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# Credit Volatility Strategist

## Crossover versus Main decompression trade via options

January 2007

### Market commentary: Risk premiums remain high, skews remain steep

With implied volatility lagging the rally in spreads, we expect volatility to decrease as investors turn to the option markets in the short term to take advantage of high risk premiums. For this reason outright long volatility positions to hedge downside credit risk are unattractive. Alternatively, we recommend covered payers and decompression option strategies.

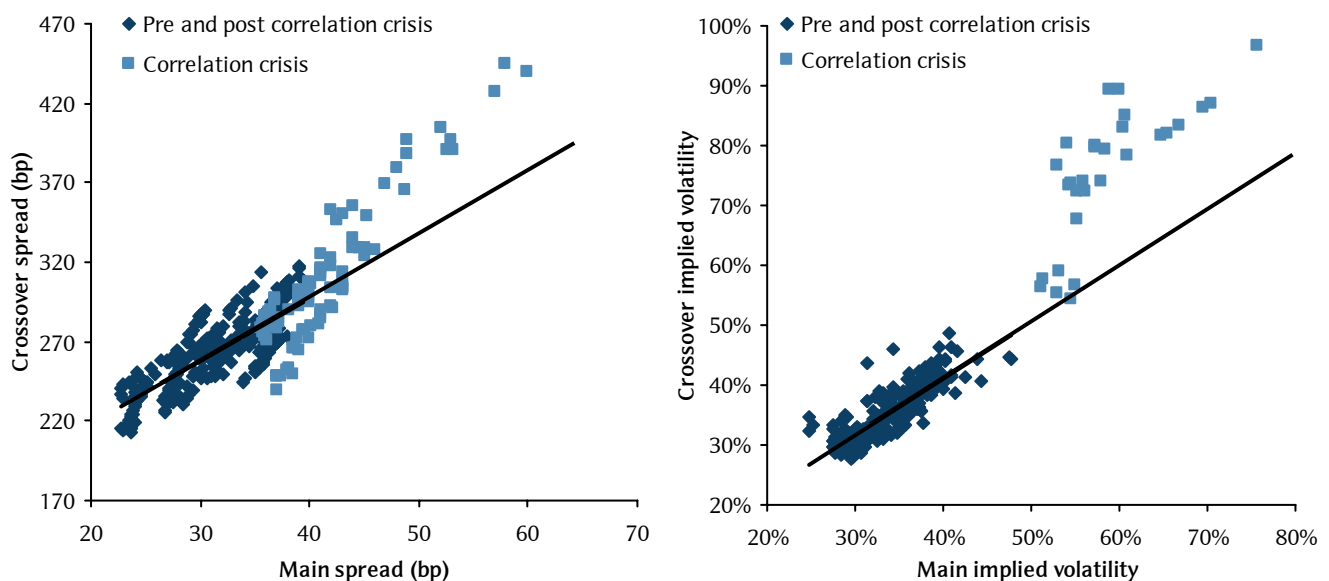
### Trade recommendation: Decompression trade in Crossover versus Main using June options

We recommend funding a long Crossover payer by selling a June payer in the Main index. This trade is flat in a spread rally and is potentially very profitable in a widening scenario as the Crossover index is expected to widen by more than the Main index. Also index volatilities are expected to diverge in a scenario in which volatility rises (eg, May 2005), further contributing to the profitability of the trade. Currently spread and volatility differentials between Crossover and Main indices are very compressed.

### Trade recommendation: Covered payers on Crossover as an efficient short

We recommend that investors buy protection on Crossover and sell OTM payers. This trade should outperform buying outright protection as long as spreads do not widen beyond the strike of the payer; it also offers a more favourable mark-to-market profile. We believe that the steepness of the Crossover volatility skew, along with our forecast that the probability of CDS indices gapping out is low due to structured credit technicals, makes our recommendation compelling.

Figure 1: Index volatility and spread levels diverge in a rising volatility/spread environment



Source: Barclays Capital.

## Summary of views on a one- to three-month horizon

### Key views

- Our core view for 2007 is that we remain in a low volatility scenario. The uncertainty over inflation and growth and record-low risk premiums across asset classes increase the probability of volatility and spread spikes.
- Crossover volatility is too low compared with Main and the skew is too flat. This creates opportunities to implement decompression trades in volatility between low beta and high beta indices.
- As we believe that the remuneration to illiquidity and to tail risk is currently stingy, we recommend primarily executing strategies that either implement a fundamental view or that are expected to benefit from a mispricing.

### Market positioning

#### Relative value

##### Relative value trade recommendations:

- We recommend funding a long Crossover payer by selling a Main June payer. This trade is flat in a spread rally and is very profitable in a widening scenario.
- In the short term, we expect volatility to decrease as investors turn to the option market to take advantage of high risk premiums, as implied volatility is lagging the rally in spreads.
- If the rally in spreads loses momentum, we expect an inversion of the volatility term structure. Market participants would then likely rush to buy short-dated payer options, pushing implied volatility higher.
- We expect the March-June term structure to steepen.

#### Yield enhancement strategies

- Sell low-strike receivers as a yield-enhancement strategy, benefiting from fast time decay.

#### Hedging strategies

- We recommend tranche and option strategies to hedge downside corporate credit risk (see [Top shorts using tranches and options](#), 24 November 2006).
- Outright long volatility positions to hedge downside credit risk are unattractive. We recommend instead covered June payers (due to the steep volatility skew) and also decompression option strategies as alternatives.

#### Correlation view

- Long 10 yr 0-6% delta-hedged and a 5x10 yr equity flattener are our preferred trades.
- 10 yr 22-100% iTraxx spreads are too wide and 10 yr equity too tight compared with the theoretical value implied by the CDX base correlation skew. Since the technical pressure from LSS activity is waning, we recommend selling 10 yr CDX.7 equity protection and buying 10 yr iTraxx.6 equity protection to position for a convergence of the two markets

#### Credit view

- The momentum currently driving markets tighter is likely to prevail until end of January/February as the technical (strong CDO activity) and fundamental backdrop for credit markets remains supportive
- In the first quarter the main risk to this forecast is that Q4 earnings and LBO risk surprise markets negatively

## Highlights

- In the short term, we expect volatility to decrease as investors turn to the option market to take advantage of high risk premiums, as implied volatility is lagging the rally in spreads.
- For this reason outright long volatility positions to hedge downside credit risk are unattractive. Alternatively, we recommend covered payers and also decompression option strategies as alternatives.
- We expect the March-June term structure to steepen.
- If the rally in spreads loses momentum, we expect an inversion of the volatility term structure. Market participants would then likely rush to buy short-dated payer options, pushing implied volatility higher.

