund community, which approaches the market with a somewhat different framework. From a fundamental perspective, we don't think that rising rates are terrible for credit, at least in the medium term, and 1994 was a very good example (see "Revisiting 1994 – A Decade of Difference," January 9, 2004). Yet, anecdotally, we find that "real" and "levered" money think about credit risk somewhat differently in a rising rate environment. Many relative return oriented investors (and insurance companies as well) agree with the notion that credit fundamentals do not change (and can even improve) in a rising rate environment, and may express these views through their actions in the market when the time comes. In fact, falling corporate bond prices (from rising rates) may allow them to push spreads tighter, given the reduced sticker shock associated with high dollar prices.

Many in the hedge fund community, on the other hand, appear a bit more concerned about credit risk in a rising interest rate environment. Rising short-term rates do have an impact on levered money's funding costs, which can lead to less appetite for credit risk at these tight levels going forward. This is a flow the market should not ignore.

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[1] *Please refer to Chapter 14.*

Equally important, though, is the "equity culture" that many credit hedge fund investors come from. Dividend discount models make equities look less attractive when the "risk-free" rates are much higher, which can impact the way these investors think about credit risk as well.

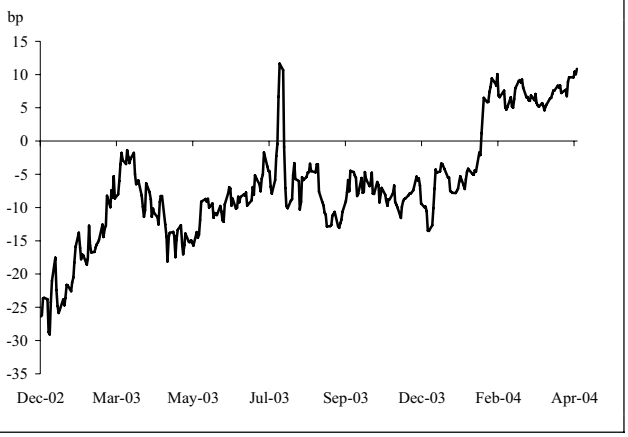
The bottom line is that differences in business models and investing culture can drive the way certain classes of investors react to credit risk in a rising rate environment. We stick to our guns that fundamentals are still strong, and take comfort knowing that a core part of the insurance and relative return investor world will still be happy with credit in such an environment. As such, a reasonable widening of spreads (particularly in default swaps) would be a technical invitation to add more credit risk, in our view.

THE BASIS – WHERE DO WE GO FROM HERE?

During the summer of 2003, when the basis between default swaps and cash was negative (corporate bonds traded wider), we claimed that one of the key drivers was dollar price anxiety in a low interest rate environment,[2] when the 10-year Treasury yielded 3.35%). With 10-year rates 100 bp higher, the basis today is positive, reflecting much of the technical flows that we have seen in both markets this year. In fact, some of the levered vs. real money sentiment we described above has come into play already. Other drivers of the positive basis include the growing use of structured credit instruments (e.g., senior tranche protection) as out-of-the-money like hedges against already established long positions, and a steeper credit curve in default swaps compared to cash.

exhibit 2

A Regime Shift – The Basis Turns Positive



Source: Morgan Stanley

Intuitively, it is hard to imagine that the basis should stay positive in a market environment where there are not a lot of natural buyers of protection (i.e., bank flows have slowed). But yet again, the sentiment that investors should be concerned with is a technical one. The key forces in a rising interest rate environment include the differences in real and levered money flows (described above), potential rising swap spreads (driven by mortgage convexity hedging), and lower dollar prices for corporate

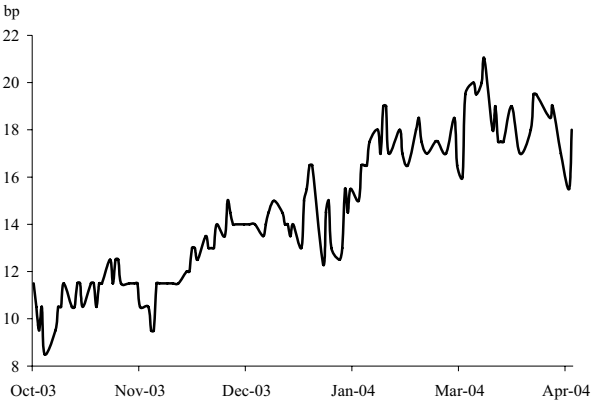
[2] *Please refer to Chapter 22.*

bonds. All three of these forces are arguments for a positive basis. But the limiting factor could be more steepening of the corporate bond curve relative to default swaps and structured credit-related buying of credit risk when default swap premiums get to interesting levels (in the old days, we called this the "CDO bid").

CREDIT CURVES

When liquidity was introduced to the 10-year part of the default swap market late last year, we argued that the 5s-10s curve was too flat from a fundamental perspective.[3] Given the cyclical nature of investment grade default rates and where we are in the cycle, 10-year default risk should be priced much higher than 5-year risk, in our view.

exhibit 3
Steepening Credit Curve Has Settled – 5s-10s TRAC-X Relationship



Source: Morgan Stanley

The 5s-10s relationship in default swaps widened from 10 bp to about 20 bp over the ensuing months, and today stands at about 18 bp (see Exhibit 3). On a Libor basis, the corporate credit curve is about half as steep today on average, but that is an improvement over the nearly absolutely flat curve we had last year.

We continue to have a preference for the 5-year part of the curve in both markets, and encourage investors to look for opportunities to sell 10-year credit risk (in either market) versus 5 years, at similar levels (i.e., anomalies), although we caution that bid-offer can be an issue in making the trade perform over the medium term.

In a nutshell, the technical trade may dominate opportunities and valuation in the coming months, particularly for those investors looking at relative value between cash and derivative instruments. In a credit world where there are less headaches today than we were all used to a couple of years ago, following the flows and trading the technicals makes a lot of sense to us.

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[3] *Please refer Chapter 33.*

chapter 49 Reacting to the New Regime

May 14, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Anisha Ambardar
Angira Apte

We have spent a good amount of our research energy this year talking about higher rates and the impact they could have on credit spreads and curve shapes.[1] With 10-year Treasuries 110 bp higher, the 5s-10s Treasury curve 20 bp flatter, and the market fully pricing in an active Fed starting with the June 2004 FOMC meeting, we are quite clearly already in the new regime. We argue that this is a good opportunity to see how the credit markets have reacted (so far), better understand relationships and revisit ideas.

In the credit markets, the biggest impacts have been on "key" relationships, rather than on absolute market levels (see Exhibit 1). The basis between cash and default swaps has moved more (25 bp wider) than either the cash or default swaps markets this year. With default swaps now trading well wider than cash, we attribute this basis regime change to hedge fund selling of credit risk through derivatives, less dollar price anxiety among bond investors, and significantly wider swap spreads (another "key" relationship). 5s-10s credit curve relationships have steepened as well – as they should – given the changing shape of the Treasury curve and where we are in the economic cycle.

Yet, in a credit environment where there is a lot of homogeneity in credit spreads, we find quite a bit of dispersion in credit curve relationships among similar issuers and between bonds and default swaps. In our view, these opportunities are driven by a variety of technical and fundamental factors, including the notion that credit markets have not uniformly adjusted to the new interest rate regime, given how quickly it happened. That spells opportunity.

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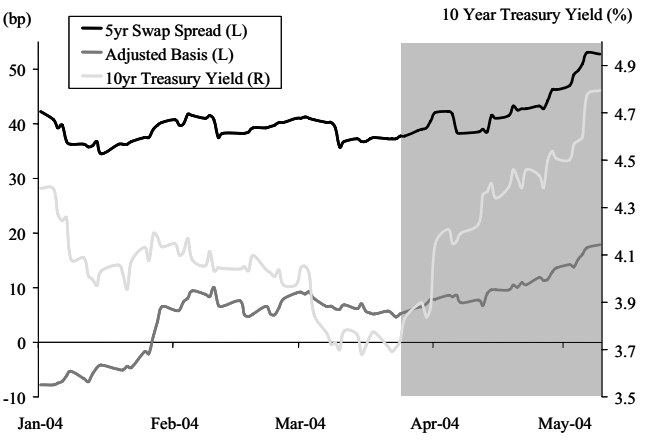
[1] *See "2004 Outlook: Liquidity Lifts the Fog," December 19, 2003, and "Revisiting 1994 – A Decade of Difference," January 9, 2004. Please also see Chapters 42 and 48.*

exhibit 1

The Regime Shift – Key Relationships Change



Source: Morgan Stanley

HOW STEEP AND WHY?

As the US economic expansionary period progresses, curve relationships should be impacted by perceptions of the length of the expansionary period, given the cyclical nature of default risk. The typical US economic expansion lasts approximately 5 years, although the 1990s period lasted 10 years (1991 through 2001). We are 2½ years into the current cycle, so one's view on the strength and length of the cycle is a key driver of the relative attractiveness of 5s-10s relationships. A short cycle view (in which we approach the trough before 5 years) is an argument for a flatter 5s-10s credit curve, while a longer cycle view (in which we reach the trough closer to the 8-10 year mark) supports a steeper 5s-10s curve. We find comfort in the latter camp more so than in the former.

