**Part II: Using the S&P 500 Futures Contract to Transform the Portfolio**

1. Using the data in the ***port.wkly.csv file***, estimate the ß and R2 for the portfolio versus ES for the weekly time period 4/3/09 to 4/29/11.

Ans. ß = 0.982289 and R2 = 0.79412

2. Using the ß you estimated, hedge the systematic risk of your portfolio from 5/2/11 until 12/30/11 (you will use the data in ***port.csv***).

a. What is the value of the unhedged portfolio on 12/30/11?

Ans. $94,249,886 (excel sheet: port)

b. What is the value of the hedged portfolio on 12/30/11?

Ans. $101,864,724 (excel sheet: port)

c. What is the dollar and percentage difference between the hedged and unhedged portfolios on 12/30/11?

Ans. Dollar difference between the hedged and unhedged portfolios on 12/30/11 = $7,614,838. Percentage difference between the hedged and unhedged portfolios on 12/30/11 = 8.08 % (excel sheet: port)

d. What are the Sharpe ratios for the unhedged and hedged portfolios?

Ans. Sharpe Ratios for unhedged portfolio = 0.78400

Sharpe Ratios for hedged portfolio = 0.65840

(excel sheet: port, calculated by daily return)

e. List and compute other relevant risk measures you have learned about in your portfolio class.

Ans. Alpha = 0.01%

Tracking Error = 0.00235%

Information Ratio = 603.86

(excel sheet: port, calculated by daily return)

f. What day was portfolio minimum value during the holding period ?

Ans. The day was unhedge portfolio minimum value during holding period is 10/3/2011 ($77,312.820). The day was hedge portfolio minimum value during holding period is 10/11/2011 ($95,796.867). (excel sheet: port)

g. What was the maximum drawdown percentage?

Ans. -22.69% (excel sheet: port)

h. What was return for the hedged portfolio on that date?

Ans. The return for hedged portfolio on the day that unhedge portfolio has minimum value is 0.25% (excel sheet: port)

i. Was your portfolio over- or under-hedged during the holding period?

Ans. Over-hedged

j. If you answer to (i) was not no, how would you improve your hedge?

**Part III: Using the S&P Select Sector Futures Contract to Transform the Portfolio**

1. For each of the nine sectors, what is the stock associated with that sector?

|  |  |  |
| --- | --- | --- |
| **Sector** | **Bloomberg Ticker** | **Symbol** |
| Consumer Discretionary | IXYA | DIS |
| Consumer Staples | IXRA | CVS |
| Energy | IXPA | OXY |
| Financial | IXAA | GS |
| Health Care | IXCA | MRK |
| Industrial | IXIA | UNP |
| Materials | IXDA | AA |
| Technology | IXTA | V |
| Utilities | IXSA | EXC |

2. As of 4/1/2013, compute how the composition of the portfolio has changed since 5/2/2011. Which stock has outperformed the portfolio? What stock has underperformed the portfolio?

Ans.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Index | DIS | CVS | OXY | GS | MRK | UNP | V | AA | EXC | Portfolio |
| 5/2/2011 | 14.2% | 8.7% | 15.8% | 14.8% | 19.5% | 8.9% | 9.9% | 3.3% | 4.9% | 100.0% |
| 4/1/2013 | 15.5% | 10.8% | 9.1% | 11.8% | 20.8% | 10.0% | 17.1% | 1.3% | 3.6% | 100.0% |

DIS, CVS, MRK, UNP and V have outperformed the portfolio.

OXY, GS, AA and EXC have underperformed portfolio.

(excel sheet: composition)

3. Compute the following for the outperformer and underperformer: beta and R2 using the ES and the appropriate select sector futures contract (use the ***ssec.wkly.csv*** file).

