Fixed Income PS 1 - Case 2

Group 9 - Yuhua Deng, Xiahao Wang, Nupur Solanki, Haoxuan Tong

In this case we evaluated the long/short strategy of the principle stripe bond and coupon stripe bond for one-year period starting Jan 2nd, 2014. The principle stripe bond and coupon stripe bond with the same face value should have identical price, but in reality, there exists a small spread. Thus, there is an arbitrage opportunity that we can exploit.

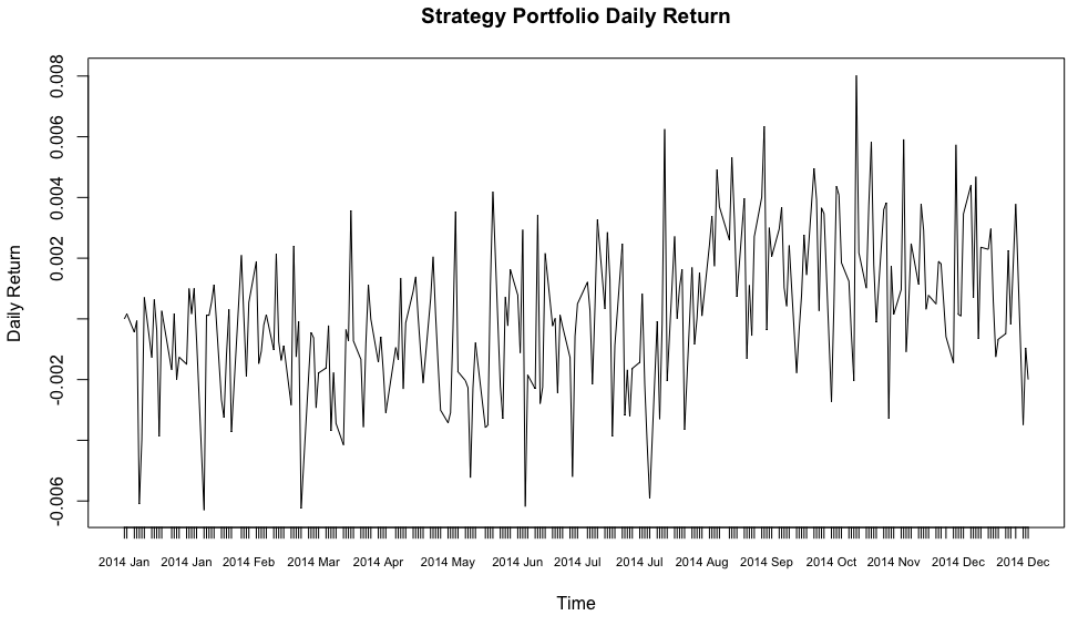
Table 1 shows the construction of the portfolio, and its profit by mark to the market everyday. If we long 1 unit of the principle stripe bond (lower price) and short 1 unit of the coupon bond (high price), the spread of $0.196 will be realized arbitrary profit if we hold to the maturity. However, the price discrepancy between the strip bonds may widen or shirk over time, resulting in daily profit and loss.

Table 1

Date	Long Position	Short Position	Daily Return (%)	Cumutive Return ($)
2014-01-02	73.184	73.38	0	0
2014-01-03	73.21309652	73.40831451	0.000162097	0.000810483
2014-01-06	73.24316465	73.44061277	-0.000440332	-0.001391176
2014-01-07	73.27742909	73.47521017	-6.08966E-05	-0.001695659
2014-01-08	73.29491561	73.52320864	-0.006096697	-0.032179144
2014-01-09	73.32007314	73.56831403	-0.003983879	-0.052098539
2014-01-10	73.35457249	73.59931255	0.000705863	-0.048569224
2014-01-13	73.37624963	73.62736197	-0.001268762	-0.054913032
2014-01-14	73.41399442	73.66195789	0.000635466	-0.051735703
2014-01-15	73.44284539	73.69267662	-0.000367857	-0.053574991
2014-01-16	73.4585642	73.72774658	-0.003864534	-0.072897661
2014-01-17	73.4925816	73.76047129	0.000264232	-0.071576502
2014-01-21	73.51704102	73.79338384	-0.001684933	-0.080001167
2014-01-22	73.5542264	73.82974783	0.000169973	-0.079151304
2014-01-23	73.57264656	73.85817614	-0.001995934	-0.089130976
2014-01-24	73.59047029	73.88233273	-0.001260877	-0.095435363
2014-01-27	73.61711907	73.9164676	-0.001491525	-0.102892985
2014-01-28	73.65358652	73.94797401	0.000997903	-0.097903468
2014-01-29	73.68222728	73.97581852	0.000164943	-0.097078752
2014-01-30	73.71138901	73.99999782	0.001002179	-0.092067856
2014-01-31	73.74000289	74.032184	-0.000708766	-0.095611685
2014-02-03	73.75436087	74.07806699	-0.006299307	-0.127108221
2014-02-04	73.78016723	74.10328785	0.000122794	-0.126494252
2014-02-05	73.80531918	74.1278926	0.000115137	-0.125918567
2014-02-06	73.83448295	74.15435157	0.000546653	-0.123185302
2014-02-07	73.86785985	74.1821324	0.001124909	-0.117560755

To have a better understating of the daily P/L, we graphed the strategy portfolio daily return (Graph1) and calculate the statistical summary (table 2). The daily profit/Loss position exhibits a approximately normal distribution, as short term price movements follow a Brownian Motion process.

