

Vol is Low, Sell it Anyway, Part 2

How to optimally enhance cash returns using covered calls

- **Cash portfolio returns can be significantly boosted by selling credit call options** – An overweight cash position combined with a short credit receiver option (i.e. a covered call) can be a good source of alpha because volatility is almost always overpriced in credit option markets, as we can observe from historical data.
- **The option position can be sized in terms of “equivalent index notionals”** – We use the underlying index notional as a common denominator for sizing the option position in risk terms. Converting to equivalent index notional involves adjusting for the option delta, duration mismatches between cash and synthetic indices, and the beta between the two. The frequent variations in beta can complicate the calculations.
- **Deeper OTM receiver options provide better returns on a risk adjusted basis** – We find that for the same risk in terms of equivalent notional, low delta receivers (deep OTM) are more profitable than high delta ones. However, investors may be limited in their ability to sell very deep OTM receivers due to the floor imposed by transaction costs.
- **Shorter dated options can provide better returns by leveraging “gamma”** – The greater sensitivity of shorter dated options to large spread moves (or gamma) can result in higher returns compared to longer dated options.
- **Selectively rolling the receiver option on expiry can improve performance** – Investors can significantly increase P&L by using the index spot and volatility levels to decide when to get into a new option position. We find that such a strategy produces significantly higher P&L compared to one that always rolls the option leg upon expiry.

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Selling receivers can generate alpha....

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We have recently written about the advantages of writing “covered calls” in credit (see [Vol is Low, Sell It Anyway, Part 1 - “Covered” call strategy with an intriguing payoff profile](#)). In such a strategy, an investor combines an overweight long cash credit position with a short option position by selling receivers on a synthetic credit index. The premium collected can enhance returns for the following reasons:

1. The difference between implied and realized volatility (called the Volatility Risk Premium) can be significant in credit option markets (see [Profiting from the Credit Volatility Premium - Selling credit volatility can be consistently profitable even after paying bid-ask](#)). In other words, the option seller is usually over compensated for taking on spread volatility risk.
2. The “asymmetry” related to the basis between cash and synthetic spreads – at this time, we believe that cash credit spreads have more potential to tighten compared to synthetic credit spreads. This should disproportionately benefit a long cash, short receiver option position.
3. Implied volatility in credit, while still low by historical standards, seems to have found a floor recently (see Figure 1) – going forward, we believe that there is a significant chance of implied volatility ticking higher. This should make receiver selling even more attractive in the coming months.

Figure 1. Implied volatility for CDX IG has found a floor recently (red line). Both 1 month and 3 month implied volatilities have been ticking up.



Source: Citi Research

....But how does it work, exactly?

Now let us consider an investor who would like to execute this strategy. In the rest of this report, we try to address some of the issues related to a successful implementation of this “covered call” strategy. In particular, we try to answer the following questions.

1. How should the investor size the option trade? When holding a long cash portfolio, how much face notional of receiver options should the investor sell?
2. When selling a receiver option, at what spread/price should the investor strike the option? Does it make sense to sell ATM options (higher premiums) or OTM options (lower risk of payout on expiry)?
3. What kind of option maturity works best for such a strategy? Should the investor prefer selling shorter dated options (faster decay in time value for the holder) or longer dated ones (more premiums for the same sensitivity to spreads)?
4. Should the investor roll the short receiver option position always upon expiry? Or is there a way to choose when to roll versus when to stay neutral on the option leg in order to maximize returns?

Key Point: It is important to understand the mechanics of selling receiver options to successfully implement an optimized “covered call” strategy in credit. Specifically, we think it is important to optimize the trade in terms of notional size, strike, and option maturity. Selectively rolling the option leg upon expiry can also be important.

Sizing the receiver trade is not difficult....

The first question that our hypothetical investor will need to answer is how much face notional of receiver option should be sold? We have touched briefly on this in Part 1 of this series (see [Vol is Low, Sell It Anyway, Part 1 - "Covered" call strategy with an intriguing payoff profile](#)), and we delve into a little more detail in this section.

We believe that the best way to size the receiver option trade is to understand it in terms of risk. To do so, we convert all notionals to a common denominator – in our case, this shall be the synthetic index underlying the receiver option. We then define a risk budget in terms of this “equivalent index” notional and size the receiver trade accordingly.