## Market update

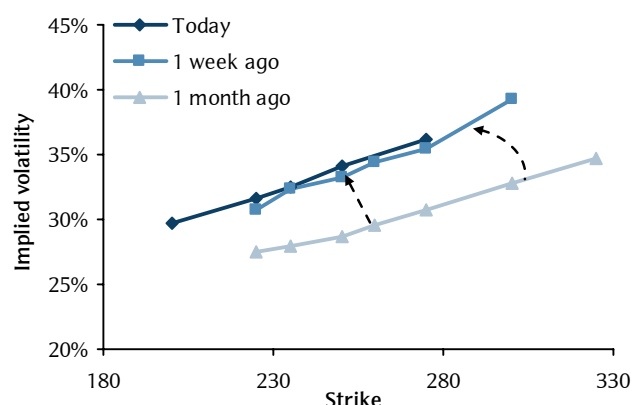
### Implied volatility up, skew steeper, term structure normalized

- Implied volatility is up 2% over the month and realized volatility down by 1%, thus increasing volatility risk premiums by roughly 3% (Figure 13).
- As implied volatility increased, the skew steepened in Main and particularly in Crossover – Figure 2.
- Across iTraxx Main, HiVol and Crossover, the volatility term structure steepened significantly between Dec and Mar over the past months – Figure 3. This development has been in line with our belief that investors rush to drain premiums out of the front contract to position for the end-of-year rally, while bidding up for March protection as investors re-loaded their shorts at the beginning of the year.
- The current term structure for the Main index (Figure 13 Panel A) is very steep between Feb/Mar and very flat between Mar/Jun.
- One reason for the term structure kink (Figure 3) around March could be concerns over the rolling of CPDOs, see our discussion in *Implications of the growth of the CPDO market*, 09 November 2006. Given the volume of CPDOs that have gone through, we believe such concerns are unwarranted. There is thus no reason for March vol to trade as high as currently.
- In the medium term, we would expect the term structure to normalize further, with a smoothly increasing volatility term structure.

### Unless the current rally losses steam, we expect implied volatility to come down

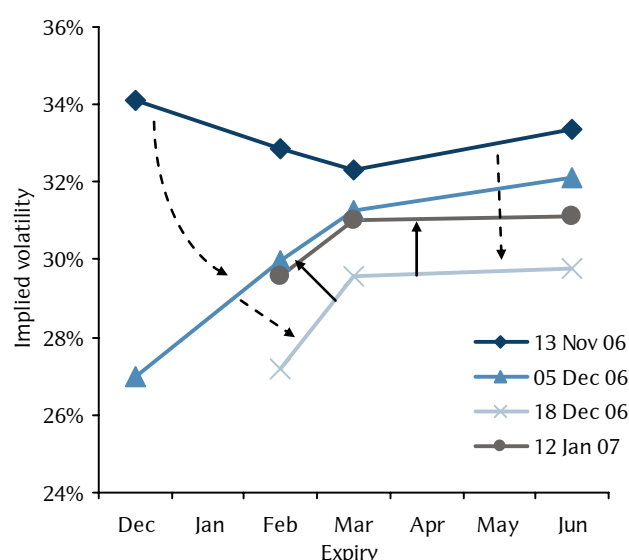
- As we expect the current strong momentum in credit markets to continue, we expect investors to turn to the option market to take advantage of currently high volatility risk premiums. This should drive implied volatility lower.
- This upbeat view is based on our view that the technical (strong CDO activity) and fundamental backdrop for credit markets remains supportive.
- In the first quarter the main risk to this forecast would be a Q4 earnings surprise or LBO announcement.
- Also we believe that the risk of volatility spikes has risen. This is because uncertainties over inflation and growth are making the forecast of the direction monetary policy

Figure 2: A steeper skew in the Crossover index



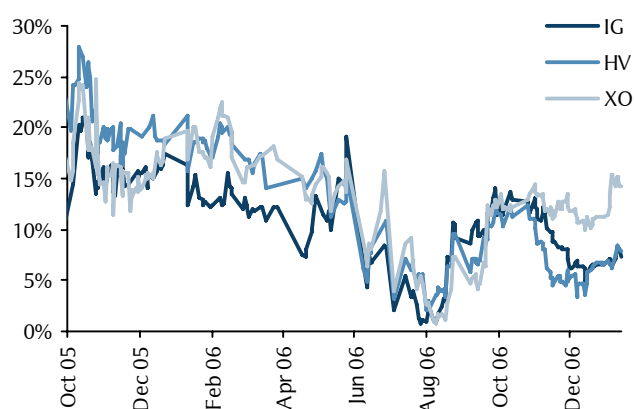
Source: Barclays Capital. Note: Calculations are as of 12 January 07.

Figure 3: The ITX term structure has normalized



Source: Barclays Capital.

Figure 4: 3-month volatility risk premiums



Note: We define the volatility risk premium as the difference between implied ATM volatility and realized volatility over the past three months. Source: Barclays Capital.

over the next few months uncertain. This and the fact that most asset classes remain at high levels and that risk premiums across asset classes are abnormally low makes us believe that the probability of spikes in realized volatility has risen.

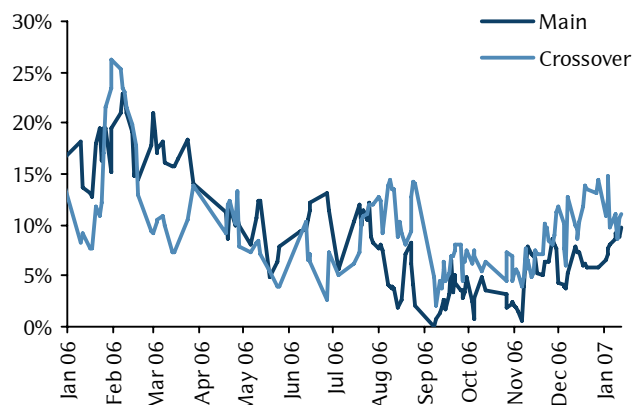
- In a widening spread scenario we would expect investors to buy short-dated volatility, which in turn would **invert the term structure**. This is a **systematic phenomenon** in credit options markets, as discussed in *The volatility skew and its term structure – an empirical investigation*, 01 November 2006.