How steep should the curve get? We have argued in previous research that, over a 10-year time period, default risk in the back 5 years is nearly 50% higher than default risk in the front 5 years, given the net negative ratings migration phenomenon in investment grade credit (see Exhibit 2 and Chapter 33). If you add into that the notion that we are in the first 2 to 3 years of an economic expansionary period, back 5 year default risk rises significantly

chapter 49

exhibit 2 Why Steeper Curves? Default Risk Rises Over Time and Is Very Cyclical

	5 Year	10 Year	Last 5 Years	Last 5 Years vs. First 5 Years (%)
Average Default Rates	0.39%	0.48%	0.57%	47%
Default Rates in Early Expansionary Periods				
1991-1993	0.02%	0.10%	0.17%	1113%
1981-1983	0.28%	0.48%	0.68%	150%
Total (Senior Notes)	-1.3%	-1.9%	-10.6%	7.6%

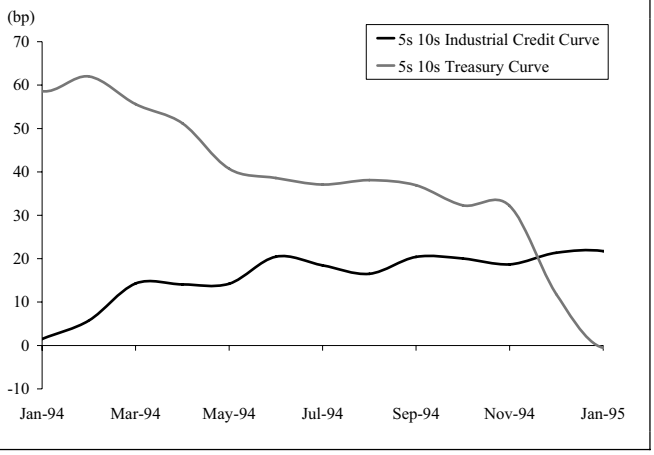
Source: Morgan Stanley, Moody's

What does this mean for 5s-10s spreads? The ratings migration is worth about 15 bp for the market (assuming a default swap premium of 70 bp), but the cyclical nature of default risk (combined with ratings migration) is worth almost 40 bp, using conservative estimates. Can 5s-10s credit curves get this steep?

WE LIVE IN A TECHNICAL WORLD

Credit curve relationships in the cash markets are not always fully transparent, for a variety of reasons. Ideally, what investors need to know is how much incremental spread they are getting paid to go from 5 to 10 years, after all of the interest rate components are taken out. Theoretically, Z-spread measures and the like quantify these risk premiums. Practically, though, this may be easier said than done. Bond liquidity issues and coupon differences have a big impact on the relative valuation.

exhibit 3 1994 – Treasury Flattening and Corporates Steepening



Source: Morgan Stanley, Bloomberg

Morgan Stanley

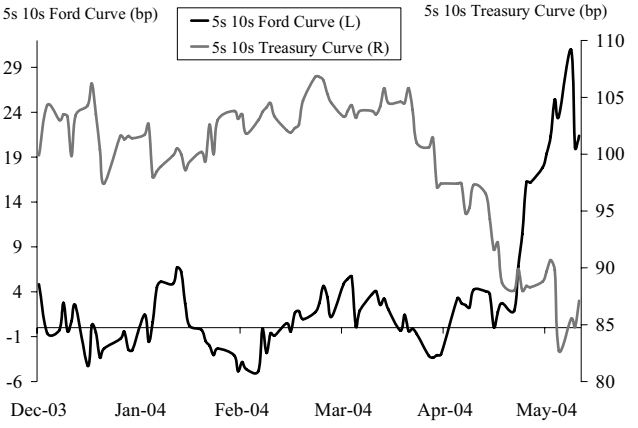
Furthermore, all-in-yield buyers of corporate bonds do not always think of the incremental risks in spread terms. As such, a flattening of the Treasury curve could force a steepening of the spread curve to keep yield pick-ups in the same zip code (see Exhibit 3 for a 1994 example). In default swaps, spread valuations are more transparent, but the market still suffers from a lack of real liquidity in the 10-year point. We can point to much more anecdotal interest in buying 10-year protection rather than in selling it, which prevents a good number of potential trades.

LEADING INDICATORS

The 5s-10s relationship in default swaps was the first to steepen, partly because the introduction of 10-year liquidity in default swaps late last year made the premium difference (10 bp at that time) both transparent and seemingly rich. Although default swaps have been leading the way in terms of curve steepness, that could change as we move forward. In particular, given that interest rate volatility is much greater than credit spread volatility today, corporate bond investors may demand even more risk premium in 10 years versus 5 years going forward, and we do see many examples of this already. Ford Motor Credit, arguably one of the most liquid names in the market, has already done so, with the 5s-10s relationship steepening 20 bp, almost in sync with the Treasury flattening (see Exhibit 4). What about the rest of the market?

exhibit 4

Leading Indicators – Treasuries Flatten, Ford Bonds Steepen



Source: Morgan Stanley, Bloomberg

chapter 49

HEREIN LIES THE OPPORTUNITY

In Exhibit 5 we compare 5- and 10-year points in cash and default swaps for numerous credits where the two markets disagree about curve steepness. In many cases, investors should have a clear preference for taking risk in one part of the curve versus the other, with one instrument instead of the other. For example, an investor inclined to take 5-year risk in Bear Stearns will find that default swaps are clearly a better value. In other names, curve long/short strategies are interesting. In Citigroup, buying 2010 bonds and buying 10-year protection implements a forward short with 7 bp *positive* carry.

In Goldman Sachs, buying 10-year bonds and 5-year protection (forward long) results in 32 bp positive carry. While we focused relative value efforts on corporate bonds that were reasonably liquid, we do caution that 10-year points in default swaps are a lot less so, although sellers of protection may find a warmer welcome than buyers. Additionally, we recommend focusing on big disparities, keeping and eye on steep credit curves and principal payments in off-the-run swap years (6 to 8 year maturities), which could bias the results of cash versus default swap comparisons.

exhibit 5 Cash and Default Swaps Disagree? Selected Curve Opportunities

Credit	Coupon	Maturity	Z-Spread	CDS (5Y, 10Y)	Comments	Credit	Coupon	Maturity	Z-Spread	CDS (5Y, 10Y)	Comments
Bear Stearns	4.000%	2008	19	45	Take risk in CDS	IBM	3.750%	2007	-4	28	
	5.700%	2014	48	60			4.750%	2012	14	48	Take risk in CDS
	Curve		*29*	*15*			*Curve*		*18*	*20*	
Citigroup	7.250%	2010	43	26	Take risk in cash	Lehman	4.000%	2008	11	45	Take risk in CDS
	4.875%	2015	34	36	Basis is minimal	Brothers	6.625%	2012	44	60	
	Curve		*-9*	*10*	*Buy 2010's, buy 10 year CDS, + 7 bp carry*		*Curve*		*33*	*15*	
Cendant	6.250%	2008	30	58	Take risk in CDS	Marathon	6.850%	2008	38	42	
	7.375%	2013	79	75		Oil	6.125%	2012	29	54	Take risk in CDS
	Curve		*49*	*17*			*Curve*		*-9*	*12*	
CIT Group	3.875%	2008	19	53	Take risk in CDS	Natl Rural	5.750%	2009	22	44	
	5.000%	2014	68	69		Utilities	4.750%	2014	20	62	Take risk in CDS
	Curve		*49*	*16*			*Curve*		*-2*	*18*	
Capital One	4.250%	2008	57	73	Take risk in CDS	Progress	5.850%	2008	48	61	
	5.125%	2014	92	88		Energy	5.125%	2013	43	79	Take Risk in CDS
	Curve		*35*	*15*			*Curve*		*-5*	*18*	
Campbell	5.875%	2008	8	25	Take risk in CDS	Praxair	2.750%	2008	-5	22	
Soup	4.875%	2013	13	42	Take risk in CDS		3.950%	2013	4	40	Take risk in CDS
	Curve		*5*	*17*			*Curve*		*9*	*18*	
Computer	6.250%	2009	33	50		Southern	3.125%	2008	4	34	Take risk in CDS
Sciences	5.000%	2013	39	72	Take risk in CDS	Company	5.125%	2012	15	29	
	Curve		*6*	*22*			*Curve*		*11*	*-5*	
EOP	7.750%	2007	55	73		Valero	3.500%	2009	45	59	
	5.875%	2013	63	91	Take risk in CDS		4.750%	2013	49	74	Take risk in CDS
	Curve		*8*	*18*			*Curve*		*4*	*15*	
Goldman	4.125%	2008	16	39	Take risk in CDS	Wells	3.125%	2009	9	25	Take risk in CDS
Sachs	5.150%	2014	71	54	Take risk in cash	Fargo	4.625%	2014	33	36	
	Curve		*55*	*15*	*Buy 2014, buy 5 year CDS, +32 bp carry*		*Curve*		*24*	*11*	

Source: Morgan Stanley

chapter 50 The Case for Organic Convergence

October 29, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA

As we concluded our fifth annual Credit Convergence Conference in New York this week, we started to think a bit about the convergence theme that has been discussed for so many years in the corporate credit markets. Initially, the term "convergence" described the bridging of the gap among bonds, credit derivatives and non-traditional credit instruments, including loans and convertible bonds. Today, so much convergence has occurred that many investors are pushing the envelope to suggest that the term now refers to closing the gap between equity and credit markets. We argue that this is a bit of a reach for a large segment of both markets, as debt/equity relationships still require some more convergence encouragement.

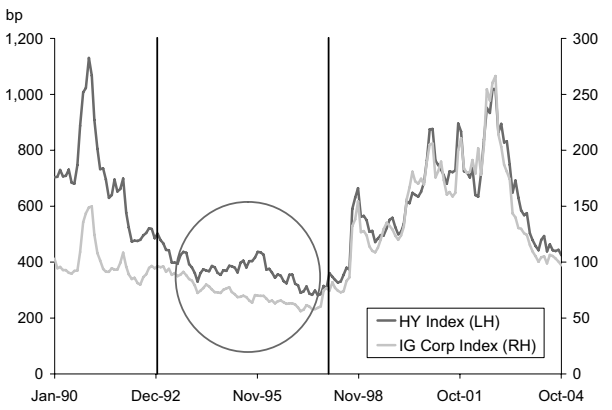
As new investors enter the credit markets and business models are reshaped, there is some organic convergence that still makes sense. Traditionally, high yield and investment grade markets were culturally separate, but the emergence of investors who are less sensitive to credit ratings (or with very different business models) has forced stronger relationships between both ends of the rating scale. However, we are by no means suggesting that high yield and investment grade are perfectly in sync, with one being a levered version of the other. In this economic cycle, investment grade has been more of an early cycle play with very strong fundamentals and a directional bias that, at this point is asymmetric at best, thanks to pension issues, margin pressures and potential capital structure changes. High yield credits, on the other hand, have more to gain if the cycle strengthens and fundamentals do not worsen much.