STEP 1:

$$\begin{array}{lcl} \text{Market} & * & \text{Portfolio} = \text{Overweight} \\ \text{Overweight} & \text{Size} & \text{Notional} \\ 5\% & * \$100 \text{ MM} & = \$5 \text{ MM} \end{array}$$

STEP 2:

$$\begin{array}{lcl} \text{Duration} & * & \text{Overweight} = \text{Duration} \\ \text{Ratio} & \text{Notional} & \text{Adj Notional} \\ (6.99 / 4.92) & * \$5 \text{ MM} & = \$7.1 \text{ MM} \end{array}$$

STEP 3:

$$\begin{array}{lcl} \text{Duration} & * & \text{Cash/IG} = \text{Equivalent} \\ \text{Adj Notional} & \text{Beta} & \text{CDX Notional} \\ \$7.1 \text{ MM} & * 0.21 & = \$1.5 \text{ MM} \end{array}$$

STEP 4:

$$\begin{array}{lcl} \text{Equivalent} & \div & \text{Receiver} = \text{Receiver} \\ \text{CDX Notional} & \text{Delta} & \text{Notional} \\ \$1.5 \text{ mm} & \div 20\% & = \$7.5 \text{ MM} \end{array}$$

To take a concrete example, consider an investor with a \$100MM portfolio. If the investor is overweight 5% cash of a \$100MM portfolio, the size of the overweight position is \$5MM.

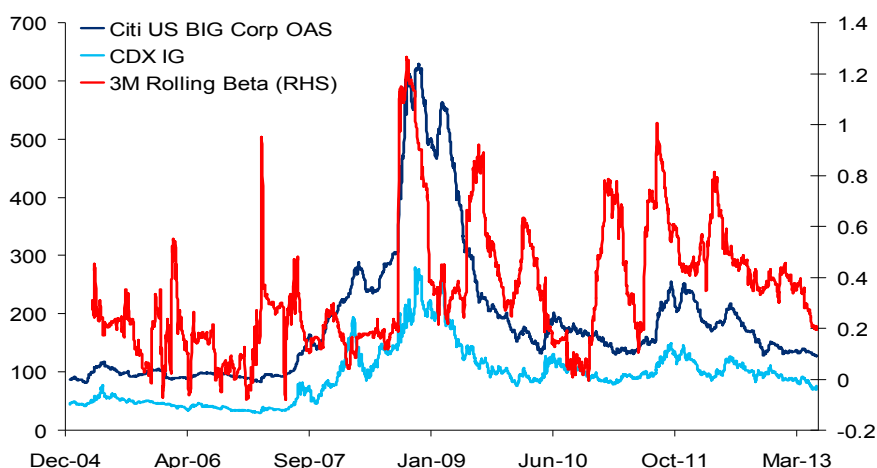
Let us also assume that the investor wishes to sell receiver options on the CDX IG index. The current duration of the cash portfolio is 6.99 and that of the CDX IG index is 4.92¹. The current 3 month rolling beta of the cash index spread to the CDX IG spread is approximately 0.21.

Adjusting for the beta and duration, we compute that the “equivalent index” notional for the overweight cash portfolio is \$1.5MM. The steps are shown on the left. Now let us assume that the investor is selling a 20% delta receiver option on the CDX IG index. In that case, the value of the option changes by 20% of the change in the underlying index – i.e., the face notional required for the option position is \$7.5MM.

....The trick is in choosing the right beta

The calculations seem relatively simple this far – so where is the catch? The problem is in computing the betas! It is important that the beta accurately reflects the relative moves of synthetic versus cash going forward, otherwise the investor will end up significantly over- or under-weight risk on the option leg.

Figure 2. Cash and synthetic credit spreads, with 3M rolling betas – note the high variation in beta over time.



Source: Markit, Yieldbook, Citi Research

¹ The duration calculations use EOD prices as of 20-May-2013. The duration of the cash index is from Yieldbook.

There are two issues related to beta selection. First, there is the question of the length of the look back period for computing the betas. In our example, we have used 3 months as the look back period, but is that appropriate in all cases? As a rule of thumb, we will set the look back period equal to the time to option expiry – i.e., for a 3M option (say), we will use a beta computed over the past 3 months.

Even then, as we see from Figure 2, there is considerable volatility in the 3 month rolling beta which makes it difficult to decide what value to use. We think that the beta selection should reflect the spread/volatility regime that we expect going forward. In our case, we expect both spreads and volatility to be range bound going forward, but on the low side – in some sense, a regime very similar to the past few months. We therefore advocate using a beta that is the average of the rolling betas for past month.