### Basis for trade ideas

These are the areas that we believe currently offer the best opportunities:

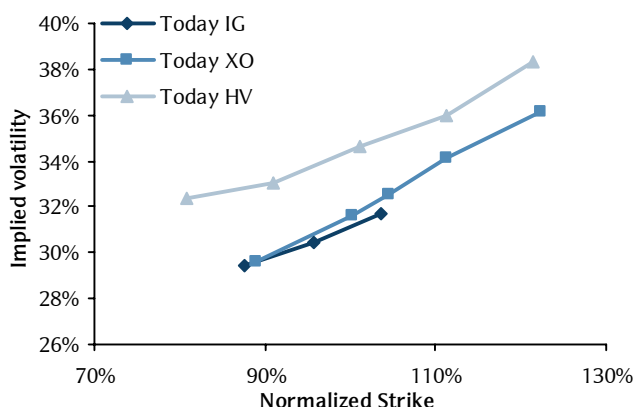
- 1) **Risk premiums (implied minus realized volatility) remain high** (Figure 14). The corollaries of these are: when implementing shorts, buying options outright is not recommended; selling volatility offers generous risk premiums in the option market.
- 2) **The volatility skew and volatility risk premiums are very similar for the Crossover and Main indices** – see Figure 6 and Figure 5. This is characteristic of a low volatility regime and is exploited in the trade idea that is presented in the next section. The current pattern contrasts with our belief that Crossover is more likely to experience jumps in spreads (steeper skew) and should gap out more in time of distress (higher volatility). Further, in our view the CPDO bid is likely to support the Main index.
- 3) The skew (difference in implied volatility for at-the-money and out-of-the-money options) is steep on an absolute basis (Figure 5).

Figure 5: Volatility skews of iTraxx Main and Crossover



Source: Barclays Capital. Note: We define the volatility skew in percentage term as the 110% strike minus 90% implied volatility divided by the ATM (100% strike) implied volatility. We define the strike in percentage terms as the strike of the option divided by the forward spread at expiry.

Figure 6: 3-month volatility skew – Main/Crossover/HiVol



Source: Barclays Capital. Note: Calculations are as of 12 January 07.

## Trade recommendation – A Main / Crossover decomposition trade via options

### Rationale

- We recommend funding a long Crossover payer by selling a Main June payer. This trade is flat in a spread rally and potentially very profitable in a widening scenario.
- The catalyst to implement this trade is that spread and volatility differentials between Crossover and Main indices are very compressed.
- If the market rallies, the two options should expire worthless. In a stressed scenario the trade should make money if the Crossover market sell-off by more than 7.7 more than the Main index (on average this beta is of 8.4).
- If spreads in the Main index widen by 10 bp by June 20 and Crossover spreads widen 8.4 more, the trade would generate 24 bp of profit on the notional of the long leg, or a return on the of 100%.
- Also index volatilities are expected to diverge in an scenario in which volatility rises, eg, in an scenario similar to May 2005
- Hence the profitability of the trade would be higher if volatility AND spreads decompress and the trade is closed before expiry.

### Risks

- If spreads tighten further, both sets of options expire worthless and the investor loses the initial outlay.
- The main risk to the trade is a spread widening in Main combined with a further compression between Crossover and Main: If the Main index widens significantly but the Crossover does not, the trade can suffer severely.
- The trade also has exposure to volatility risk: If implied volatility on Main increases while implied volatility on Crossover drops, the trade will suffer mark-to-market losses.

### This trade outperforms a decompression trade via indices

A strategy that buys CDS protection on Crossover and sells protection on iTraxx is inferior because such a package:

- 1) Has significant negative spread convexity.
- 2) Has significant downside, while the downside of the option trade is limited to the initial outlay.
- 3) Has a less stable mark-to-market profile.

### Comparison to other shorts

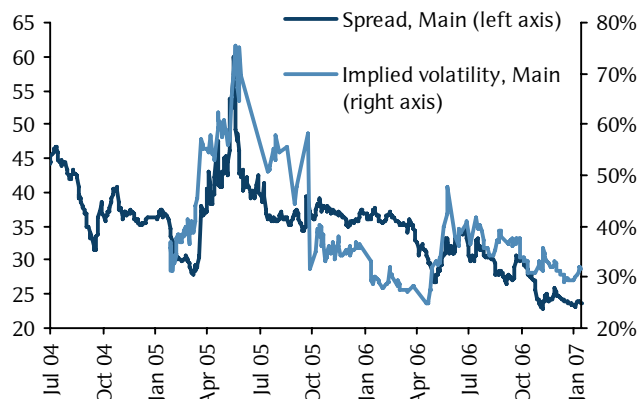
- Why is the decompression trade not costless? There are two reasons. First, a conservative estimate for the beta is 8.4 while the ratio of prices is 1:9. Taking negative spread convexity due to different levels of DV01 in the two indices into account, the ratio has to be somewhat lower than 8.4. Only if the investor is confident that the realized beta will be above 9 should the trade be implemented on a costless basis.
- Second, even assuming a lack of decompression, the trade should be profitable – the payoff profile being similar in spirit to a payer spread (buying payer options, selling further OTM payer options). Therefore, the cost should be compared with the cost of a payer spread. In addition, payer spreads will not benefit from a decompression in spreads and volatility.

