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Risk Modeling Bulletin Issue 28

Yield Curve Risks in OTR-Futures Basis Trades March 16, 2010

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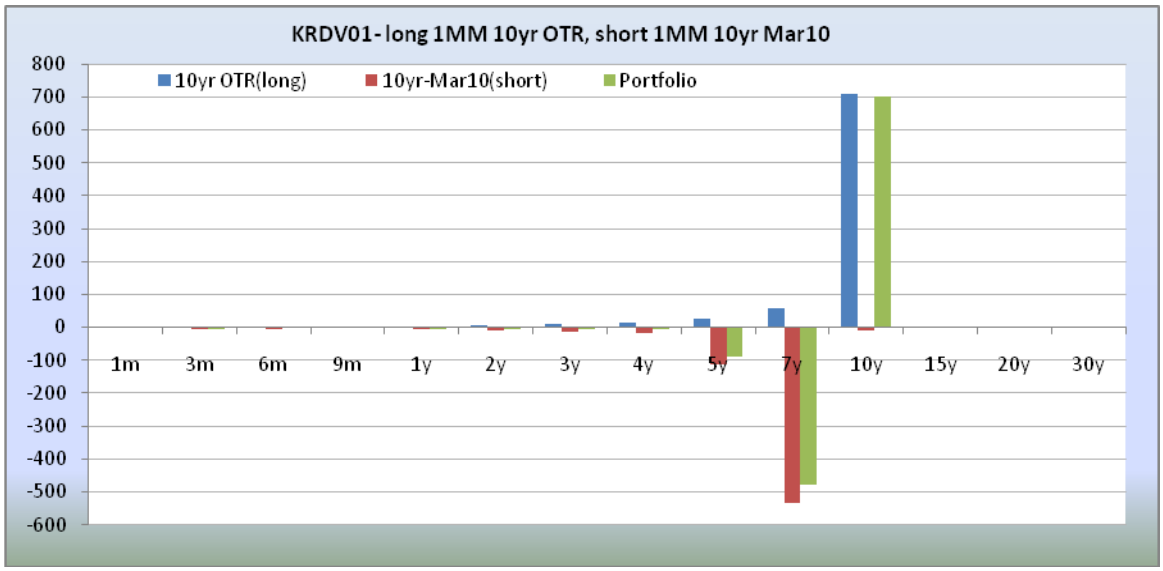
There are many risk drivers in the OTR-Futures basis trades: the parallel and non-parallel shifts of the yield curve, the futures / CTD spreads and the CTD/OTR spreads. We can better exploit trading opportunities by knowing how to identify and isolate these risk drivers. Is the futures contract pricing lagging or coming ahead of the market? Is the Treasury auction affecting a particular segment of the curve? Have the market prices already incorporated the news?

