WORLDQUANT UNIVERSITY

MScFE 640: PORTFOLIO THEORY AND ASSET PRICING

Group Members

Moses E. Tommie (tommiemoses1988@gmail.com)

Kwadwo Amo-Addai (kwadwoamoad@gmail.com)

Daniel Morales (danielmoralesx@hotmail.com)

Brandon Spiteri (brand.spiteri@gmail.com)

GROUP ASSIGNMENT 3

Over View

The main objective of the Assignment is to measure compute the periodic return of ten SPDR funds, calculate the active return relative to the S&P500 as benchmark and calculate the tracking error for each fund. A period length of one month is taken into account. The month-end closing prices in excel sheet "GWP_PTAP_Data.xlsx" will be used as provided.

i) **Computing the Price Return for each SPDR and S&P500 for each month of 2017**

The price return can be calculated by taking into consideration the initial stock price and ending stock price per end-of-month. In this case, the percent return was required. The dividend per period was not specified, hence it will be assumed to be null.

The equation used in calculating the individual returns is:

$$Price\ Return = \frac{P_f - P_i}{P_i}$$

Where P_f = ending stock price
P_i = initial stock price

The respective price return results are shown in full in the excel sheet attached to this submission, in the "10 SPDRs and S&P500" tab.

The average returns for each SPDR and S&P500 were also calculated by taking the average of all periodic price return. This provided an idea of the global return for 2017.

FUND	AVERAGE TOTAL RETURN
XLE	-0.27%
XLB	1.67%
XLI	1.66%
XLY	1.64%
XLP	0.83%
XLV	1.55%
XLF	1.57%
XLK	2.39%
XLU	0.74%
XLRE	0.59%
S&P500	1.50%

Table 1 - Average Total Return per SPDR and S&P500

XLK showed a much higher average return that the S&P500 while XLE under-performed all other assets.

ii) **Compute the Active Return Relative to the S&P500 for each SPDR for each Month of 2017**

The calculation for the active return is simply the period subtraction of benchmark return from the fund's actual return. The following equation was implemented in excel to obtain the active return:

$$Active\ Return = Fund\ Return_i - S\&P500\ Return_i$$

Where $i = period\ (month\ in\ this\ case)\ being\ calculated$

The results are shown in the "10 SPDRs and S&P500" tab.

The average active returns were also calculated. This gives an idea of how the funds performed relative to each other.

FUND	AVERAGE ACTIVE RETURN
XLE	-1.77%
XLB	0.17%
XLI	0.16%
XLY	0.14%
XLP	-0.67%
XLV	0.05%
XLF	0.08%
XLK	0.89%
XLU	-0.75%
XLRE	-0.90%

Table 2 - Average Active Return per SPDR

As concluded in section (i) above, the XLK had the highest average active return, hence it yielded largest return, whilst the XLE fund had the lowest returned (negative – indicating a loss) in this case.

XLB, XLI, XLY, XLV, and XLF returned a result close to 0, indicating that their return was close to the S&P500 return.

iii)   Compute the Monthly Tracking Error for each SPDR in 2017

Tracking error is simply the standard deviation of the active returns. Tracking error is a measure of the risk in an investment portfolio that is due to active management decisions made by the portfolio manager; it indicates how closely a portfolio follows the index to which it is benchmarked.

The tracking error for this exercise was computed in excel by applying the standard deviation function on the active returns that had been generated.

The Tracking Error is denoted by the following equation:

$$TE = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(R_i - \bar{R})^2}$$

Where $R_i = Fund\ return$

$\bar{R} = Benchmark\ average\ return$
$N = number\ of\ periods$

The results are shown in the "10 SPDRs and S&P500" tab.

Table 3 shows a summarized results for each fund's tracking error:

FUND	TRACKING ERROR
XLE	3.71%
XLB	1.54%
XLI	1.04%
XLY	1.62%
XLP	1.99%
XLV	1.83%
XLF	2.36%
XLK	2.20%
XLU	3.25%
XLRE	1.42%

Table 3- Tracking Error per SPDR Fund

iv)   Identify the SPDR that Best Tracks the S&P500

Funds with low tracking errors show that they better track a benchmark.

From Table 3, it can be pointed out that **XLI** is the SPDR that best tracks the S&P500 because it had the lowest tracking error.

References
1. World Quant University, Module 4 Notes