### Decompression trade in Crossover vs. Main

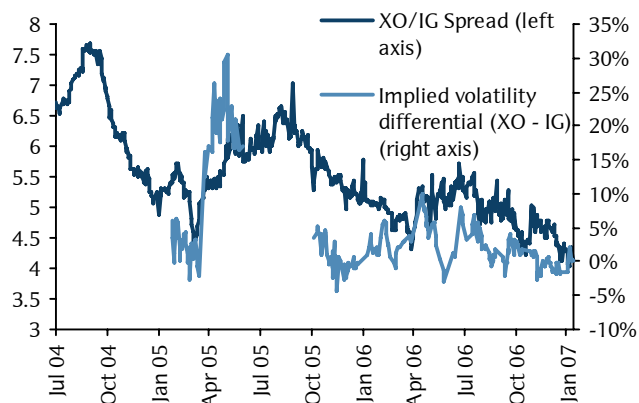
Buy €100m 20 June 2007 Crossover payers with strike 250 at 67 bp  
 Sell €600m 20 June 2007 Main payers with strike 28 at 7.4bp  
 The trade costs €230k

**Figure 8: In a tightening market, Crossover and Main spreads and volatility compress**

Panel A: As spreads rally, implied volatility decreases



Panel B: The ratio of Crossover and Main spreads and implied volatility differential decrease



Source: Barclays Capital. Note: We show the 3-mth ATM implied volatility for Main and the difference between Crossover and Main, the "implied volatility differential". As a measure of compression in spreads, we show the ratio of Crossover to Main spreads.

## Analysis

Below we discuss five aspects of this trade:

- 1) **Rationale.**
- 2) **Trade implementation.**
- 3) **Payoff profiles at expiry.** We examine the sensitivity of the payoff to the ratio at which spreads in the Crossover index move compared to the Main index (the “beta”).
- 4) **Mark-to-market risk.**
- 5) **Risks to the strategy**

### Rationale – time to implement decompression trades via options

- European CDS index markets have witnessed a compression of spread differentials between the iTraxx Main and Crossover indices (Figure 8, Panel A) and volatility levels (Figure 8, Panel B) over the past few quarters.
- This phenomena, which is common to equity derivatives markets, is natural: as spreads tighten and volatility drops, **risk premia compresses** across markets.
- **Index volatilities diverge in a rising volatility scenario:** as we have documented in the past – see [Hedging systemic risk via option markets: long XO straddle, short HV straddle](#), 01 November 2006 – implied volatility in Crossover gapped out relative to Main volatility.
- In periods of significant spread widening, the beta of Crossover with respect Main tends to increase, ie, the high beta index tends to widen proportionally more. We find evidence for this in the correlation crisis of early 2005 (Figure 1).
- **In sum, compressed volatility and spread differentials and the likelihood that index and volatility levels diverge in a rising volatility environment creates an opportunity to implement an efficient short volatility position.**
- In addition our recommended trade would benefit from any LBO stories of names in Crossover while LBOs in Main should have negligible effect.

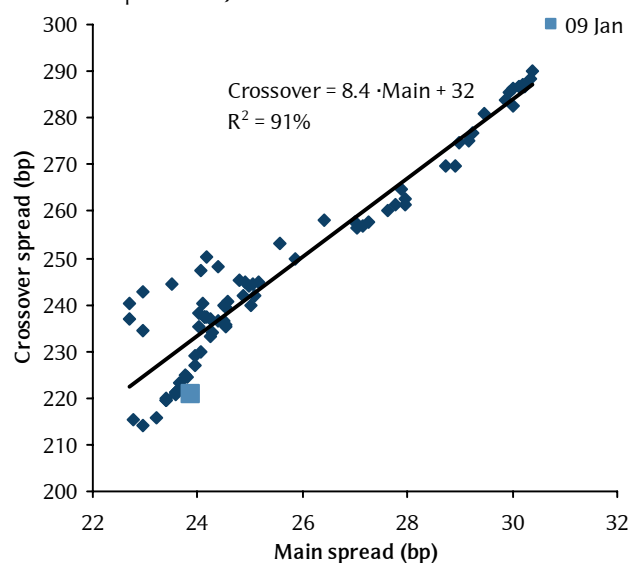
### Trade implementation

In implementing the trade, we go through several steps:

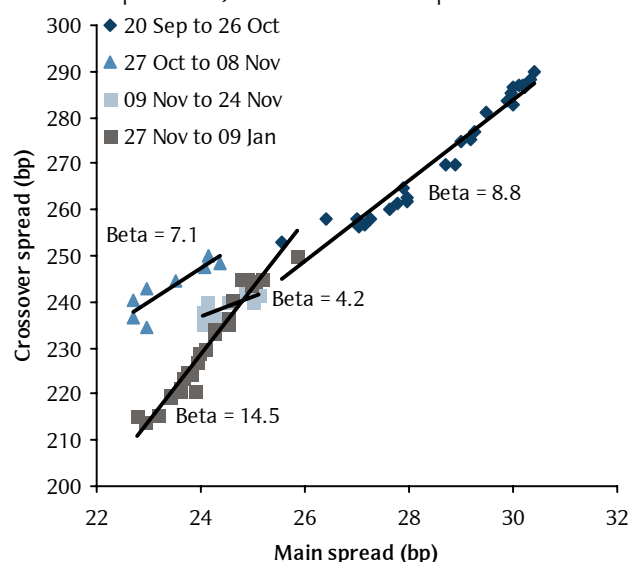
- 1) Calculate the historical beta between the iTraxx Main and the Crossover index – 8.4 for (Figure 9 Panel A).
- 2) Pick the strikes of the payer options – we pick 28 (spot 24) for Main (this is the further out-of-the money payer option available and 250 (spot 216) for Crossover. By picking Crossover options with a strike of 250, the two sets of options will be ATM at the same time, if beta is indeed 8.4.
- 3) Pick the ratio of notionals of the two legs of the trade. We pick 1:6. Because the Crossover payer costs 67 (at mids) and the strike 28 payer in Main costs 7.4 (at mids). To be costless, we would have to sell 9 options on Main for each option bought on Crossover.
  - Because the beta is only 8.4 (and because of convexity, discussed in detail below), the trade would not be profitable in a widening scenario. Only if we are prepared to assume that the beta will indeed be significantly higher

**Figure 9: Crossover vs. Main beta, iTraxx.6**

Panel A: 20 Sep 06 to 09 Jan 07



Panel B: 20 Sep 06 to 09 Jan 07 broken into sub periods



Source: Barclays Capital.

#### Profit and loss in decompression trade – an example

We want to calculate the profit or loss at expiry from our decompression trade assuming Main spreads widen 10 bp and beta between Crossover and Main is 8.4.