Spread compression in investment grade has made the trading of fundamentally driven pairs fairly uninteresting from a return perspective. Ironically, history tells us that the high yield and investment grade relationship is a bit more volatile when investment grade is so compressed. However, in recent years, the markets appear better correlated through thick and thin, suggesting that a secular change may be afoot.

Given where we are in the cycle and the asymmetric nature of fundamentals, especially for investment grade credits, we argue that selected long high yield versus short investment grade "pairs" can result in well-balanced positive carry trades, even when adjusted for volatility differences. What is the convergence driver? We point to fundamentals.

exhibit 1

HY and IG: In Sync During Volatile Periods, But Not During Quiet Periods



Source: Morgan Stanley, The YieldBook

THE ASYMMETRY OF FUNDAMENTALS

Morgan Stanley Fixed Income Credit Strategist Greg Peters has focused quite a bit on the capital structure conflict that exists in the investment grade markets today (see "Don't Discount the Pensions," October 8, 2004 and "Concerns on the Margins," September 24, 2004). Today's cash rich, low-leveraged investment grade corporate must lean in a credit-unfriendly direction if shareholders demand more return tomorrow than the suboptimal balance sheets can deliver today. Rising capex, share repurchases or cash-financed M&A activity could be the answer, none of which bodes well for bonds. Furthermore, the growing concerns of corporate pension obligations and margin pressures from any direction (including commodities) will negatively affect both ends of the capital structure.

The high yield market has benefited from the deleveraging theme, as well, but we argue that the fundamental state of this corner of the market is not so asymmetric today. The equity market tilt is a concern for high yield credits, as well; however, from a credit perspective, success on the equity side, in the form of earnings growth, can still improve the credit side of the equation, especially relative to the investment grade story.

WHAT DOES HISTORY TELL US?

With the asymmetry of fundamentals favoring high yield, what can we learn from history, at least from a pricing perspective? Spread relationships between both markets have been reasonably well correlated over the past nearly 15 years, with high yield having the higher volatility associated with higher leverage levels (see Exhibit 1). The only period with a meaningful breakdown in the relationship coincides with the low volatility period in the mid-1990s, driven largely by little spread movement in the investment grade markets following the multi-year rally that started at the end of the previous recession (1991). We highlight this period for two reasons. First, there are cyclical similarities to today's market environment. Second, the breakdown in correlation between both markets was associated with almost a range-bound directional theme (see Exhibit 2). Can we gain any insight from this in trying to quantify relationships going forward?

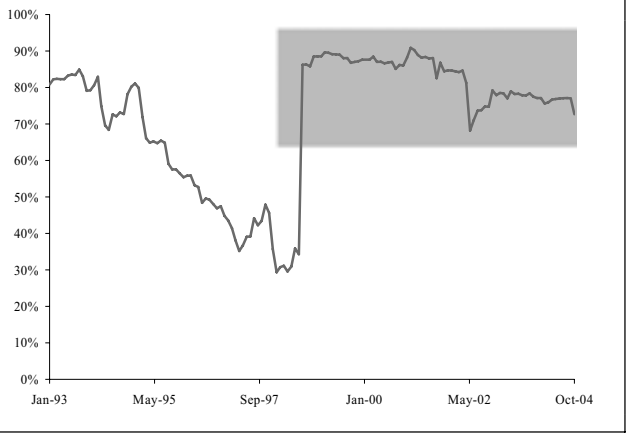
chapter 50

HOW DO YOU WEIGHT THE TRADE?

Weighting a high yield versus investment grade "pairs" trade is the hardest part of any convergence or divergence strategy. The weighting, or hedge ratio, is essentially the "safe" weighting for the relationship when an investor's view does not play out.

History may help us a bit, although we caution that it could be misleading, as well. Relative to the mid-1990s, the period since 1998 has been a high volatility environment in both investment grade and high yield markets, except for the past year. Correlation has been high, as well, as we highlight in Exhibit 2. The argument for this being a cyclical change is relatively clear, as we experienced systemic events (1998), along with a very large turn in the credit cycle. However, even in the relatively low volatility world of this year, the correlation between both markets has remained high, which is not what we experienced in the mid-1990s. The absolute level of volatility in this environment is also higher than in the mid-1990s.

exhibit 2
HY and IG: Have We Moved Into a New Correlation Regime?



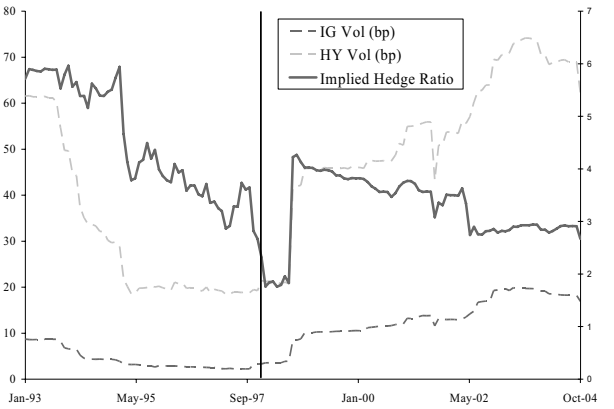
Source: Morgan Stanley

We calculate the hedge ratio (or delta) between both markets simply as the ratio of their volatilities multiplied by their correlation. The three-year rolling volatilities and implied hedge ratios can be seen in Exhibit 3. This high yield/investment grade hedge ratio has been relatively stable (in the 3.0 to 4.0 range) over the past few years, despite the large absolute moves in spreads and shifts in volatility. In the early- to- mid 1990s, the hedge ratio was much more volatile, driven mostly by changes in correlation, which indicates a relationship that was much less stable than today. We find the constant nature of the hedge ratios encouraging. Investors who are positioning for a convergence or divergence trade should be able to hedge missteps or lack of volatility without too much pain, if recent history is a good indicator.

THE "PAIRS" TRADES

With the above points in mind, we create portfolios of long/short trades to take advantage of the better-balanced fundamental picture in high yield, as well as the idiosyncratic pressures on investment grade names from capital structure conflicts, pension issues and margin pressures. Our base-case hedge ratio (delta) is one that makes the trade ideas credit market neutral, at least from a historical perspective. A delta of 3.5x between the high yield and investment grade markets equals both the long-run average and the middle of the range over recent years (see Exhibit 3).

exhibit 3
HY and IG Hedge Ratios Have Become More Stable



Source: Morgan Stanley

THE TELECOM PAIR

The first pair idea is truly idiosyncratic in nature and focuses on the telecom space (see Exhibit 4). A long/short implementation of these views results in net positive carry of 113 bp.

POSITIONING AGAINST SYSTEMIC HIGH YIELD RISK

While there are many other sector opportunities in both markets where fundamentals may be leaning in different directions, there are also more macro ways of implementing these types of views which we believe are interesting to highlight. We have discussed the developing high yield tranche market in some of our recent work (see "A Shot at High Yield Tranches – Bottom Up," October 1, 2004). Selling mezzanine protection on High Yield CDX (say the 15-25% tranche) is a way of implementing the view that there will not be a systemic event in high yield, and at the same time, it protects one from a fair bit of idiosyncratic risk (until of course this becomes systemic itself). Positioning this versus specific event-driven shorts in investment grade is a more macro way of implementing the same theme.

For these more macro "pairs" relationships, we use a combination of the correlation model-based delta for the tranche (3.2x) and the high yield vs. investment grade delta from history (3.5x) to get a hedge ratio of 11.2x. This is a fairly conservative delta (i.e., it could be lower), since the High Yield CDX index is a low beta portfolio versus the high yield market. On the investment grade side of the trade, we have selected our

shorts based on a number of fundamental criteria, but generally they are intended to capture event driven risks in the specific names.

The pension risk portfolio contains nine investment grade short positions in names that have pension return assumptions that appear high (greater than 9%). The long/short package results in a net carry of 48 bp. The portfolio focused on corporate actions and other event risks contains ten investment grade short positions and results in a net carry of 36 bp. Finally, a portfolio containing both sets of credits would contain sixteen $7 million investment grade short positions and results in a net carry of 41 bp.

exhibit 4 The "Pairs" Trades – Long High Yield, Short Investment Grade

Telecom		
	Notional	**Spread**
Long Credit		**CDS Bid**
LU	10MM	260
NT	10MM	260
Total Long	**20MM**	**260**
Short Credit		**CDS Offer**
CTL	35MM	57
AT	25MM	31
FON	10MM	52
Total Short	**70MM**	**47**
Net		**96**

Aggressive Pensions		
	Notional	**Spread**
Long Credit		**CDS Bid**
15-25% HY CDX	10MM	600
Total Long	**10MM**	**600**
Short Credit		**CDS Offer**
LLY	18.6MM	26
S	18.6MM	127
SVU	18.6MM	51
CAT	18.6MM	26
FD	18.6MM	46
TXN	18.6MM	20
Total Short	**112MM**	**49**
Net		**48**

Corporate Events		
	Notional	**Spread**
Long Credit		**CDS Bid**
15-25% HY CDX	10MM	600
Total Long	**10MM**	**600**
Short Credit		**CDS Offer**
CTL	11.2MM	57
LTD	11.2MM	54
SWY	11.2MM	68
SVU	11.2MM	51
MCK	11.2MM	113
BAX	11.2MM	39
LLY	11.2MM	26
TWX	11.2MM	54
DD	11.2MM	15
HPQ	11.2MM	27
Total Short	**112MM**	**50**
Net		**36**

Source: Morgan Stanley

chapter 51 Spill-Over Effects?