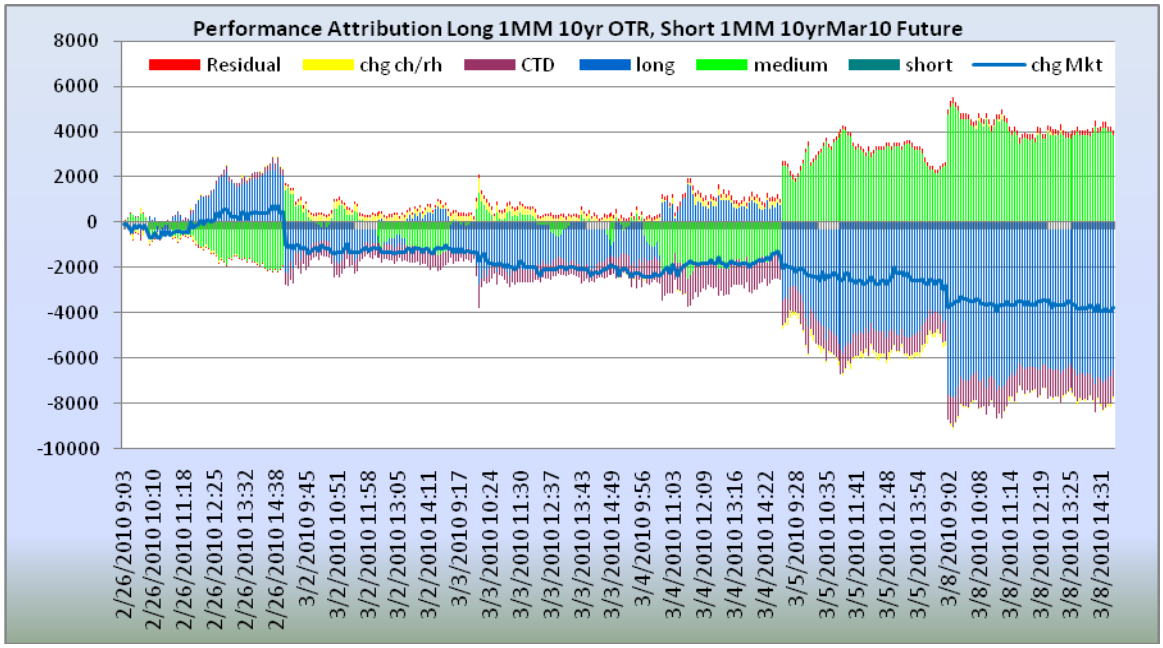
The tools that we can use to answer these questions are: key rate DV01 measures and the performance attributions. The key rate DV01 measures the increase in value of a portfolio of positions with one basis point drop in a segment of the curve. The performance attributions identify the sources of performance of a trade.

Consider the results below. Figure 1 shows the key rate DV01 of the 10 year OTR– 10 year March contract basis trade. The result shows that the 10 year futures contract is more exposed to the seven year than the 10 year. Therefore, the basis position is exposed to the yield curve risk. In particular, the basis position would do well when the 10 year rate falling with a 7 year rate rising, even though the position is relatively immune to a parallel shift of the yield curve.



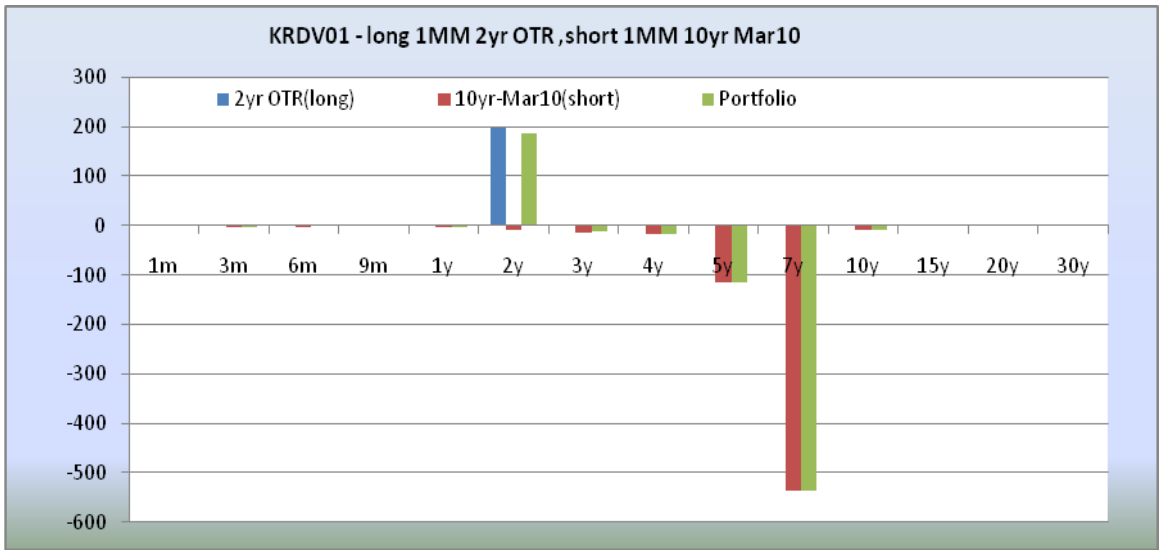
The performance attribution figure below confirms this observation. At 5 minutes intervals, from 2/26/2010 to 3/8/2010, the profits and losses of the basis positions are calculated. The cumulated profit and loss (P/L) is represented by the blue line. The P/L is then decomposed into the risk drivers, the short term rates (less than 2 year rates), medium term rates (>=3 year and < 10 year) and long term rates (>= 10 year); the changes of the cheap/rich of the CTD and the futures and finally the residuals, not explained by the model.