- Main spreads widen 10 bp and are now at 34. We are short payer options with a strike of 28 and a DV01 of 4.1. We thus lose  $25 = ((34-28) \cdot 4.1)$  for every option. We have written six of these, so we lose 148.
- With a beta of 8.4, Crossover spreads widen 84 and are now 300. We exercise our long payer option with a strike of 250. At a DV01 of 3.9, we make a profit of  $195 = (300-250) \cdot 3.9$ .

The trade at the outset cost us 23 bp so in total, the profit is  $24 = (195-148-23)$ .



would a costless structure be prudent. Instead, we opt for a ratio of 1:6.

- With this ratio, the package has an upfront cost of €230k for €100mn notional invested in the Crossover payer. This choice of ratio also allows the trade to outperform even if the realized beta does not increase beyond the current beta.

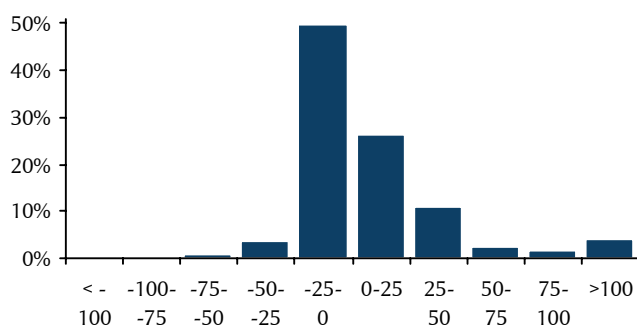
### Decompression trade profits if spreads widen

- Figure 10 Panel A shows the profit and loss profile of our trade at expiry for different betas. A spread widening of Main to 50 bp will result in a net profit of 122 bp on 20 June 2007 (see the box below for a worked example of how to compute the profit and loss of this trade).
- If instead the Crossover beta increases as spreads widen, as we expect, the trade would be more profitable. If the beta is 10, the trade will not yield 264 bp.
- The main risk to this trade is that the Crossover beta is lower than expected. If the actual beta is 7 instead of 8.4, the trade will lose (net of initial cost) between 4 and 44 bp as long as Main spreads are between 24 and 84. However, it is hard to imagine a case where this happens.
- Figure 10 Panel B shows the payoff of a decompression trade via CDS indices in which the ratio of nationals is 1:6.8 – by using this ratio the cost of carry is equal to the cost of the option strategy that we recommend.
- For almost any combination of spread change/realized beta, the index version of the trade underperforms the option version. This is in part because, unlike the option trade, the index trade does not have limited downside. Secondly, the duration of the Crossover index is lower than that of the Main index and decreases faster. This induces significant negative spread convexity.

### Reconstructed historical profit and loss distribution

- We have back-tested our strategy since December 2004 by calculating the one month profit and loss histogram of this trade (Figure 7). Not surprisingly this strategy lost money most of the time as volatility and spreads compressed as documented in Figure 8.
- When the trade is profitable it tends to be very profitable – such as in May 2005 or when spreads generally widen fast.
- This confirms that decompression trades are good shorts: They have very little tail risk (admittedly in sample) and can provide significant upside in periods of distress.

**Figure 7: Historical distribution of monthly returns of decompression trade since December 2004**

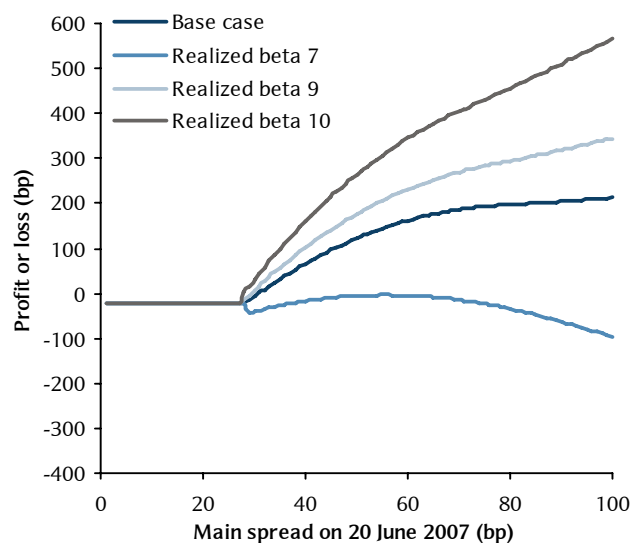


Source: Barclays Capital. Note: We calculate the monthly profit and loss for 6-mth trades where we buy 115% strike payers on Crossover and sell 115% strike payers on Main at a zero cost at inception.

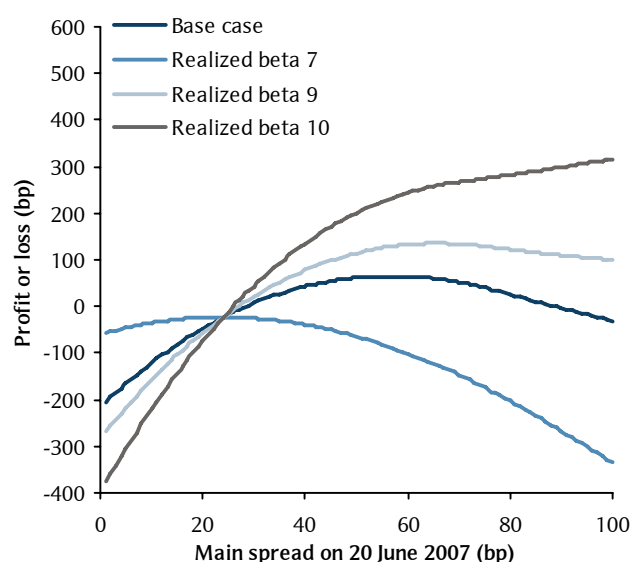
**Figure 10: Payout profiles of decompression trades via options or CDS indices, 20 June 2007**

Profit and loss shown in bp of notional of long Crossover payer

Panel A: Buy Crossover strike 250; sell 6x Main strike 28 payer options



Panel B: Buy Crossover protection; sell 6.8x Main index protection



Source: Barclays Capital. Note: All calculations are net of cost of carry and options premiums funded at Libor. Our base case for the beta between Crossover and Main is 8.4. We show profit and loss in bp of the notional of the long Crossover payer. All calculations are as of 9 January.