November 5, 2004

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA

With the benefit of hindsight, equity markets were clearly bothered by the uncertainty of the presidential elections, as a healthy post-election rally demonstrates. Corporate credit markets were less concerned, given the dominance of technical factors, and have continued to grind tighter, with any election uncertainty relief being only one step in the otherwise trending direction. The insurance scare has subsided for the credit market at large, with it narrowing to become a very sector-specific event at this point.

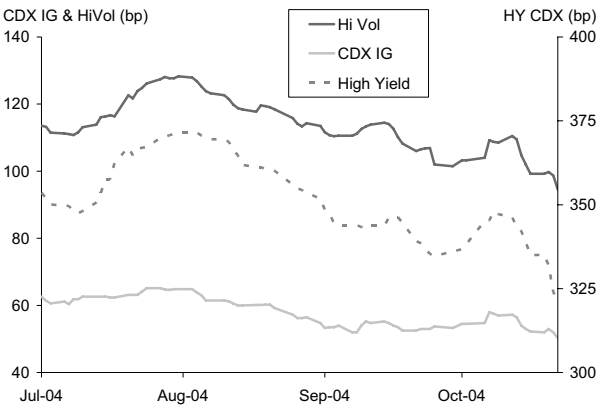
The demand for levered credit continues, with the insurance-motivated widening revealing the back bid for a shelf full of deals waiting to get done. Five-year CDX now trades at its tightest levels of the year (49 bp), despite the fact that 10 insurance names in the index are still wider on average than before the insurance sector news. The HVOL index, which has no insurance names, is 8 bp through the pre-insurance tights in early October. In the structured credit markets, most of the relative richness is evident in junior mezzanine tranches, where the base correlation skew remains about 10 correlation points, with equity tranches marginally cheaper recently on a correlation basis.

We argue that if the appetite for levered credit continues, it will spill over into the high yield world as well. In fact, for the less risky or easy to trade instruments, it already has. High Yield CDX is at its tights as well, 15 bp tighter than pre-insurance scare tights. The cash high yield market returned 1.4% over Treasuries in October, the second best monthly performance of the year. The basis (default swaps minus cash bonds) for many of the BB-rated names that we track is now negative like investment grade, with many recent deals including these default swaps as part of the collateral pool. There is a lot more room for rallies in other parts of the high yield markets, including single-B names and mezzanine tranches, if investment grade is to be used as a benchmark and sentiment spills over.

With a growing convergence of themes in the investment grade and high yield markets, we focus on these two technical points in more detail. First, the investment grade basis today is more compressed and fair in value than we can ever recall, even using our sharpest relative value tools. High yield, though, has many more opportunities, but also many more challenges. Second, the relative pricing of tranches in high yield has experienced some fairly big moves recently and is beginning to mirror some of the sentiment in investment grade, albeit with thinner volumes.

exhibit 1

Grinding or Gapping Tighter?



Source: Morgan Stanley

THE ANATOMY OF THE BASIS, TODAY

The basis is one of the most basic credit derivatives concepts, yet it can also be one of the most complicated to calculate, given the tedious nature of accurately comparing bonds and default swaps. There are two types of basis measures that we think will be relevant going forward. The first is our traditional Z-spread-based measure (originally called the adjusted basis[1]). We argue that this measure looks at relative value from the perspective of fixed-coupon bond investors, using measures like Z-spread and dollar price to measure relative value.

The second type is a derivative-based measure that relies on CDS markets to generate the default probabilities that drive the relative value. This measure takes credit curve shape directly into consideration. We have discussed the methodology in detail in previous research.[2] In today's market environment of very steep investment grade curves, it suggests that default swaps are marginally richer than the Z-spread basis demonstrates.

[1] *Please refer to Chapter 22.*
[2] *Please refer to Chapter 34.*

chapter 51

exhibit 2 Only a Few Truly Positive Basis Relationships in Investment Grade (Mid-Market Levels)

Tkr	5yr CDS	Z-Spread Basis	Curve Adjusted Basis
TWX	45	15	12
BLS	26	13	17
CD	50	15	15
CIT	41	18	18
CMCSA	43	11	11
CPB	28	13	14
DE	22	13	16
DIS	28	11	14
EMR	18	12	16
GE	23	11	15
MO	166	16	13
NWL	58	16	16
RDN	55	19	20
RTN	38	16	15
VZ	29	15	16

Source: Morgan Stanley

A COMPRESSED INVESTMENT GRADE BASIS

We continue to believe that the structured credit bid can keep spread levels tight as many market participants ignore the idiosyncratic wake-up calls in their hunt for yield. The average basis relationship is near fair value (in our medium-sized universe of 115 names), suggesting that cash markets are very much in sync with the belief that the structured credit bid is not a temporary phenomenon. We find only a handful of opportunities where the basis is truly positive (default swaps trading wider than bonds), if we factor in both carry and relative value and leave room for full bid/offer (see Exhibit 2).

ALL EYES ON HIGH YIELD

There is still a significant liquidity gap between derivative and cash instruments in the high yield space, especially if one considers how deep the investor base is on the cash side. Similarly, in the structured credit markets, a developing tranche market in High Yield CDX still has a lot of growing to do if CLO issuance and secondary market trading is a barometer. Yet, there are many factors that are pushing credit investors toward opportunities in high yield, the most powerful one being the limited opportunities in investment grade, in our view.

"DERIVATIVE-IZATION" OF HIGH YIELD – LEADING INDICATORS?

For many BB-rated issuers in the market, the basis has now turned negative, as demand for synthetic BB risk from deals has pushed default swaps tighter than bonds. In Exhibit 3, we highlight the spill-over effect in a selected universe of names (comprising our high yield basis, sorted by S&P rating). Broadly speaking, the higher quality credits have more negative bases (default swaps tighter) than their lower quality counterparts. The average basis levels for credits rated BBB, BB and B/CCC are -3, 21 and 44, respectively. The single-name results are fairly consistent for both the B/CCC and BBB categories, while for the BB category, the single-name bases range from -40 to 82. This dispersion in relative value among these issuers leads us to believe that structured credit users have waded into the shallow end of the pool rather than jumping into the deep end of the BB space.

chapter 51

exhibit 3 Profile of the Basis – Selected High Yield Issuers

Ticker	5-yr CDS	Z-Spread	Raw Basis	Z-Spread Basis	Curve Adjusted Basis	S&P
Average	**166**	**149**	**17**	**21**	**21**	
EP 6.75 05/15/09	325	262	63	54	39	CCC+
LU 5.5 11/15/08	240	136	104	68	46	B
WMB 7.125 09/01/11	155	88	67	90	72	B+
DPL 6.875 09/01/11	113	103	10	26	25	B+ /*-
RAD 7.125 01/15/07	450	336	114	28	40	B-
DDS 7.85 10/01/12	260	246	14	38	48	BB
ARM 8.75 03/01/12	220	249	-29	-6	-1	BB+
DELBB 8.125 04/15/11	115	121	-6	17	11	BB+
GPS 6.9 09/15/07	65	35	30	11	8	BB+
HOT 7.875 05/01/12	135	102	33	58	48	BB+ /*-
MGG 8.5 09/15/10	162	161	1	22	13	BB+ /*-
PPE 7 04/15/13	144	82	62	78	82	BB+ /*+
GLW 6.3 03/01/09	160	168	-8	-13	-9	BB+
JCP 8 03/01/10	106	111	-5	7	-4	BB+
MBG 6.5 07/31/09	157	151	6	10	18	BB+ /*-
RJR 7.25 06/01/12	271	302	-31	-24	21	BB+
TE 7.2 05/01/11	135	122	13	28	26	BB
ABY 6 06/20/13	252	232	20	31	57	BB
BOW 6.5 06/15/13	225	206	19	29	50	BB
DCN 9 08/15/11	150	150	0	31	20	BB /*+
DISH 6.375 10/01/11	150	156	-6	23	20	BB-
GP 8.125 05/15/11	105	114	-9	15	5	BB+
SKS 8.25 11/15/08	225	208	17	-17	-40	BB
TXU 6.375 06/15/06	59	52	7	-28	-28	BBB-
CNP 5.875 06/01/08	83	89	-6	-22	-17	BBB-
HLT 7.625 12/01/12	66	72	-6	14	15	BBB-
LEA 8.11 05/15/09	84	90	-6	-2	-3	BBB-
TYC 6.375 10/15/11	39	38	1	13	17	BBB

Source: Morgan Stanley

exhibit 4 High Yield Structured Credit – Big Moves in Mezzanine and Senior Tranches

	Spread		Correlation Skew	
	8/3/2004	11/4/2004	8/3/2004	11/4/2004
15-25%	705	493	6	3
25-35%	260	150	10	16
35-100%	35	21	NA	NA
Index	365	324	NA	NA

Source: Morgan Stanley

Taking it to the next step is a big deal, and not necessarily a natural step. But some of the recent indicators from the structured credit markets are pointing to investors taking a bit more risk, at least at the mezzanine level. With High Yield CDX somewhat tighter, there appears to be more demand for levered high yield investors at the mezzanine and senior level as base correlation skews increases (for example, from 10 to 16 correlation points at the 25% attachment level and from 0 to 4.5 correlation points at the 10% attachment level). From a spread perspective, the 25-35% tranche has tightened from 260 bp to about 150 bp today, while the 15-25% tranche is about 200 bp tighter.

SPILL-OVER EFFECTS

Early indications point in the direction of increased derivatives use further down the credit spectrum. Like the election polls, these indications only give us a glimpse of the potential future. With investment grade at current spread levels and the opportunity set shrinking as a result, structured credit users may force high yield to be the 2005 trade.

chapter 52 Risk Premium or VIX Premium?

