



Risk Modeling Bulletin Issue 26

OTR/Futures Basis Trade Mar 10 2010

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This issue focuses on OTR/Futures intraday basis trade. This report deals with the following questions:

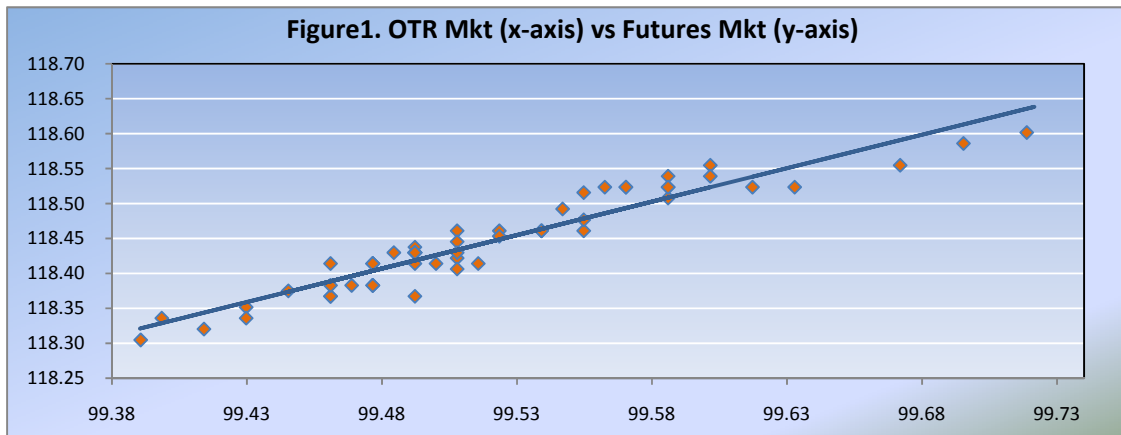
- What are the potential profits and risks of the futures/OTR 10 year basis trade in market making?
- How to identify market opportunities?

OTR/Futures Basis Trade (Intraday)

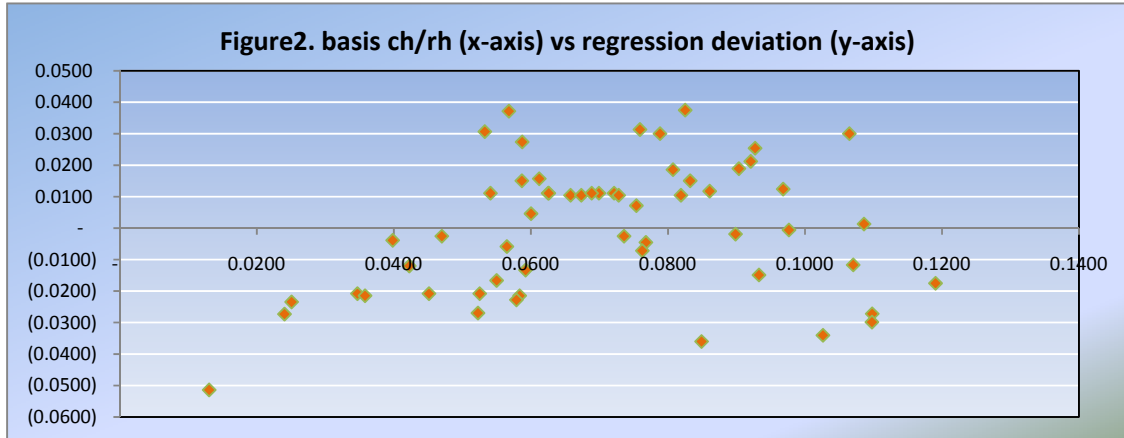
The basis trade is to long the 10yr OTR and short 10yr 10Mar futures. We use market data at 5 minutes intervals from 9:00am – 3:00 pm on March 5, 2010. The spot curve is constructed from the on-the-runs. The futures contract is the March 2010 contract, which has a delivery option of approximately 0.04%.

Methodology and Results

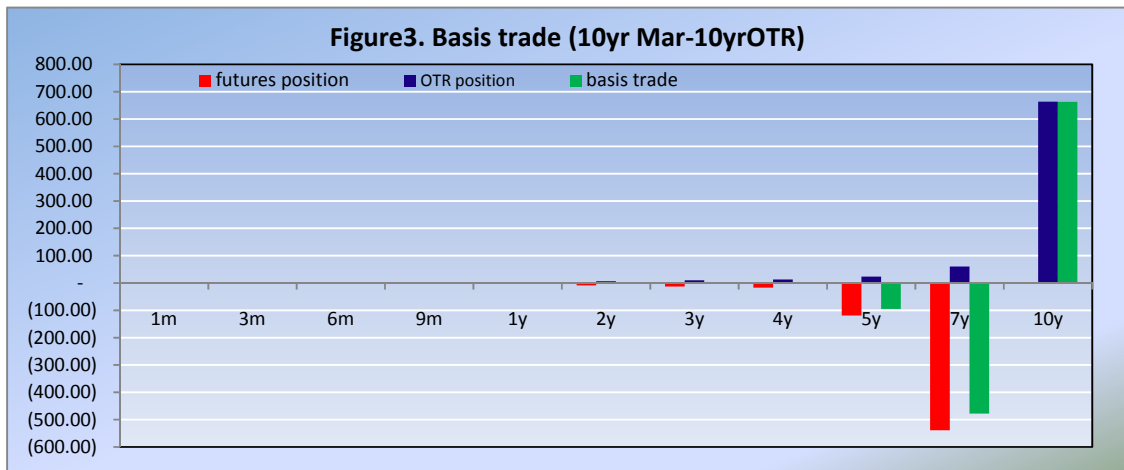
We first follow a standard approach in forming the hedge ratio, using the empirical duration. The hedge ratio is estimated to be 0.957852. See figure 1. The regression line also suggests possible trading signals. The deviations from the regression line represent the cheap/rich values of the basis trade.