## Decompression trades via options have stable mark-to-market profiles

- Figure 11 Panel A shows this stability. In contrast, the decompression trade via CDS indices has significant downside and lower upside than the option-version of the trade.
- This relates to our two points discussed above: The CDS version of the trade has more downside and suffers from negative spread convexity.

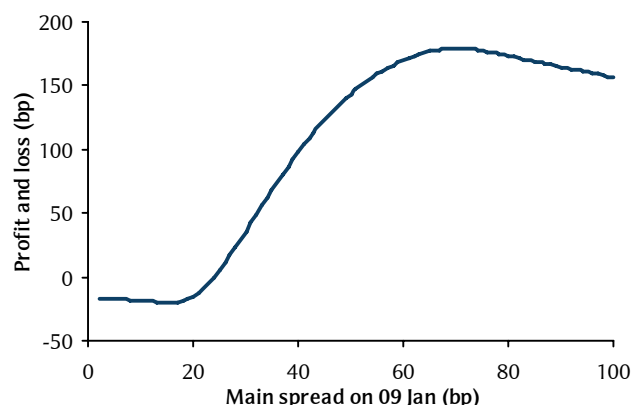
### Main risk to the trade

- A situation in which the Main widens 10 bp but with a beta of only 5, such that Crossover widens by 50 would be the worst-case scenario: at inception this would generate a loss of 96 bp for the index version and 59 for the option version.
- We have seen such a decoupling in late 2006 when hype regarding the issuance of CPDOs (*The CPDO-driven rally*, 09 November 2006) caused Main to rally, Crossover only responding vaguely (Figure 9 Panel B).
- Granted, this kind of decoupling would have benefited our decompression trades since a) our long leg rallied and b) our short leg moved only little.

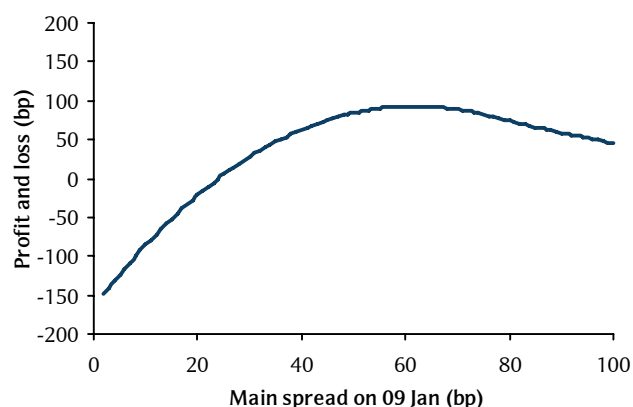
## Figure 11: Mark-to-market profile after inception for decompression trades via options and indices

Profit and loss shown in bp of notional of long Crossover payer

Panel A: Buy Crossover strike 250; sell 6x Main strike 28 payer options



Panel B: Buy Crossover protection; sell 6.8x Main index protection



Source: Barclays Capital. Note: All calculations assume a beta for Crossover of 8.4 and that implied volatility remains constant. Current spot is 24 bp. All calculations are as of 9 January.



## Trade recommendation – Covered payers as an efficient short

### Rationale

- The trade outperforms an outright short for two reasons: its lower mark-to-market volatility and the fact that if spreads tighten it does better.
- The entry point for this trade is good as the volatility skew is steep and investors can be paid generously for selling OTM options, see Figure 6.
- The profit of the trade at maturity is capped at 252 bp: if spreads widen significantly, above the strike of the payer, the options are exercised against the investor. This means that any further profit generated from the short index position are lost from the exercise of options.
- We believe that structured credit technicals are likely to keep corporate credit indices from gapping out significantly.

### Risks

- There are two downsides to the trade. If spreads keep rallying, the investor will suffer mark-to-market losses at a rate similar to having bought outright protection in the index.
- Having sold out-of-the-money options, the investor will suffer mark-to-market losses if implied volatility increases and/or the implied volatility skew steepens.

### Discussion

- We show the payoff profile at expiry (20 June 2007) of covered payers and an outright short in Figure 12 Panel A. In case spreads tighten, both covered payers and outright shorts lose money. However, in a covered payer, the investor pockets the premium for the sold options. This means that the loss for a covered payer will always be below that of an outright short.
- An intuitive way to think about this is that by entering into a covered payer, the investor gets paid money now (the premium) for agreeing to take profits if spreads widen to a predetermined level (the strike).

### Covered payers have lower mark-to-market risk

- In a covered payer, the investor is short the CDS and short the option. As spreads move before expiry, these two contracts have offsetting effects, reducing mark-to-market volatility. We illustrate this in Figure 12 Panel B, showing the mark-to-market profile for an outright short and covered payers as spreads move immediately after inception of the contracts.
- The covered payer is exposed to change in implied volatility, but only to a marginal extent. Having sold options, covered payers suffer from a mark-to-market perspective if volatility increases further. This exposure, however, is very small compared to the exposure to spread movements. For example, for a covered payer with a strike of 300, if volatility increases 1% after inception of the contract, the mark-to-market loss on the covered payer is 1.7 bp. The covered payer experiences the same mark-to-market loss if spreads tighten by 0.5 bp. This means that volatility exposure is small indeed, the spread being the dominant factor and the covered payer being a directional bet indeed.

### Recommendation: Crossover covered payer

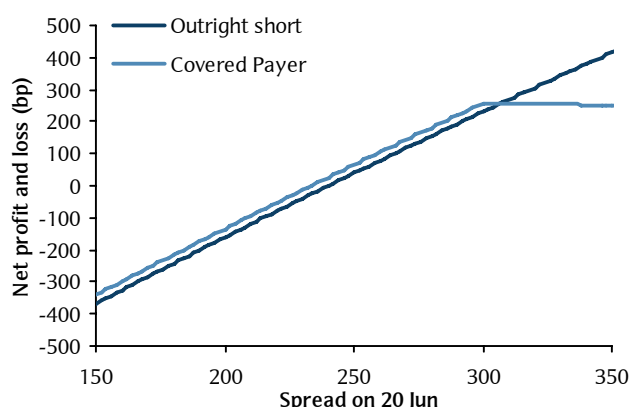
Buy €10m protection in the Crossover index

