Arbitrage between XLE and its Component Stocks

In my earlier article [no. 1] on Index Tracking and Arbitrage Using Cointegration, I described an index arbitrage strategy where we:
a) pick an index (or an ETF representing this index), and
b) construct a basket of stocks that best cointegrates with this index, and
c) trade the spread of the value of this basket against the ETF.

In this paper, I put this strategy to use for our favorite sector ETF: the energy SPDR XLE.

XLE is composed of some 33 stocks (as of 2/16/2007). Our goal is to pick some smaller subset of these stocks to form a basket. We pick them based on how well they cointegrate with XLE. How big should this subset be? I pick 10. The higher the number, the better this basket cointegrates with XLE, but the smaller the profits. (If you include all stocks in XLE in this basket, then the basket cointegrates perfectly with XLE, but there will be no trading opportunities!) The lower the number, the higher the (specific) risk as well as return. So it is more of a personal risk-return preference than any scientific criterion which determines how many stocks to pick.

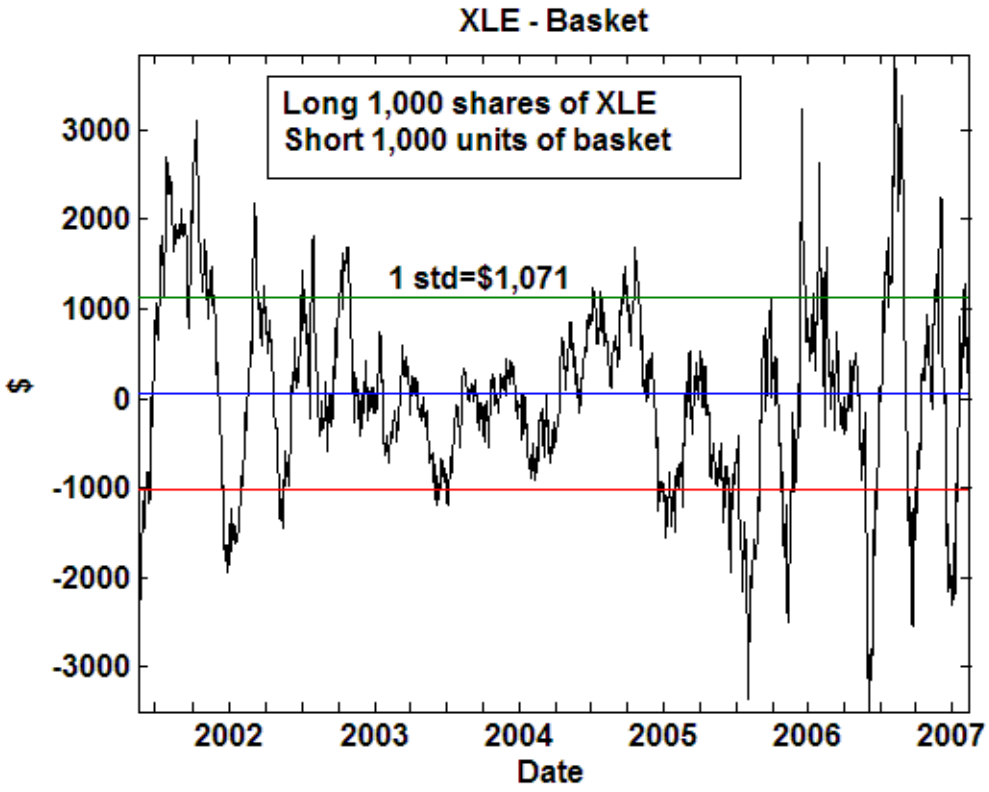
The basket composition is the following (assuming we are short 1,000 shares of XLE on the other side):

Symbol	Num Shares
KMI	178
CNX	81
RIG	203
NOV	48
OXY	109
VLO	-131
ESV	214
XTO	-179
COP	390
NE	-117

Notice that there are negative shares in the basket, indicating we have short as well as long positions. I have found that this basket cointegrates with XLE with better than 99% probability since 2001/05/22. The half-life for mean-reversion is about 20 days, which means you have to hold a position for at most a quarter. (My own rule is to exit when the spread hasn't reverted in 3 times the half-life.) If you enter into a position when the z-score is about ±2, you can expect a profit of about $2,000 on an investment of about $58,000 on one side. This comes to a return per trade of about 3%. You can of course boost this return by using options to implement the XLE position instead.

As an aside, if you use Interactive Brokers, you can easily trade an entire basket of stocks using their Basket Trader.

I have created an online spreadsheet with (almost) real-time values of this spread in the subscription area. As of the 2007/02/23, the spread has a z-score of -0.55, so I would not recommend either long or short the spread at that point. Note also that in theory, every time the XLE changes composition, we have to re-compute our basket composition as well. But fortunately XLE composition does not change very much or very often, so I will only update my basket at most once a month.


XLE - Basket
Long 1,000 shares of XLE
Short 1,000 units of basket
1 std=$1,071
3000
2000
1000
0
-1000
-2000
-3000
$
2002
2003
2004
2005
2006
2007
Date