Graph1



At the same time, we can observe slightly negative skewness and thicker tail. The 1% quantile is -3.15%. That been said, the tail risk is high. Before realizing the profit, there are chances that the portfolio became extremely highly levered.

Graph2

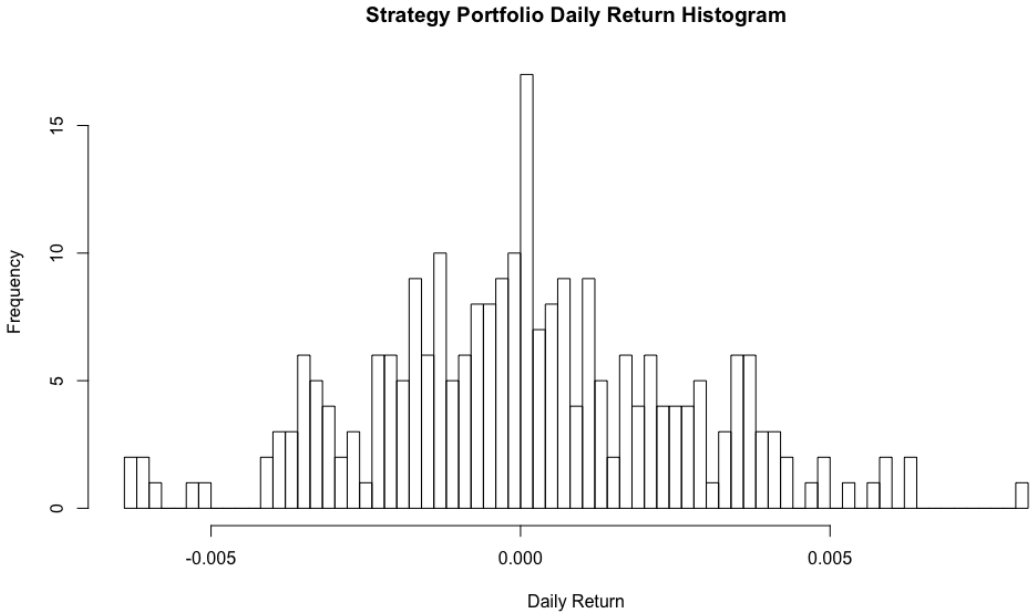
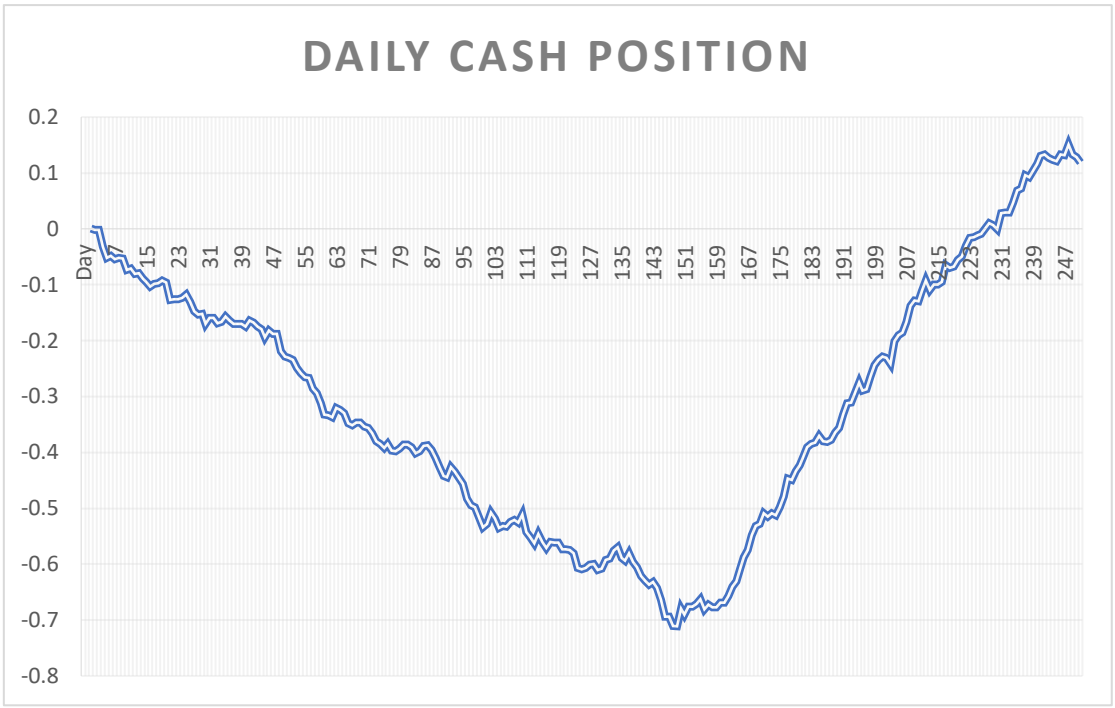


Table 2:

Mean	SD	Skewness	Kurtosis	Sharp Ratio
0.02369402	0.04019753	0.1246374	0.07286435	0.5894397

Graph 4



The last Graph illustrates the daily position with accumulated return, confirming our conclusion that the arbitrage profit will eventually be realize, but during the process the portfolio may appear to be highly risky due to price movements.