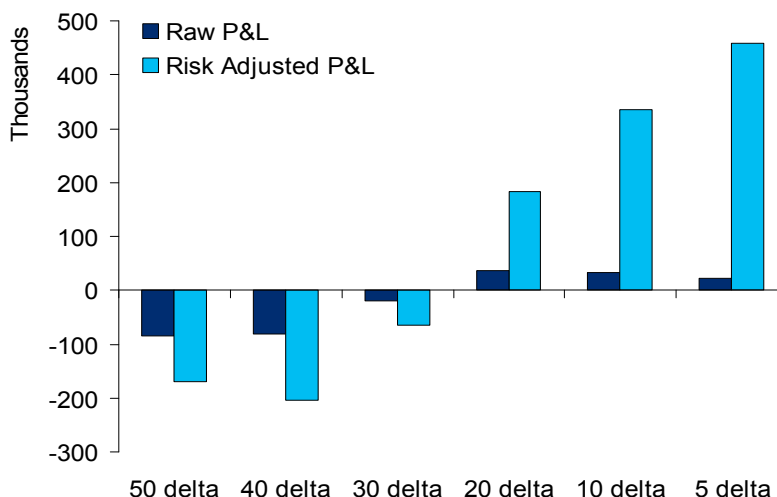
Key Point: Sizing the receiver option trade is computationally straight forward. However, the art is in deciding how to choose a beta – we believe the best way is to choose a spread/volatility regime that reflects our future expectations and use an average beta from such a regime.

Deeper OTM is more profitable....

The next issue that our investor needs to resolve is at what spread should the receiver option be struck? Selling an ATM (at-the-money) receiver option appears attractive because it offers higher premiums, but at the same time, it also has a higher likelihood of expiring in the money. The deeper out-of-the-money an option is, the lower the premium, but the option seller has a higher chance of seeing the option expire worthless. So where is the trade off? More importantly, is there some sort of efficient frontier that allows the investor to choose the most efficient strike?

To answer this question, we look at the performance of receivers with different deltas and a 3 month expiry date. The excess P&L from a \$10MM option leg for a two year period is shown in Figure 3 (dark blue bars). It appears that ATM options do not add any alpha, and beyond a certain threshold (20% delta in this graph), the returns go down as we move more and more out of the money.

Figure 3. P&L (22-Feb-2011 through 20-Mar-2013) from selling 3 month receivers with various deltas, with a face notional of \$10MM (dark blue bars). The light blue bars show the P&L once we adjust the face notionals for risk in terms of the same index equivalent notional.



Does not consider transaction fees and other costs. Past performance is no indicator of future results. The above results are dependant on replicating exact conditions during which they occurred for which there is no guarantee. Source: Citi Research

However, there is one twist here – we have not adjusted for the risk associated with the option. Note that a 10% delta option has significantly lower spread risk (in terms of index equivalent notional) than a 20% delta option. We therefore adjust for this risk by changing the face notionals such that each option position has the same risk in terms of index equivalent notional. For example, the adjusted face notional for the 10% delta position is twice as much as that for the 20% delta position. Once we adjust for spread risk, Figure 3 (light blue bars) shows that it is much more profitable to sell as far out-of-the-money receivers as possible.

Why does this happen? To explain that, let us consider a 10% delta receiver option and versus a 20% delta receiver option. At option expiry, the probability that the 10% delta receiver option expires in the money is roughly half the probability that the 20% delta option expires in the money². This would imply that the expected payout for (say) a \$100MM notional 20% delta receiver is the same as that of a \$200MM notional 10%

² Assuming the underlying index spread has a lognormal distribution at option expiry.

delta receiver. In other words, it appears that the expected payouts for the two receivers are the same, once we have risk adjusted the notionals.

This would be true, if the payouts for both the options are the same whenever they expire in the money. However, that is not the case – the payout for the 20% delta option is always higher than the payout for the 10% delta option whenever they both expire in the money. This means that the expected payout for the 20% delta option is higher by more than a factor of 2 than the expected payout for the 10% delta option. From the option seller's perspective, this implies that on average, the risk adjusted gains (premium less payout at expiry) is higher for deeper out-of-the-money options.