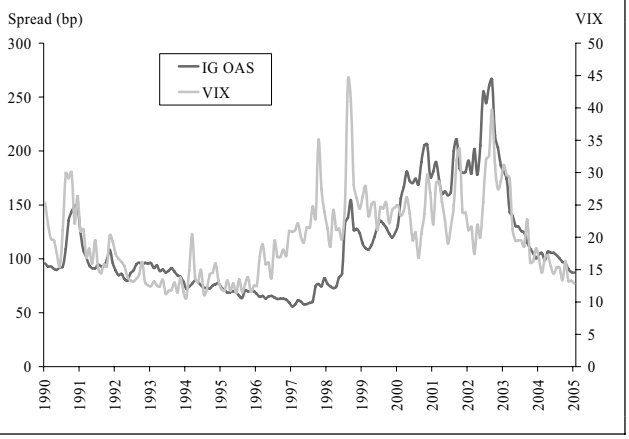
February 18, 2005

Primary Analyst: Sivan Mahadevan
Primary Analyst: Peter Polanskyj
Primary Analyst: Ajit Kumar, CFA

While the new year has been met with a bit more credit excitement from a capital structure perspective (M&A activity and the like) than the tail end of 2004, the old themes continue to grab hold of the market. The VIX (the popular equity volatility index) is in an 11% range today, which is a low point for this economic cycle, and has garnered much press attention. Yet, we argue that this is not uncharted territory by any measure, as the VIX spent much of 1993 in this same range. At the same time, the structured credit bid that everyone is tired of hearing about continues to provide a solid support for the credit markets, puzzling many who wonder why credit does not seem too rich for participants in this corner of the market.

We have spent quite a bit of effort in the past comparing what different markets are saying about default risk, to get a sense of how much or how little risk premium there is in credit. Equity volatility is an important driver of Merton models, but so are credit fundamentals. The combination of both is pointing to even lower default risk for the investment grade market at large, which makes credit the cheapest it has been in this cycle, at least based on this one measure.

exhibit 1
It Feels Like 1993 – The VIX Hits a Low for this Cycle



Source: Morgan Stanley

Yet, if we remove the volatility and equity components and focus strictly on leverage, we get an opposing indicator (investment grade credit is at the richest point for this cycle), which demonstrates how influential the volatility component can be in the Merton framework. This leaves us to ask the natural question, is today's risk premium really a VIX premium?

HOW DOES ONE MEASURE RISK PREMIUM?

What we become frustrated with frequently in the credit markets is the lack of a standard valuation measure upon which to judge both absolute and relative value. The

most common approach is to judge relative value optically, i.e., on spread measures historically or for comparable credits, which leaves much to be desired. Default risk, in our view, is a good baseline approach, but there are different ways to measure it.

As an aside, in the equity markets, there is at least one agreed-upon standard. The dividend-discount model is a method of implying a stock's price from many factors, including growth assumptions, expected dividends, and risk-free interest rates. As a tool, these models allow us to imply a price from a risk premium or, alternatively, to extract a risk premium from a price, given the other assumptions. It is easy to criticize these models for missing some of the intelligence of the market, but they are fundamentally simple and sound, and provide a baseline measure to compare stocks with very different dividends and growth forecasts.

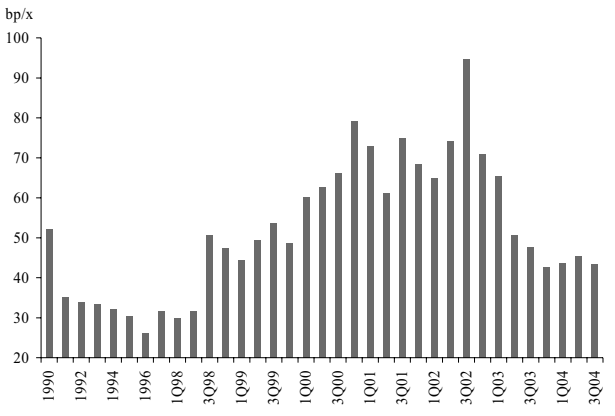
Returning to credit, the best measures we have today to map between price and risk examine spread levels (or spread-implied default rates) relative to default rate expectations. Morgan Stanley chief credit strategist Greg Peters has focused on spread per unit of corporate leverage (SPL), and in our credit derivatives research, we have focused on the ratio of spread-implied default rates to default rates from Merton models (Moody's KMV EDFs).

RISK PREMIUM IN CREDIT

As we alluded to earlier, both approaches give us different results. Corporate leverage levels (debt/EBITDA) have been slightly lower over the past few quarters, which has kept the SPL ratio very stable and significantly lower than it was during 2002-2003 period for the investment grade market when spread widened much more than leverage levels increased (see Exhibit 2). In a nutshell, in today's markets investors are getting paid less per unit of corporate leverage than earlier in this cycle and late in the previous cycle.

exhibit 2

IG Spread Per Unit of Corporate Leverage – Credit Is at the Richest Point in the Cycle

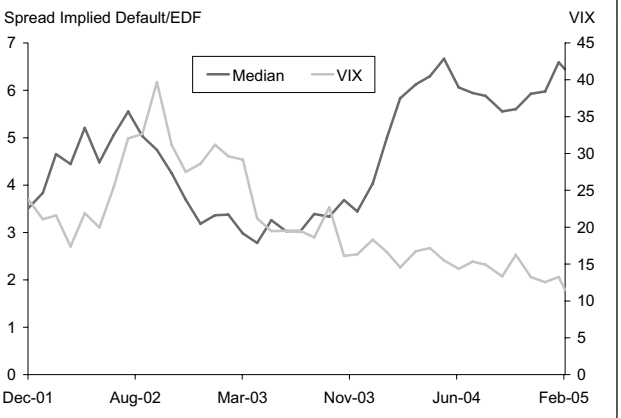


Source: Morgan Stanley

But the current state of balance sheets is only one piece of the puzzle. Balance sheets can change, and static measures like SPL cannot capture the market's perception of the speed with which these change may occur. Asset values and the level of volatility are significant drivers on that front, and it turns out that those factors are enough to push the risk premium result in the other direction. In particular, in Exhibit 3 we compare

spread-implied default rates with equity-implied default rates (Moody's KMV EDFs). The ratio of the two has moved higher for this universe (approximately 160 investment grade issuers), which we argue is driven more by falling volatility and rising equity levels than by changes in spread or corporate leverage levels. We note that corporate leverage levels are based on third-quarter reports, but the early read of fourth-quarter balance sheets shows largely unchanged levels.

exhibit 3
Credit-Implied vs. Equity-Implied Default Rates – Credit Is at the Cheapest Point in the Cycle



Source: Morgan Stanley, Moody's KMV

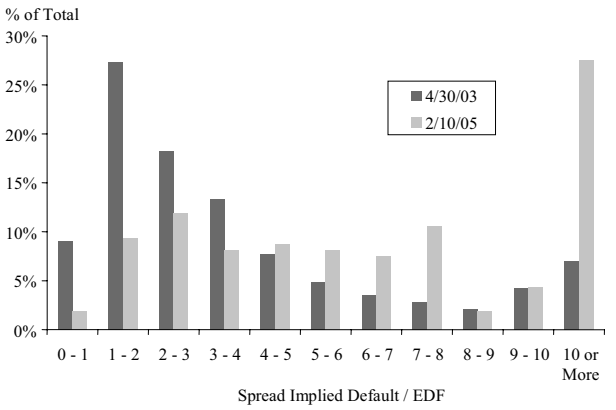
2003 FEELS FAR AWAY

Market averages, however, can hide some important details. Given the changes in pricing in each market, it is worthwhile to examine how much the debt and equity markets disagree when it comes to default risk for this cross-section of names. In Exhibit 4, we show the distribution of our implied default rate ratio for all the individual components that make up the universe in Exhibit 3 at two points in time.

The first date we examine is April 30, 2003, which is the point at which credit markets were pricing in the least amount of risk premium relative to our equity indicators. The distribution at this time was well behaved – most of the observations are clustered around the average, with a reasonably small amount of outliers. This tells us that credit and equity markets, for the most part, were reasonably consistent in their assessment of risk on a credit-by-credit basis.

Our most recent observation is one in which credit markets are pricing in the most risk premium relative to what equity markets are telling us. Today, the ratio is almost randomly distributed across a wide range of values with a very fat tail (25%) of credits, for which there is a significant disagreement between the markets. This indicates a large disparity in how equity and credit markets are assessing risk, depending on what name we are looking at, and stands in rather stark contrast to what we saw in early 2003.

exhibit 4
Dispersion of Risk Premia



Source: Morgan Stanley, Moody's KMV

MARKETS MISALIGNED

The explanation for why equity and credit markets disagree today is complicated, but we can offer some potential causes for the disparity:

- The idea that equity and debt market expectations are inconsistent with one another is one potential explanation. If equity markets are priced for aggressive growth that is inconsistent with the credit-friendly environment priced into our markets, we would see a large disparity in pricing today.
- Another explanation is the low absolute level of default risk priced into both markets. Equity markets can imply almost zero default risk, while our market will still charge some premium for taking even that default risk. The result is a credit spread that is made up largely of risk premium with a small amount of expected losses. There is a floor on credit spreads but not on EDFs.
- Capital structure changes are another potential source of misalignment. While both equity and credit markets are sensitive to capital structure changes, the impact of the most feared (by credit investors) type of capital structure change (equity-friendly and credit-unfriendly) will drive markets in opposite directions. To the extent markets are pricing some expectation of corporate action, today's debt-to-equity relationships will appear to be moving in different directions.

Our key message is that these practical aspects of investment grade credit force the much higher risk premium relative to pure default risk measures from the equity markets. In the credit market we face today, some (but not all) of the forces driving equity valuations may be just as important to credit investors as the traditional metrics we are used to, like leverage and cash flow.