Sell €10m 20 June 2007 Crossover payers with strike 300

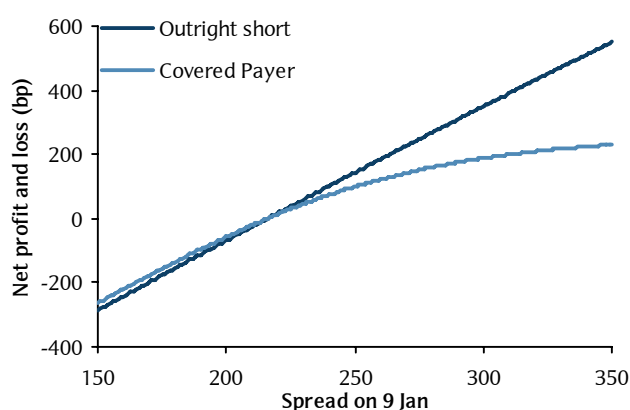
**Figure 12: Comparing outright shorts and a strike 300 covered payer on Crossover**

Profit and loss shown in bp of notional

Panel A: Payoff profile at expiry



Panel B: Mark-to-market profile at inception



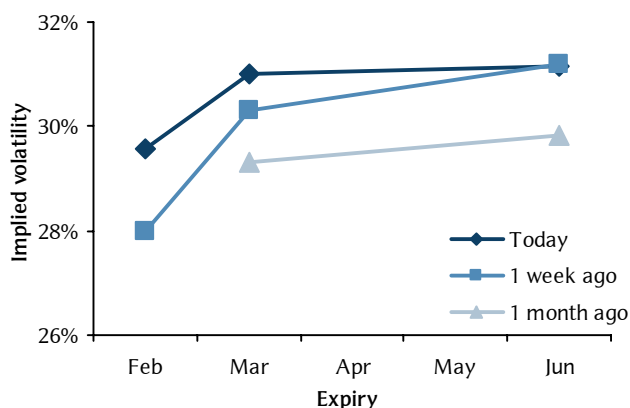
Source: Barclays Capital. Note: The payoff profile at expiry includes cost of carry and upfront premiums funded at Libor. All calculations are as of 9 January.

Figure 13: Index spread levels and volatility for 3 mth at-the-money forward options

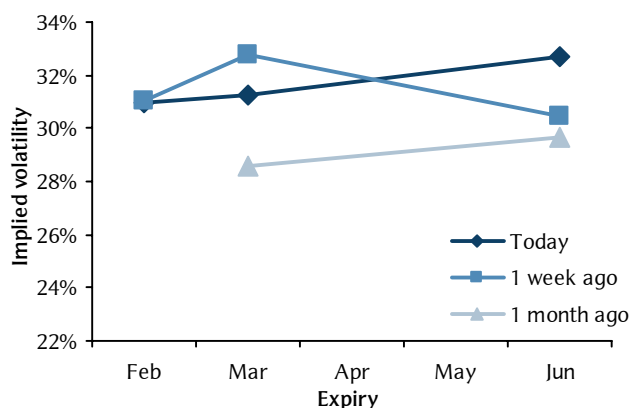
	Spread			Implied 3 mth Volatility			Realised 3 mth Volatility		
	Current	Change		Current	Change		Current	Change	
		Week	Month		Week	Month		Week	Month
Main	23.6	-0.3	-0.4	31.1%	0.7%	1.8%	23.8%	-0.4%	-0.6%
HiVol	46.5	-0.5	0.0	34.4%	1.6%	2.9%	26.5%	-0.2%	-1.5%
Crossover	212.9	-7.8	-17.1	31.6%	-1.0%	3.1%	17.4%	0.1%	-1.2%

The term structure of implied volatility for at-the-money 5 yr iTraxx options

Panel A: iTraxx Main Index

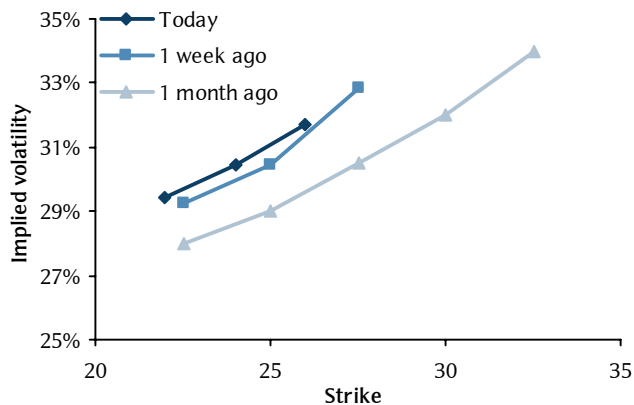


Panel B: iTraxx Crossover Index

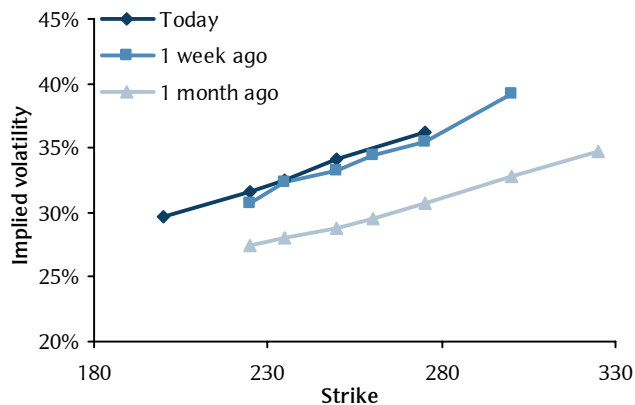


Volatility skew for 3 mth 5 yr iTraxx options

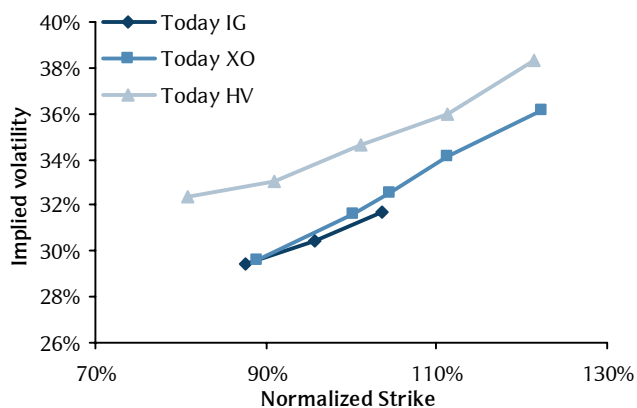
Panel C: iTraxx Main Index



Panel D: iTraxx Crossover



Panel E – Normalized skew – 5 yr iTraxx Main and Crossover Panel F – 5 yr iTraxx main and Crossover spreads