....But be aware of liquidity

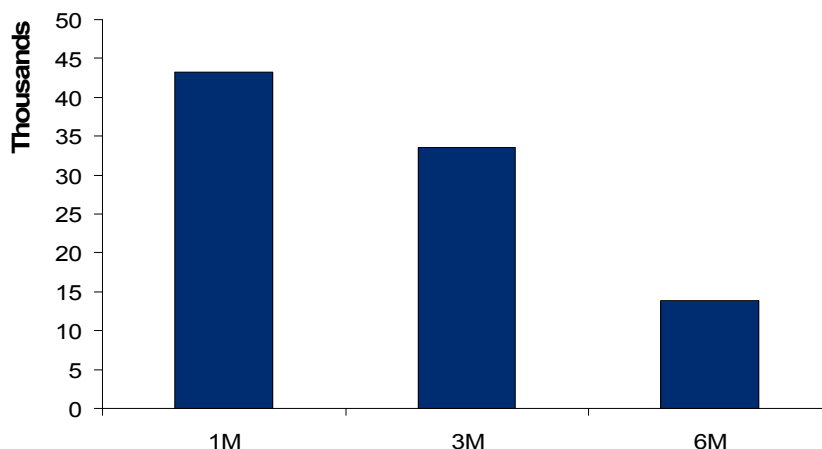
In the limit, it would appear that investors should be selling as far out-of-the-money receivers as possible in very large sizes to maximize their excess returns on a risk adjusted basis. However, there is one issue that should be taken into account here – as we go deeper and deeper out-of-the-money, the price of an option goes down in dollar terms. At the very extreme end (say < 5% delta), an option can cost as little as 1 or 2 cents, which is often less than the bid-ask spread.

In such cases, dealers may be unable provide the kind of liquidity needed for the large trade size that is required when the notional is risk adjusted. We therefore recommend choosing an option delta that is as low as possible, such that the option premium remains above a 5 cent threshold. This threshold is chosen to be conservatively above the bid-ask spread even during the more turbulent periods, such as Fall 2011.

Does the option maturity matter?

The maturity of the receiver option sold by the investor can also influence the performance of the covered call strategy. We show in Figure 4 the performance (captured by the total P&L) for 10% delta options at various maturities. It is clear that selling short dated receiver options generated the best performance for the strategy.

Figure 4. P&L from selling 10% delta receiver options with different expiries, \$10MM face notional, 22-Feb-2011 through 20-Mar-2013.



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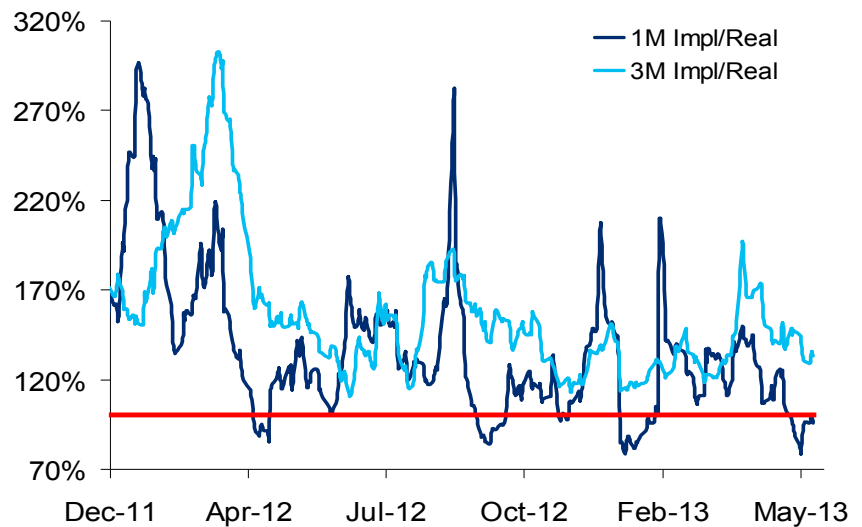
Once again, we turn to the risks (or greeks) associated with an option for an explanation. The total P&L for a short receiver position can be approximated as:

$$\begin{aligned} \text{P\&L} &= \text{delta P\&L} + \text{gamma P\&L} + \text{theta P\&L} + \text{vega P\&L} \\ &= \text{delta P\&L} + \frac{1}{2} * \text{gamma} * (\text{sprd move})^2 * (\text{realized} - \text{implied vol}) + \text{vega P\&L} \end{aligned}$$

The expression above follows from option math – please see [Profiting from the Credit Volatility Premium - Selling credit volatility can be consistently profitable even after paying bid-ask](#) for details. In the expression, gamma captures the sensitivity of the option value to large changes in the underlying index spread, while vega represents how the option value changes with implied volatility.

Since we are comparing receiver options with the same delta, but different maturities, the first component can be ignored. The main contributor to P&L here is the second term, which shows that the total P&L from a receiver option depends on the gamma, which is negative for a short receiver position. Therefore, the second term has a positive contribution to P&L if the implied volatility is higher than the realized volatility. This is generally true, as we show in Figure 5. Please refer to [Profiting from the Credit Volatility Premium - Selling credit volatility can be consistently profitable even after paying bid-ask](#) for a more detailed discussion on this issue.

Figure 5. Ratios of implied (backward looking) to realized volatilities – for most of the time, the ratio is above 1, i.e., above the red line.