Ans.

|  |  |  |  |
| --- | --- | --- | --- |
| STOCK | BETA | R-SQUARE | EXCEL SHEET |
| DIS | 1.0489 | 0.6528 | IXY |
| CVS | 0.6657 | 0.4278 | IXR |
| OXY | 1.1365 | 0.7670 | IXP |
| GS | 1.3344 | 0.5108 | IXA |
| MRK | 0.6840 | 0.3896 | IXC |
| UNP | 1.1197 | 0.6331 | IXI |
| AA | 1.5358 | 0.6183 | IXD |
| V | 0.9493 | 0.4483 | IXT |
| EXC | 0.4304 | 0.2064 | IXS |

4. Partial sector rotation:

a. Compute the dollar amount that the outperformer share has grown since 5/2/11, how much

is it (use the ***port.ssec.csv*** file)?

Ans.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Index | **DIS** | **CVS** | **MRK** | **UNP** | **V** | **Total** |
| 5/2/2011 | 14,237,406.36 | 8,694,975.71 | 19,539,830.61 | 8,866,202.71 | 9,920,776.13 | 61,259,191.52 |
| 4/1/2013 | 19,261,410.37 | 13,459,992.94 | 25,984,235.82 | 12,503,256.16 | 21,316,430.73 | 92,525,326.03 |
| Diff | 5,024,004.01 | 4,765,017.22 | 6,444,405.21 | 3,637,053.45 | 11,395,654.61 | 31,266,134.50 |

(excel sheet: share performance)

b. You are going to short the appropriate amount using the appropriate select sector beta for

the stock and go long the appropriate amount of the select sector futures representing the

stock that has underperformed. Using the prices from 4/1/13

c. What is your hedge ratio? What is the respective number of contracts you are going long

and short?

Ans. Beta > 1 then we are going to short futures contacts. (excel sheet: share performance)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Underperformed | OXY | GS | AA | EXC |
| Beta (Sector Only) | 1.1365 | 1.1415 | 1.2267 | 1.0549 |
| Contracts (Sector Only) | 162 | 372 | 49 | 121 |
| Hedge Ratio | 1.1340 | 0.4568 | 1.2271 | 1.0577 |

d. What is the final value of the portfolio with a partial rotation compared to the portfolio

without that adjustment?

Ans. Portfolio value with adjustment: $138,528,508

Portfolio value without adjustment: $142,525,668

(excel sheet: port.ssec) without adjustment is better than adjusted?

5. For the security that has outperformed:

a. Consider the following three scenarios:

i. You sell that position on 4/1/13 and leave the proceeds in cash.

ii. Use the ES futures contract to eliminate the systematic risk due to the outperforming security.

Ans. If Beta > 1 then we are going to short ES future contracts.

If Beta < 1 then we are going to long ES future contracts.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outperformed | DIS | CVS | MRK | UNP | V |
| Beta (ES) | 1.142849 | 0.665704 | 0.683992 | 1.119738 | 0.94927 |
| Contracts (ES) | 283 | 115 | 228 | 180 | 260 |

(excel sheet: share performance)

iii. Use the appropriate select sector futures contract to hedge the systematic risk due to the outperforming security.

Ans. If Beta > 1 then we are going to short selected sector future contracts.

If Beta < 1 then we are going to long selected sector future contracts.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outperformed | DIS | CVS | MRK | UNP | V |
| Beta (ES) | 1.04889 | 0.989716 | 1.061324 | 1.001107 | 0.980899 |
| Contracts (ES) | 383 | 336 | 598 | 304 | 697 |
| Hedge Ratio | 1.048898 | 0.990277 | 1.061173 | 0.999778 | 0.98126 |

(excel sheet: share performance)

b. How does the return from (ii) and (iii) compare to the return found for (i)?

(i) Portfolio value as of 4/1/13= 124,646,025 Return from (i) is 24.64%

(ii) Portfolio value as of 11/8/2013 = 183,830,942. Return from (ii) is 83.83%

(iii) Portfolio value as of 11/8/2013 = 135,385,518 Return from (iii) is 35.38%

(excel sheet: port.ssec)