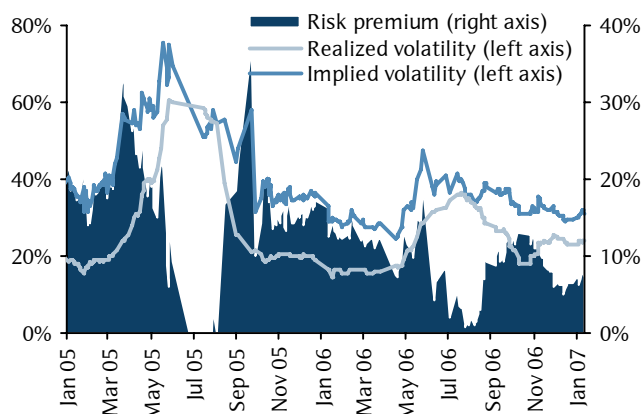


Note: Levels are as of market closing 12 January 2007. See the note in the next page. Source for all graphs on this page: MarkIt, Barclays Capital.

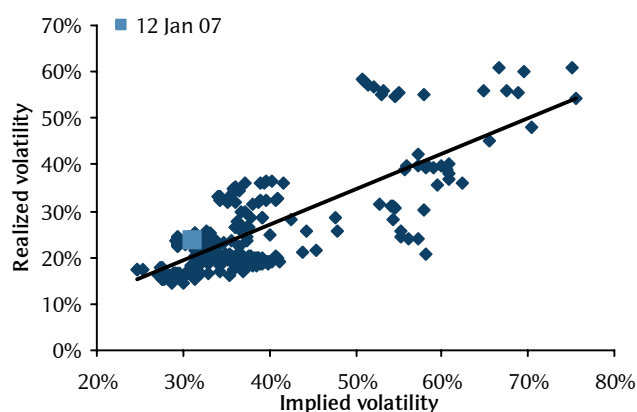
Figure 14: Volatility monitor

3 month at-the-money realized and implied 5 yr iTraxx volatility

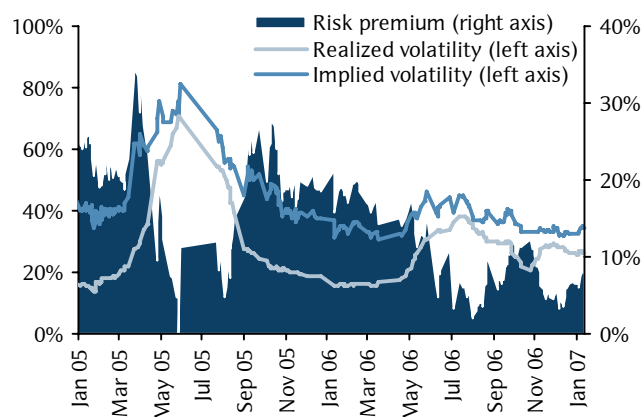
Panel A: iTraxx main index



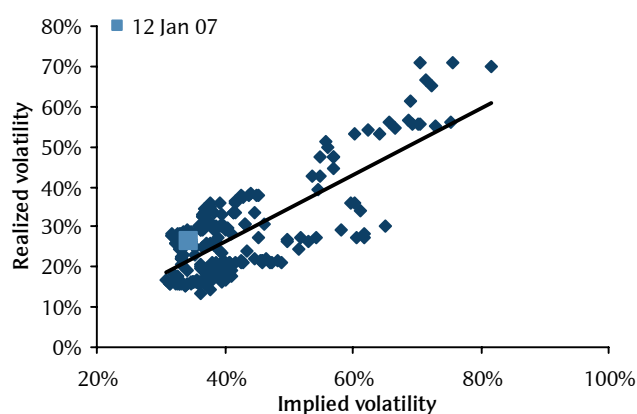
Panel B: iTraxx main index



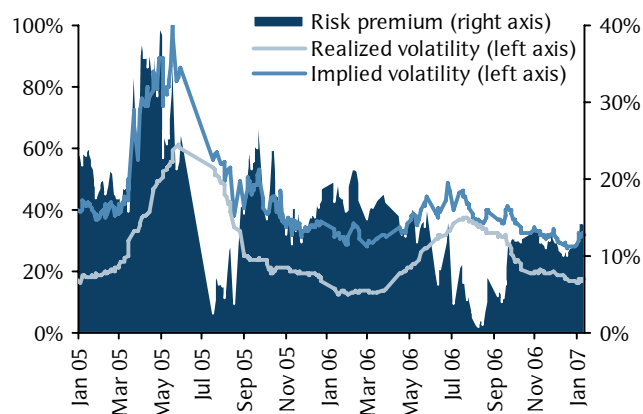
Panel C: iTraxx HiVol



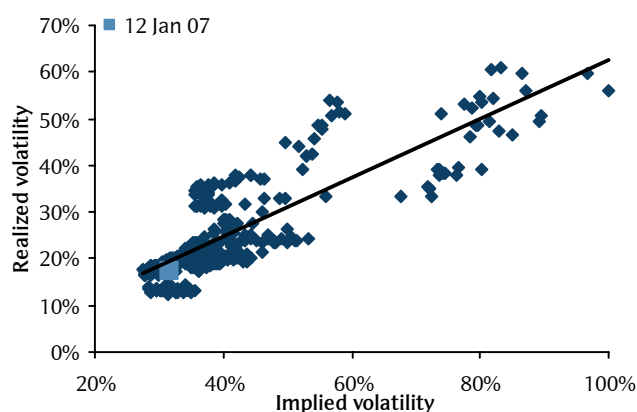
Panel D: iTraxx HiVol



Panel E: iTraxx Crossover



Panel F: iTraxx Crossover



Levels are as of market closing 12 January 2007. Implied volatility is the volatility implied by the market price of a 3 mth at-the-money forward option. Realised volatility is the annualized standard deviation of the daily changes in the underlying index spreads, calculated over the past three months. Normalized strike is the strike of the option divided by the 3 mth forward level of the spread of the underlying index.

Source for all graphs on this page: MarkIt, Barclays Capital.

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