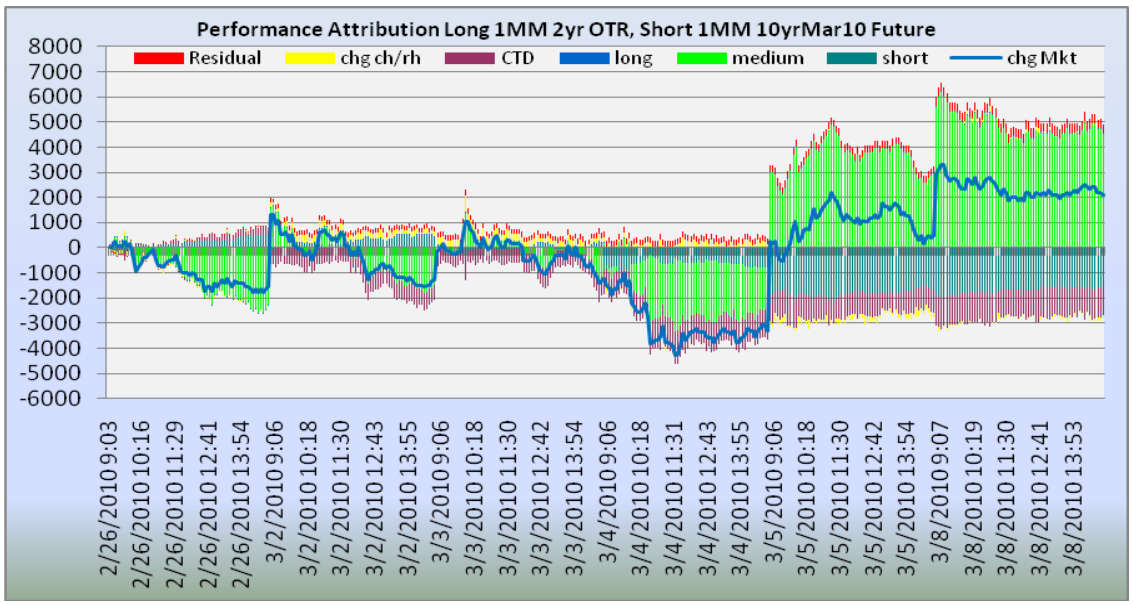
The results show that the basis has significant yield curve risks, even though the 7 year rate risk tends to mitigate the 10 year rate risk. But the residual yield curve risks remain significant. The changes of the cheap/rich of the CTD (CTD brown) are also a significant driver of risks and they can be valuable trading signals as the cheap/rich values tend to mean revert. The changes of the futures cheap/rich (chg ch/rh yellow) is relatively small in this sample. Finally, note that the residuals are very small, verifying the validity of the models.