Section G

Glossary

Glossary

ADJUSTED BASIS
Difference between the adjusted Z-Spread of a bond and a CDS premium. The Z-Spread is adjusted for bonds trading above or below par.

AMERICAN-STYLE OPTION
An option that can be exercised by the holder at any time from the date of purchase up to the expiry date. American-style option premiums are typically greater than European-style options due to the increased flexibility afforded to the option holder.

AMORTIZING TERM LOAN
A term loan is a funded loan type where once borrowed funds are repaid, the funds cannot be borrowed again. Under an amortizing term loan agreement, the borrower pays back the principal over the life of the loan – amortization is usually back-ended.

ASSET SWAP
A swap of the returns or cash flows of two assets. They are commonly used to convert fixed cash flows to floating.

ASSET SWAP SPREAD
The spread to the swap curve on the floating-leg payments of an asset swap, in exchange for fixed cash flows.

ASSIGNMENTS
A secondary trading convention in the loan market. When a loan is traded on an assignment basis, the assignee (buyer) becomes the direct signatory to the loan and receives payments directly from the administrative agent. In the event of default, assignees will have complete rights and access to private information. Assignments usually require the consent of the borrower and the agent on a not-to-be-unreasonably-withheld basis. See also "Participations".

AT-THE-MONEY
Refers to when the strike spread is equal to the market spread for both payer and receiver options.

AVAILABLE FUNDS CAP
The interest on US home equity loan securitizations is capped at a certain pre-specified rate called the available funds cap rate. This feature introduces interest rate risk to such securitizations and credit default swaps where the reference obligation is a home equity loan.

BASIS (OR CDS-BOND BASIS)
Difference between CDS premium and a selected spread measure of a bond. A positive basis implies that the prevailing default swap premium is greater than the spread on the bond.

BERMUDAN-STYLE OPTION

An option that can be exercised by the holder only on a series of preset dates up to a final maturity date (similar to a hybrid of American- and European-style options).

BETA

Measures the price sensitivity of a security to movements in the broad market. If beta is greater than one, any change in the market will result in a magnified price move (multiplied by the beta) of the security.

BULLET BOND

A bond where the repayment of principal occurs only at the maturity date. Also known as a Non-Callable Bond.

CALLABLE BOND

A bond where the issuer holds the option to redeem the bond before its maturity date, typically at a preset price and at/after a preset date.

CANCELABLE SWAP

A CDS where the protection buyer has an option to cancel the CDS, usually after an initial period when the swap cannot be cancelled. For example, a five-year CDS that can be cancelled anytime after two years.

CASH SETTLEMENT

The settlement of a CDS contract whereby the protection buyer pays an amount equal to the market value of a deliverable obligation and receives par upon the occurrence of a credit event.

CDX HVOL INDEX

A sub-index of the DOW JONES CDX NA, comprising 30 of the highest-volatility credits in the index, as determined by a consortium of dealers.

CDX NORTH AMERICA (DOW JONES CDX NA) INDEX

The synthetic index of 125 investment grade credits in North America, as determined by a consortium of dealers. Rolls over on September 20 and March 20 of each calendar year.

CHEAPEST-TO-DELIVER OPTION

The option held by the protection buyer to deliver the cheapest deliverable obligation available to the protection seller when a credit event occurs.

CLEAN UP CALL

An option with the originator in securitization transactions where the originator can buy back the outstanding securitized instruments when the principal outstanding has been substantially amortized, leaving a small uneconomic amount to be serviced. As a further inducement to call, the coupon usually steps up when the outstanding amount falls below a certain rate. Normally, clean up call is exercised when the outstanding principal falls below 10% of the original. In ABS CDS, the contract gets cancelled when there is a clean up call; however, this is not the case with ABX.HE index contracts.

CONSTANT MATURITY CREDIT DEFAULT SWAP (CMCDS)
A credit default swap where the quarterly premium is not fixed, but is linked to the prevailing index spread on each payment date.

CONVERTIBLE BOND
A bond where the bondholder has the option to convert the bond into a preset number of a company's shares.

CORPORATE LEVERAGE
A financial ratio that captures the amount of debt vs. the size of the company's ability to pay, for example, a firm's total debt divided by its EBITDA (earnings before interest, taxes, depreciation and amortization over the last 12 months). Typically, the higher the leverage ratio, the riskier the credit will be, given the insufficiency of the firm's operating earnings to support its debt load.

COVERED CALL
A call option sold by an investor who is already long the underlying asset.

CREDIT EVENT
An event that materially affects the reference entity and triggers the termination of the CDS. Examples of credit events can include bankruptcy, failure to pay, obligation acceleration, repudiation, moratorium and restructuring.

CREDIT I/O
The residual default risk (in the form of credit risky residual coupon streams) resulting from an unwind of off-market credit default swap with a standard par default swap.

CURVE-ADJUSTED BASIS
Basis calculation that considers the full CDS curve, as opposed to just the CDS corresponding to the bond's maturity.

CURVE-ADJUSTED PAR SPREAD (CAPS)
A spread measure that extends on curve-adjusted Z-Spread and adjusts for any discount/premium on the bond by making a specific recovery assumption.

CURVE-ADJUSTED Z-SPREAD
An adjusted Z-spread measure that takes into consideration the shape of the credit curve over Libor, instead of assuming a flat credit curve (as per the generic Z-Spread metric).

DEFAULT PROBABILITY
The probability that an issuer will default on its debt obligation. Default probabilities calculated using bond or CDS pricing are market implied or risk-neutral default probabilities, and are usually different from empirical probabilities.

DEFAULT THRESHOLD

Used in structural models to signal the limit to which a firm's assets can decline before defaulting. This limit is equal to the firm's liabilities, and can be modeled to be static or dynamic over time.

DELIVERABLE DEBT OBLIGATION

Bonds or loans that are eligible for delivery by the protection buyer when physical settlement is specified.

DELTA

The resulting change in a derivative's price given a change in the underlying security's price. Also referred to as Hedge Ratio.

DESIGNATED PRIORITY

Designates the lien status of a loan, i.e., whether the loan is first lien or second lien. Claims on second liens rank behind those of the first-lien loans in an event of liquidation.

DISTANCE-TO-DEFAULT

The difference between a firm's asset value and its liabilities, measured in units of standard deviation of the asset value. Effectively represents the number of standard deviations that a firm is from default and can be used to compute the probability of default.

DIVIDEND-DISCOUNT MODEL

An equity valuation model that compares the current stock price to the present value of all future expected dividends from a company, using a discount rate reflecting the risk-free rate and the appropriate risk premium for the company.

DOW JONES TRAC-X^{SM} NORTH AMERICA INDEX

An off-the-run 100-name synthetic index of North American credits (which is a successor to TRACERS) launched in 2003.

DURATION-WEIGHTED

The size of the offsetting positions of a trade determined by the duration of each position.

ENHANCED EQUIPMENT TRUST CERTIFICATE (EETC)

Tranches of securitized debt collateralized by specific assets and equipment of a firm, with a waterfall structure in case of bankruptcy. Typically issued by industrial companies and airlines.

EQUIPMENT TRUST CERTIFICATE (ETC)

Debt collateralized by specific assets and equipment of a firm. Typically issued by industrial companies and airlines.

EUROPEAN-STYLE OPTION

An option that can be exercised by the holder only on the expiry date. European-style option premiums are typically lower than American-style options due to the reduced flexibility afforded to the option holder.

EXPECTED DEFAULT FREQUENCIES (EDF^{TM})

A predictor of issuer default over a specific term, generated by Moody's proprietary KMV Model. See Structural Model.

EXTENSION RISK

The risk that a callable security's duration is increased, due to the lack of prepayment by the issuer (typically driven by increased interest rates or spreads).

FACTOR MODEL

A statistical model that uses regression to quantify the contribution of various characteristics of the issuer/bond to the total spread of the bond. Sample characteristics may include Debt/EBITDA, duration and stock volatility.

FALLEN ANGEL

A bond that was originally issued an investment-grade rating but has since been downgraded to below investment-grade due to deteriorating credit quality. Opposite of a Rising Star.

FIXED CAP

The interest on US home equity loan securitizations is usually capped at the available funds cap (AFC) rate. Therefore, when rates rise above the AFC rate, the ABS CDS referencing a home equity loan experiences an interest shortfall. Under the pay-as-you-go approach, these interest shortfalls are addressed by floating payments from the protection seller to the protection buyer. Fixed cap is one of the mechanisms used to settle the interest shortfall. Under the fixed cap approach, the protection seller pays to the protection buyer a fixed amount capped at the protection premium for the applicable period. See also "variable cap" and "no cap."

HAZARD RATE

The forward probability of default over a specified time horizon. Can be modeled or inferred from CDS premiums or asset swap spreads.

HEDGE RATIO

See Delta.

HOLDING COMPANY (HOLDCO)

A company that holds a controlling interest (usually has voting control) of another company. Also referred to as the parent company. Typically has a lower recovery relative to the operating company (see OPCO).

IDIOSYNCRATIC RISK

Risk that is specific to a security or issuer/company and unrelated to market risk. Such firm-specific risk can be diversified away. Opposite of Systemic Risk.

IMPLIED EQUITY VOLATILITY

The standard deviation of a stock's return, as implied by its option premiums. Often calculated using the Black-Scholes model.

IMPLIED FORWARD CDS

Default swap rates between two future dates implied by the current CDS curve.

IMPLIED OPTION VALUE

The value of the embedded option in a bond, as implied by the bond's price, a volatility assumption and the risky swap curve (thus reflecting the default risk inherent in the bond's cash flows).

IMPLIED SPREAD VOLATILITY

The standard deviation of a corporate security's spread changes, as implied by its spread option premiums.