We can use these deviations to compare with the cheap/rich values of the basis trade as determined by the THC futures pricing model. The results below show that the correlation between the two approaches is not very significant. See Figure 2 below. What can be the reasons?

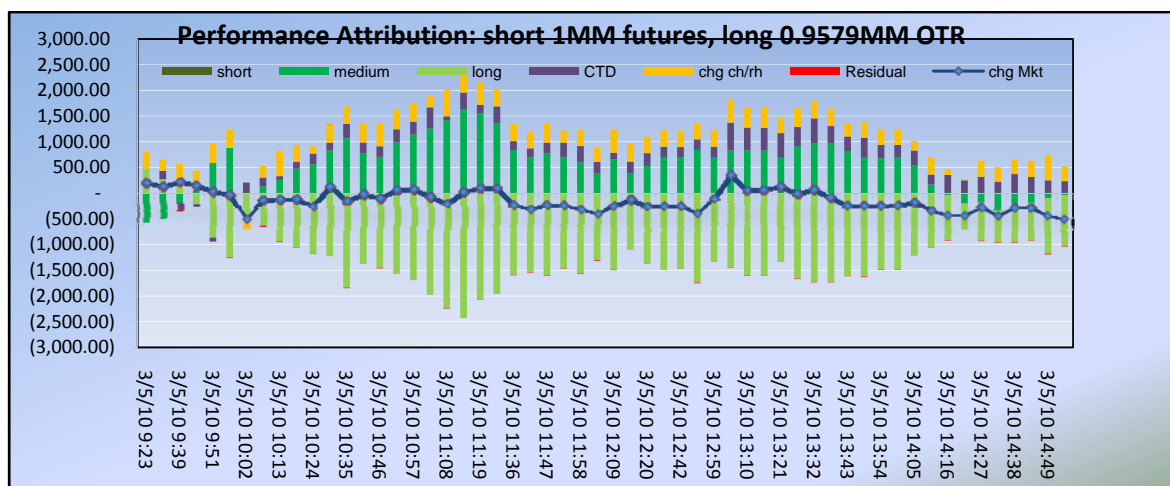


Many deviations from the regression line in Figure 1 come from the key rate duration mismatch between the futures contract and the on-the-run. Figure 3 below shows that the basis trade (green bars) in essence bets on the 10 year rate and shorts on the 7 year rate. Note that the sum of the key rate DV01 is the DV01 of the positions. The DV01 of the basis point trade based on the empirical duration is not zero, but \$81. Significant profit/loss may result from the steepening or flattening in that part of the curve.



Indeed, Figure 4 below depicts the performance attribution of the basis trade during the day. We can see the many of the variations of the performance is driven by the yield curve movements (green bars). The futures cheap/rich (yellow) and the cheapest-to-deliver cheap/rich (purple) are relatively small for that day. The unexplained returns (red) are negligible.

At least for this sample period, the basis trade is a combination of a trade on the mean-reversion of the cheap/rich of the basis trade and on the key rate bets on the curve on the 7 to 10 year range. The entry point and the exit point of the trade should be quantitatively determined by the trends of these two risk drivers.



Conclusions

We have used one trading day as an illustration of the use of financial models to identify the potential risks and profit opportunities of a basis trade. We have shown that the models can quantify the mean-reversion behavior of the cheap/rich and at the same time isolate the basis value from the yield curve risks.

The use of quantitative approaches to market making in real time can offer new market making opportunities. In this illustration, we have used a 5 minutes interval, but, in principle, traders can perform these analyses at a higher frequency.

We should note that the empirical duration is backward looking. The hedge ratio is calculated from the historical data and we have to assume that the hedge ratio will remain the same the next day. Such an assumption is not required using the DV01 or related risk measures. Furthermore, we should also caution the use of empirical duration for interday trading since the delivery option can affect the hedge ratios over a longer time period, depending on the volatility of the market.

The result suggests that the analysis can be extended to other contracts, even less liquid contracts such as the 30 year contract or the new contract Ultra. The methodology can be used for event risks for periods such as the auction days or the calendar roll days.

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Contact us if you have any questions, suggestions or comments

support@thomasho.com Voice: 1-212-732-2878 Fax: 1-212-608-1233
[Http://www.thomasho.com](http://www.thomasho.com) 55 Liberty Street, 4B, New York, NY 10005-1003 USA

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