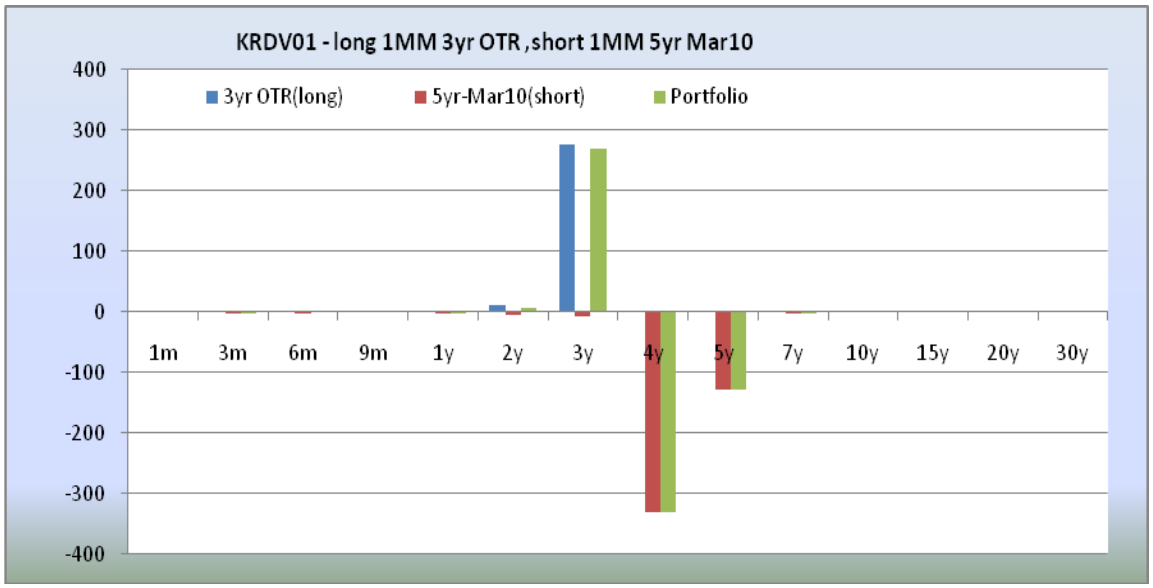


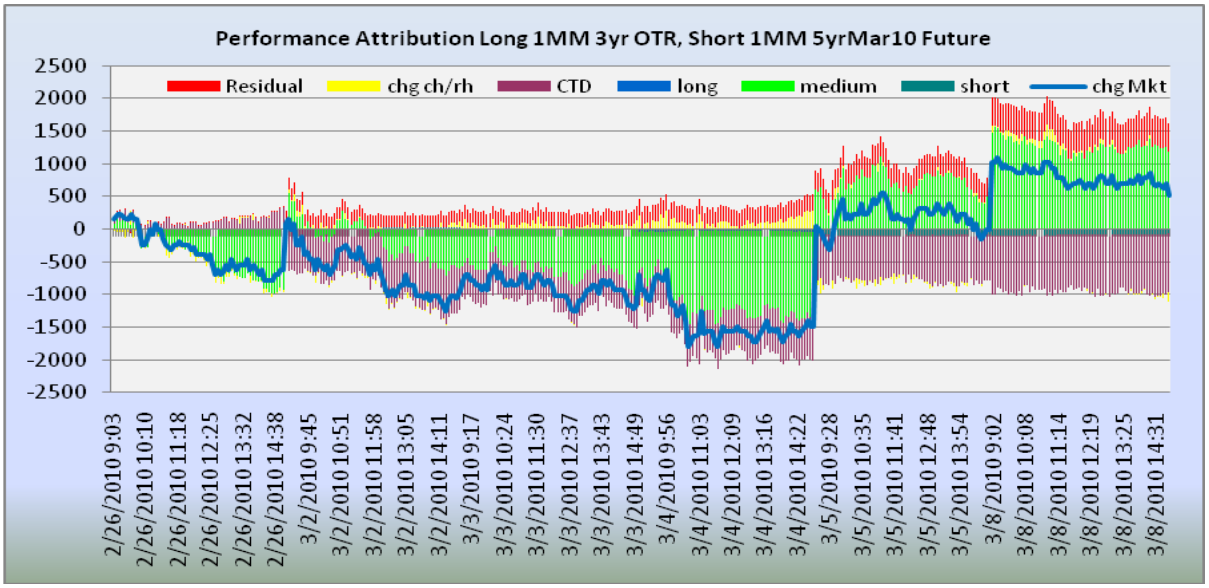
Conclusions. By measuring the risks exposure of the basis position accurately, we can better identify the trading opportunities. For example, if the trade is to exploit the mean reversion of the cheap/rich values, we should use a more effective hedge against the 10 year futures. Maybe a 7 year OTR would be more effective in hedging the futures contract. Also, note that in matching the DV01 of the futures and OTR, the basis has neutralized the parallel shift of the yield curve and the remaining risks exposures can still be substantive.