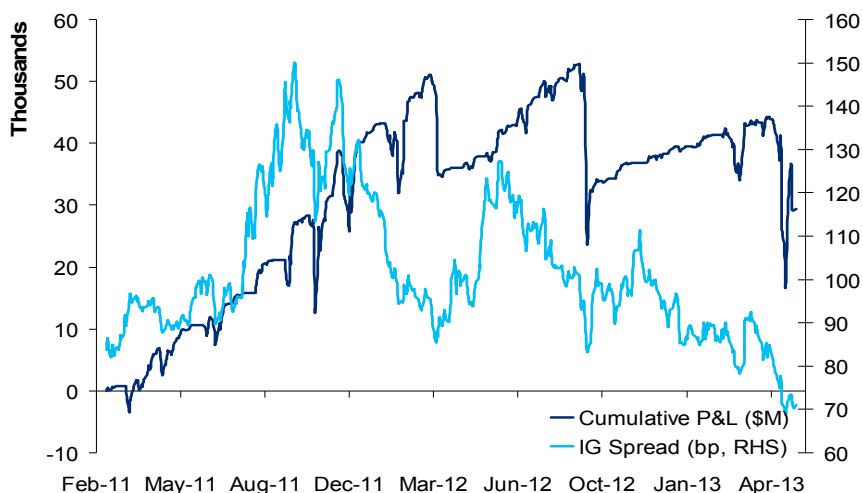
Source: Citi Research

Now given that the gamma for shorter dated options is more negative compared to longer dated options, it follows that the P&L contribution from the position gamma for shorter dated options is higher. Therefore, for the same delta, the shorter dated options tended to perform better relative to the longer dated options.

Choose the right time to roll the options

We finally come to the holy grail of all trades – the issue of timing. So far, we have focused on a simple covered call strategy where the investor systematically sells an OTM receiver option and holds it till maturity, at which point he/she sells a new OTM receiver option. While this strategy is profitable in general (as we have argued earlier), there are times when the investor ends up with a net loss on the position because the underlying index spread gaps tighter unexpectedly – see, for example, Figure 6, where we show the cumulative P&L generated by systematically selling 1 month 10% delta options along with the underlying index spread levels.

Figure 6. Cumulative P&L from systematic selling of 1 month 10% delta receivers. The trade usually makes money except for the few large drawdowns when spreads gap tighter.



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In this context, one way to enhance the profitability of the covered call strategy is to selectively roll into a new option position upon expiry. In this modified version of the strategy, the investor sells a new receiver upon the expiry of the previous option position only if certain conditions are satisfied (which serves as a signal).

Obviously, the key here is to be able to select a good signal that helps our hypothetical investor to avoid most of the loss making trades, but keep the gains from the profitable ones. We have come up with a simple rule of the thumb for doing this as follows.

Consider a covered call strategy where the investor sells 1 month 10% delta receivers against a long cash portfolio. We can compute the option implied spread move over a 1 month period using the implied volatility level for the option³. For example, the implied volatility level for a 1 month, 10% delta on 22-Sep-2011 was 74%. From this, and the underlying spread level (145.2bp), we can compute the implied spread move for 1 month to be 30.9bp.

Now, if we look at the distribution of actual moves in CDX IG over more than a 8 year period (starting in Jan 2005), we find that the probability for a 30.9bp move in 1 month is 4%. This means that the option seller is being compensated for a really large spread move – one that has only a 4% chance of occurring according to historical data.

³ Implied spread move over 1 month = (1M implied volatility * Spread level) / sqrt (12). The sqrt (12) factor is used to convert the implied annual spread move to an implied 1 month spread move.

We can now envisage setting a threshold for the probability of the implied spread move to function as a signal. If the computed probability is lower than the threshold, the implied spread move has a low chance of happening, and the option seller is being over compensated for the risk. The covered call strategy should roll over the option position only under these conditions. For our example in the earlier paragraphs, if we set the probability threshold at 15%, the covered call strategy should roll over the option position on 22-Sep-2011, after the previous option expires.

Using a probability threshold of 15%, we find that the total P&L from the option leg of the covered call strategy goes up by 25.7%, which is a substantial improvement. Thus, selectively executing the option leg of the strategy based on index spread levels and implied volatilities can provide a significant boost to the returns.

Conclusions

Selling covered calls against an overweight cash portfolio can significantly increase returns, but the mechanics of the option trade matter. We believe that the covered call strategy can be optimized by using short-dated, deep out-of-the-money (OTM) options. The profitability of the strategy can be further enhanced by using a simple rule of thumb to decide when to roll over the option leg upon expiry of the previous position.

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