INSTITUTIONAL TERM LOAN

A term loan is a funded loan type wherein once borrowed funds are repaid, the funds can not be borrowed again. Institutional term loans are usually taken out by leveraged borrowers (i.e., non-investment grade borrowers with debt/EBITDA greater than 2.0x) and repaid at maturity (there might be some minimal, back-ended principal repayments). They are normally longer dated compared to amortizing term loans (five to seven years) and may be prepaid at any time at par. Multiple tranches with varying maturities can co-exist within a facility.

IN-THE-MONEY

For payer (payor) options, it refers to when the strike spread is less than the market spread on an underlying reference entity. For receiver options, the strike spread is greater than the market spread on the entity. In either case, the option holder will be incentivized to exercise the option.

INTERPOLATED SWAP SPREAD (I-SPREAD)

Also known as Yield-on-yield spread. The spread of a security relative to the swap curve, calculated by taking the yield to maturity of a bond less the interpolated yield on the swap curve.

INVERTED CURVE

When the short-end of the curve is at a higher level than the long-end of the curve, such that the curve has a negative slope. Typically signals near-term risks with positive expectations in the long-term.

ISDA

The International Swaps and Derivatives Association is the trade association representing participants in the derivatives industry, covering swaps and options across all asset classes (interest rate, currency, commodity and energy, credit and equity). Its publications include credit derivatives definitions, which have improved standardization of CDS contracts.

ITRAXX EUROPE

The synthetic index that consists of 125 equally weighted credit default swaps on European entities. Composition of the index is rules based and determined by a dealer liquidity poll. iTraxx Europe is rolled over every six months in March and September.

JUMP TO DEFAULT RISK

The risk of a credit spread gapping significantly wider to imply a high probability of default in the near term, as opposed to a gradual spread widening.

KMV MODEL

A Merton-based quantitative structural model proprietary to Moody's rating agency. Analyzes Expected Default Frequencies (EDF™) by comparing the value of a firm's liabilities to its assets, using equity value and equity volatility as inputs. See Structural Model.

LEAPS

Acronym for Long-term Equity AnticiPation Security. LEAPS are equity options with maturity dates of up to 36 months.

LIBOR

An acronym for London InterBank Offered Rate. LIBOR is the interest rate at which banks borrow funds from other banks and is commonly used as a benchmark for short-term interest rates.

LSTA

Loan Syndication and Trading Association. Formed by international financial institutions, LSTA aims to develop standard settlement and operational procedures, market practices and other mechanisms to more efficiently trade par and distressed bank debt.

MANAGEMENT OPTION

The option held by management as to when and how to change a firm's capital structure. The probability of this option being exercised is typically derived subjectively, via fundamental analysis.

MARK-TO-MARKET

The current market value of a security or a position that reflects any gains or losses since inception.

MARKET-IMPLIED DEFAULT RATE

The likelihood that an issuer will default, as implied by the spread of the issuer. Can be approximated by dividing the spread by the expected loss (par less recovery value).

MARKET-IMPLIED RECOVERY RATE

The expected value of the deliverable obligation (either market-value or its claim on the firm's assets), as implied by the spread of the issuer.

MARKET VALUE ASSET SWAP

An asset swap converting fixed cash flows to floating, with the original notional based on the original market value of the bond (not trading at par) and amortizing/accreting to par at maturity.

MERTON-BASED MODEL

A structural model premised on the concept that a firm's equity is synonymous to a call option on the residual value of a firm's assets, once all liabilities have paid off. From the value of this call option, we can calculate the firm's distance to default, which reflects the likelihood of the firm defaulting.

MODIFIED MODIFIED RESTRUCTURING (MOD-MOD-R)

Under this definition, the main difference from Mod-R is that the protection buyer can deliver a deliverable obligation with maturity up to 60 months after restructuring (in the case of the restructured bond or loan) and 30 months in the case of all other deliverable obligations.

MODIFIED RESTRUCTURING (MOD-R)

In the case of a restructuring credit event, the protection buyer must deliver obligations with a maturity date prior to a) 30 months following the restructuring, and b) the latest final maturity date of any restructured bond or loan, but not shorter than the CDS contract.

NEGATIVE BASIS TRADE

The purchase of bonds and protection on the same issuer in order to isolate the negative basis that exists between both securities (when the CDS premium is tighter than the spread of the bond).

NET COUPON

The difference between the bond coupon received (adjusted for the interest rate hedge) less the CDS premium paid out, when an investor buys bonds and CDS simultaneously.

NO CAP

A type of settlement mechanism for ABS CDS (under the pay-as-you-go approach) wherein the protection seller compensates the protection buyer for any interest shortfall. Since there is no applicable interest shortfall cap, the protection seller pays the entire amount of the shortfall to the protection buyer. See also "fixed cap" and "variable cap."

NON-CALLABLE BOND

See Bullet Bond.

NOPS

Notice of physical settlement – a required condition to settlement in transactions where physical settlement is applicable. Typically a NOPS should be delivered within 30 days of a credit event.

NOTIONAL-WEIGHTED

When the size of the legs of a trade are determined by the notional amount of each leg.

OBLIGATION ACCELERATION

Credit event whereby the default of the reference entity causes the reference obligation to be due and payable, in lieu of the reference obligation's original maturity date.

OPERATING COMPANY (OPCO)

A company that is majority-owned by another company (the holding company). OpCo debt is often considered to have a higher recovery value because it has a closer claim to operating assets, relative to holding company debt.

OPTION-ADJUSTED SPREAD (OAS)

The spread of a corporate security relative to Treasuries or Libor, adjusted for embedded options.

OUT-OF-THE-MONEY

For payer (payor) options, it refers to when the strike spread is greater than the market spread on an underlying reference entity. For receiver options, the strike spread is less than the market spread on the entity. In either case, the option holder will likely let the option expire.

OVER-THE-COUNTER (OTC)

The market for securities that are not listed on one of the major exchanges.

PAIR TRADE

A combination of a long protection position and a short protection position. If implemented on individual credits, this trade may mitigate market risk and isolate credit risk.

PAR ASSET SWAP

An asset swap converting fixed cash flows to floating, with the notional of the swap based on par value.

PARI PASSU

Latin term meaning at an equal pace or without partiality. In the event of a liquidation, creditors that rank pari passu would have equal entitlement to the assets and hence would be paid pro rata in accordance with the amount of their claim.

PAR SPREAD

The periodic, typically quarterly, premium that the protection buyer pays to the protection seller on a CDS contract so that the contract has a zero market value at inception.

PARTICIPATION RATE

In case of a CMCDS, the proportion of the current reference CDS index premium that a CMCDS protection buyer pays to the protection seller is referred to as the participation rate. The participation rate is fixed for the term of the CMCDS.

PARTICIPATIONS

A secondary trading convention in the loan market. When a buyer obtains a loan through participation, he or she enters into a separate agreement with an existing lender to take a participating beneficial interest in the lender's position. The existing lender remains the official holder of the loan and passes on payments to the participant buyer. In some cases, participants may not have the same voting rights as assignees. Access to information is likely to be through the grantor of the participation instead of directly from the borrower to lender as would be the case in an assignment. See also "Assignments".

PAY-AS-YOU-GO

In the context of structured finance CDS, the settlement mechanism that replicates the exact economics of the underlying cash instrument. The buyer and the seller of CDS make "floating payments" to account for features unique to the structured finance instruments, such as principal writedowns, interest caps (AFC risk), and payment-in-kind (PIK) option.

PAYER (PAYOR) OPTION

The option to buy protection at a preset strike on an underlying reference entity. Also known as buyer options or puts.

PAYMENT-IN-KIND

Provision where the interest on a tranche/security is deferred and instead added to the principal amount of those tranches in order to mitigate a potential default by the tranche and extend the life of the structure.

PERFORMANCE ASYMMETRY

When the risk/reward ratio of an asset is skewed, either towards the upside or downside.

PHYSICAL SETTLEMENT

The settlement of a CDS contract whereby the protection buyer will deliver any deliverable debt obligation to the protection seller upon the occurrence of a credit event.

PROBABILITY-WEIGHTED BREAKEVEN RECOVERY VALUE

The expected recovery value in the event of default, weighted using scenario analysis.

PROTECTION BUYER

The counterparty of the CDS contract that pays premiums to the seller in exchange for protection against a credit event by the issuer. The buyer will either deliver a deliverable bond or make a payment equal to the market value of the bond to the seller and will receive par in exchange in case of a credit event.

PROTECTION SELLER

The counterparty of the CDS contract that receives premiums in exchange for guaranteeing the payment of par to the buyer in the event of default by the issuer. The seller will receive the deliverable bond or a payment equivalent to market value of the bond from the buyer.

PULL-TO-PAR

For a bond trading at either a discount or a premium, it is the tendency for the bond's price to converge to par as it approaches maturity.

RATINGS MIGRATION

The shift of a security or a group of securities from one rating class to another.

RAW BASIS

The difference between the 5-year CDS and the Z-spread of the bond.

RECEIVER OPTION

The option to sell protection at a preset strike on an underlying reference entity. Also known as seller options or calls.

RECOVERY LOCK

A form of recovery swap that isolates recovery risk by pairing a standard (floating recovery) default swap with a fixed recovery default swap. The recovery lock is quoted at a market-implied recovery value, i.e., the fixed recovery rate that is required to make the premiums of both legs the same.

RECOVERY RATE

The value of the deliverable obligation received by the protection seller when a credit event occurs, calculated as a percentage of par.

RECOVERY SWAP

A contract between two parties where the fixed recovery payer agrees to receive the difference between the predetermined recovery rate and the actual recovery rate on the reference obligation in case of a default.

REDUCED FORM MODEL

A credit valuation tool that models a firm's forward probability of default (hazard rate) over any time horizon, typically calibrated to a term structure of credit spreads.

REFERENCE OBLIGATION

The bond or loan specified in a CDS contract, used to determine other deliverable obligations if the reference entity defaults.

