Managing Interest Rate Risk Using a Butterfly Trade
Bulletin 33

Using DV01 to determine the hedge ratios when trading basis is often effective. However, as explained in Bulletin 32, this approach exposes the trader to steepeners, flatteners, and other yield curve risks. This bulletin explores a solution to improve control of interest rate risks, and offer traders an effective way to exploit the mean reversion of the cheap/rich values.

THC Futures Butterfly Trade

A butterfly trade refers to concurrent short and long positions in futures, balanced by a medium term contract. THC determines relative size and optimum make up of the positions based on research on yield curve fluctuations. The Optimizer feature tab in THC Decision^{TM} Treasury Analyticscan be used to determine the butterfly positions. The steps for a butterfly trade are:

- Enter 100 contracts in Risk-Position for the 5 year June contracts.
- Select the 2 year June and 10 year June contract in the Optimizer as "choice variables"
- Select "Minimize the shift DV01" as the objective function
- Click on "Optimize" and select the optimal solution by clicking on "Trade"
- The positions will automatically be updated in the Risk-Position sheet. In the Cointegration sheet select the "Read positions from Position-Risk". The following results are provided in cointegration.

Results

- The results are very striking when comparing the cointegration results of the Butterfly Trade (Figure 1) with the DV01 Hedge Ratio Trade (Figure 2).
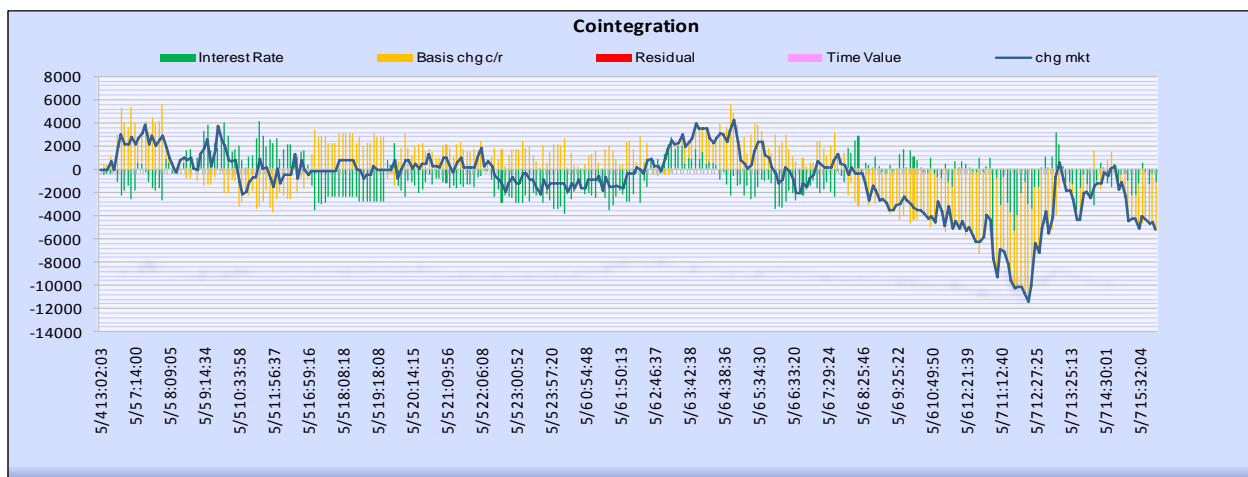

*Figure 1. **Butterfly Trade:** 2 yr June -29 contracts, 5 yr June 100 contracts, 10 yr June -51 contracts*
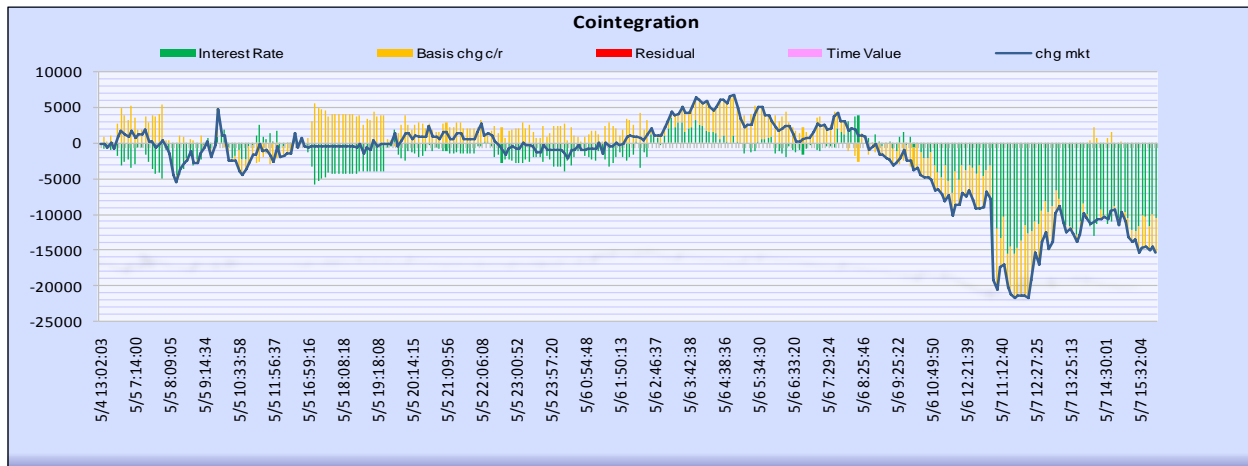
Figure 2. **DV01 Hedge Ratio Trade:** *5 yr June 100 contracts, 10 yr June -66 contracts*

- In Figure 2, the interest rate risk (green color) is significantly higher for the hedge ratio approach. By 5/7 11:12 am, the interest rate loss is $15,000. By way of contrast, in Figure 1, the butterfly trade has only a loss of $4,000, for a short time period.
- The total P/L for the hedge ratio trade was exposed to $22,000 loss, while the butterfly was exposed to only $10,000, and where much of the risk was the change in cheap/rich (yellow color) values.
- The mean reverting behavior of the cheap/rich is pronounced, with the yellow bars rising and falling over a relatively short period.

Conclusions

Using only three front futures contract, the results show that a trader can manage most of the interest rate risks. The approach enables the trader to enter and exit the trade opportunistically, exploiting the mean reversion behavior of the cheap/rich values.

For example, using the butterfly trade, the trader can:

- Buy the trade at 5/7 12:00 pm when the cheap/rich becomes extremely cheap (large negative cheap/rich value in yellow). Referring to Figure 1, the subsequent reverting to the mean would realize $11,000 in two hours.
- Sell the trade at 5/6 4:30 when the cheap/rich becomes rich (positive cheap/rich value in yellow). The subsequent reversion would lead to a $4,000 profit.

This basic butterfly trade can be extended for many applications. They can be used to hedge cash and futures that are significantly mispriced, isolating the price discovery process from the interest rate risks. Butterfly trades can also be extended to trades with more futures contracts. Furthermore, traders can construct butterfly positions for pairs of basis trades. The exploration of these trading opportunities will be the subject of future bulletins.

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