The use of the key rate DV01 and performance attribution can be extended to other basis trades. We present the 2 year OTR/ 10 year futures and 3 year OTR/ 5 year futures below. Similar interpretations of the results for these trades can be made.



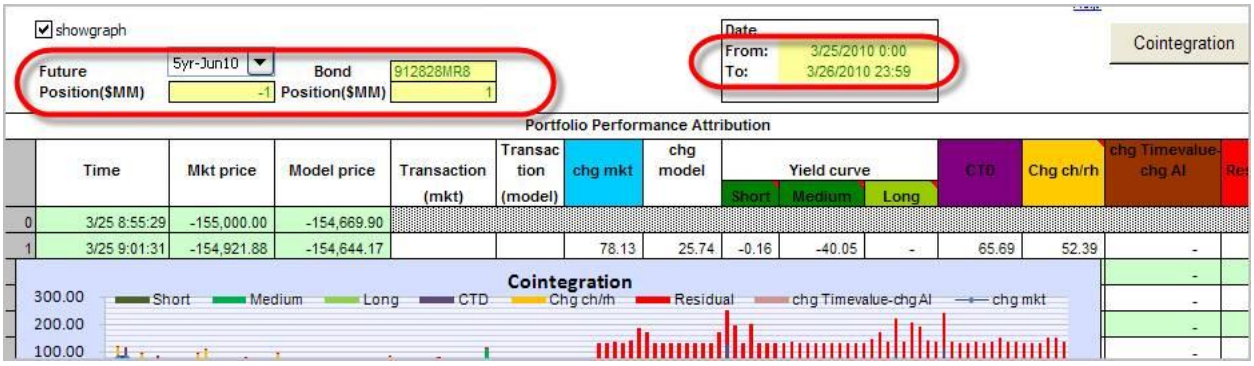

Performance Attribution Long 1MM 2yr OTR, Short 1MM 10yrMar10 Future
Residual
chg ch/rh
CTD
long
medium
short
chg Mkt
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
2/26/2010 9:03
2/26/2010 10:16
2/26/2010 11:29
2/26/2010 12:41
2/26/2010 13:54
3/2/2010 9:06
3/2/2010 10:18
3/2/2010 11:30
3/2/2010 12:43
3/2/2010 13:55
3/3/2010 9:06
3/3/2010 10:18
3/3/2010 11:30
3/3/2010 12:42
3/3/2010 13:54
3/4/2010 9:06
3/4/2010 10:18
3/4/2010 11:31
3/4/2010 12:43
3/4/2010 13:55
3/5/2010 9:06
3/5/2010 10:18
3/5/2010 11:30
3/5/2010 12:42
3/5/2010 13:54
3/8/2010 9:07
3/8/2010 10:19
3/8/2010 11:30
3/8/2010 12:41
3/8/2010 13:53


KRDV01 - long 1MM 3yr OTR ,short 1MM 5yr Mar10
3yr OTR(long)
5yr-Mar10(short)
Portfolio
400
300
200
100
0
-100
-200
-300
-400
1m
3m
6m
9m
1y
2y
3y
4y
5y
7y
10y
15y
20y
30y



THC Decisions™ Treasury Analytics

The CTD and Futures cheap/rich time series trends are depicted in the "Bias Chart", where traders can monitor the mean reversion dynamics of the market trends. The cointegration of the basis trade can be continually monitored by "Cointegration." Traders can select the basis trade and the commencement time. The results will be continually presented graphically and numerically at a user specified time interval.



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