REPUDIATION/MORATORIUM

Credit event typically found in CDS contracts referencing sovereigns, whereby the government challenges the validity of one or more of its obligations or temporarily stops making payments on the reference obligation.

REVOLVER/REVOLVING CREDIT FACILITY

The lender commits to make loans to a borrower up to a specified amount for a specified period. The borrower can draw down and repay at its discretion during this time. Revolvers are generally unfunded and mainly used by investment grade borrowers.

RISING STAR

A bond that was originally issued a below investment-grade rating, but has since been upgraded to investment-grade status due to improving credit quality. Opposite of a Fallen Angel.

RISK-NEUTRAL DEFAULT PROBABILITY

Probability of default implied by CDS pricing for a given time period. Said differently, risk neutral default probability results in expected losses that match the present value of CDS premium. See Market-Implied Default Probability.

ROLL DOWN

The return generated solely due to the passage of time for a seller of protection on an upward-sloping curve, assuming no change in the curve. The steeper the curve, the higher the roll down return will be.

RUNNING PREMIUM

The spread paid periodically (typically quarterly) by protection buyers in addition to points upfront. Commonly used in default swaps on issuers with high default probabilities.

SENIOR DEBT

When the debt holder has a senior claim (relative to subordinate claims) on the firm's assets, in the event of default. Can be secured or unsecured.

SHARPE RATIO

Excess return on an investment (i.e., return over the risk-free rate) per unit of risk (as measured by standard deviation of the returns).

SHORT SQUEEZE

A situation where short sellers rush to cover their short positions by buying back the asset. The excess demand drives the price of the asset higher, making it more costly for other short sellers to close out their positions.

SPREAD DURATION

Sensitivity of the price of a corporate security to changes in the underlying credit spread.

SPREAD DV01

The change in value of a corporate security for a 1 basis point change in its spread.

STRADDLE

A combination of options to buy and sell protection at the same strike spread. A long straddle is a view on rising volatility or wide moves in spread.

STRANGLE

This option combination is similar to straddle, but involves out-of-the-money options to buy and sell protection. A long strangle benefits from wide moves in spread, while a short strangle benefits if spreads stay within a narrow range.

STRATEGIC DEBT SERVICE MODEL

A modified structural model that incorporates the equity holders' option to voluntarily default and renegotiate the terms of debt with debt holders to their benefit, if the costs of firm liquidation are high.

STRUCTURAL MODEL

A credit valuation model premised on the concept of default occurring when a corporation's assets fall below its liabilities. Can be used to infer default probabilities and fair market spreads. See Merton-based Model.

STRUCTURED CREDIT BID

The proliferation of investors in synthetic CDOs (sellers of protection), leading to a significant tightening of credit spreads as dealers buy protection from these investors.

SUBORDINATE DEBT

When the debt holders' claim on a firm's assets in the event of default ranks below the senior claims. Can be secured or unsecured.

SUB-PRIME ABS

This refers to securitizations that have an underlying collateral pool of consumer credit with an average FICO score below 660. FICO is a credit score scale that uses a risk-based system to determine the possibility that the borrower may default on financial obligations to the lender.

SUCCESSION EVENT

According to 2003 ISDA Credit Derivatives Definitions, a succession event means an event in which one entity succeeds to the obligations of another entity, such as a merger, consolidation, transfer of assets or liabilities, spin-off or a similar event. However, if the exchange of obligations does not occur in connection with mergers and acquisitions activity as outlined above, that exchange does not represent a succession event.

SUCCESSOR

The new legal entity that a CDS references in case of owner changes for the original reference entity of the CDS.

SWAPTION

An option to enter into a swap. See Payer Option and Receiver Option.

SYNTHETIC CDO

A pool of credit default swaps that is tranched, creating synthetic exposure to multiple reference entities. Effectively, a CDO investor acts as a seller of protection to one or more counterparties.

SYSTEMIC RISK

The risk inherent in the entire market. Also known as market risk, it cannot be diversified away. Opposite of Idiosyncratic Risk.

TARGET LEVERAGE MODEL

A modified structural model that considers that a firm's capital structure can change over time, such that debt level changes in response to changes in the firm's asset value. Empirical studies show that a firm tends to issue more debt as asset values rise.

TRACERS[SM] INDEX

An off-the-run 49-name synthetic index of North American credits launched in 2002.

TRANCHE

A portion of a securitized portfolio of assets. A group of assets are pooled together and then structured to create various securities (tranches) of different maturities and risks. In the credit derivatives market, index tranches are frequently traded. Losses are prioritized by the most-subordinated tranche up to the least-subordinated (most senior) tranche.

TREASURY SPREAD

The spread of a corporate bond relative to its underlying benchmark government bond, calculated by taking the yield to maturity of the corporate bond and subtracting the yield to maturity of the government bond.

UPFRONT PREMIUM

For issuers with a high probability of default, a large part of the protection premium is typically paid upfront and the running premium is much smaller than the par spread. The present value of upfront and running payments is theoretically equal to the present value of par spread.

UPWARD-SLOPING CURVE

When the short end of the curve is at a lower level than the long end of the curve, such that the curve has a positive slope. This shape reflects the increasing risk premium of the security over time.

VARIABLE CAP

A type of settlement mechanism for ABS CDS (under the pay-as-you-go approach) wherein the protection seller compensates the protection buyer for any interest shortfall at Libor plus a spread; the spread is capped at the protection premium applicable for the period. See also "fixed cap" and "no cap."

VOLATILITY SKEW

When options on the same underlying security trade at different implied volatilities. Types of skew can include horizontal skew (when near-term options trade at different implied volatilities than longer-dated options) and vertical skew (when options with different strikes trade at different implied volatilities).

VOLATILITY SMILE

A type of volatility skew where out-of-the-money options and in-the-money options trade at higher implied volatilities than at-the-money options, forming a "smile" shape.

WEIGHTED AVERAGE COST OF CAPITAL (WACC)

The weighted average expected cost of funding from all the sources of a firm's capital. Sources of capital typically include common equity, preferred equity and debt.

WRITEDOWN

In the context of structured finance CDS, a writedown occurs when the reference obligation does not provide for a reinstatement or reimbursement of the written down principal and does not pay any interest until the reinstatement or reimbursement of the principal. A permanent writedown, as determined by the calculation agent, is a credit event. However, writedowns as a credit event are not relevant under the pay-as-you-go settlement mechanism due to the existence of "floating payments." See pay-as-you-go.

YIELD-ON-YIELD SPREAD

See Interpolated Swap Spread (I-Spread).

YIELD-TO-WORST

The yield on a bond reflecting the most undesirable repayment schedule for a bondholder of a callable bond. Typically, will either be equal to the yield-to-call (to the earliest call date) if market yields are lower than the coupon rate, or equal to the yield-to-maturity if market yields are greater than the coupon rate (no prepayment).

Z-SPREAD

A constant spread over the Libor zero curve that equates the present value of a bond's cash flows to its market price.

Z-SPREAD-TO-WORST

A constant spread over the Libor zero curve that equates the present value of a bond's cash flows to its market price, given the most undesirable repayment schedule from a yield perspective for a callable bond. Similar concept to Yield-to-Worst.

Disclosures

Credit Products Rating Distribution Table
(as of February 1, 2006)

	Coverage Universe		Investment Banking Clients (IBC)		
Rating	Count	% of Total	Count	% of Total IBC	% of Rating Category
Overweight	89	40%	41	36%	46%
Equal-weight	108	49%	64	56%	59%
Underweight	23	10%	10	9%	43%
Total	220		115		

Coverage includes all companies that we currently rate. Investment Banking Clients are companies from whom Morgan Stanley or an affiliate received investment banking compensation in the last 12 months.

Analyst Ratings Definitions
Overweight (O) Over the next 6 months, the fixed income instrument's total return is expected to exceed the average total return of the relevant benchmark, as described in this report, on a risk adjusted basis.
Equal-weight (E) Over the next 6 months, the fixed income instrument's total return is expected to be in line with the average total return of the relevant benchmark, as described in this report, on a risk adjusted basis.
Underweight (U) Over the next 6 months, the fixed income instrument's total return is expected to be below the average total return of the relevant benchmark, as described in this report, on a risk adjusted basis.
More volatile (V) The analyst anticipates that this fixed income instrument is likely to experience significant price or spread volatility in the short term.

IMPORTANT DISCLOSURES ON SUBJECT COMPANIES

The information and opinions in this report were prepared by Morgan Stanley & Co. Incorporated and/or one or more of its affiliates (collectively, "Morgan Stanley") and the research analyst(s) named on page one of this report.

Issuer Name: Ford Motor Credit
Fixed Income Research 12-Month History
Issue Type: JPY Sr. Notes
Current Rating: Equal-weight --as of 05/23/2005

Issuer Name: GMAC
Fixed Income Research 12-Month History
Issue Type: JPY Sr. Notes
Current Rating: Overweight --as of 10/01/2005
Previous Rating: --as of 05/23/2005 --Equal-weight

As of January 31, 2006, Morgan Stanley held a net long or short position of US$1 million or more of the debt securities of the following issuers covered in this report (including where guarantor of the securities): Abitibi-Consolidated, Allied Waste, Altria Group, Amkor Technology, AMR, Anadarko Petroleum, Bowater, Calpine, CIT Group, Continental Airlines, Delphi Corporation, Delta Air Lines, Devon Energy, DirecTV Group, Echostar Communications, El Paso, Federated Department Stores, Ford Motor, Ford Motor Credit, Freddie Mac, GMAC, General Motors, Georgia-Pacific, Limited Brands, Lyondell Chemical, Motorola, Neiman Marcus Group, News America Holdings, Nextel Partners, Northwest Airlines, Southwest Airlines, Sprint Nextel, Toys R Us, Unumprovident, Visteon, Walt Disney, Williams Cos. Xerox, and Yum! Brands.

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