**Strategy – Spread – SPY vs R2000**

**Introduction:**

Spread would reveal the relative relation between two assets/products. In some of the cases, the spread would have the mean reverse behavior. We may do the long-short to earn the mispricing when the spread deviate from the long-term mean. For some of the spread, they may be served as the direction indicators for an asset. In this case, we would study about the spread between Large Cap (SPY) and Small Cap (Russell 2000)

**Parameters:**

Windows : the window we define to compute the rolling mean and rolling standard deviation for standardizing the spread

Upper Threshold :   
When the standardized spread is higher than the Upper Threshold , Risk off signal would be released

Lower Threshold :   
When the standardized spread is lower than the Lower Threshold , Risk on signal would be released

**Background:**

Backtesting System : QuantConnect

Transaction Cost & Slippage : Interactive Broker Model

Leverage : 1

Account : Cash Account (It takes 2 days to settle the cash and enter another position)

Spread : VOO/VTWO

**Trading Strategy:**

Strategy (1) : Using the spread as market direction indicators  
Step 1 : Computing the standardized spread based on the rolling mean and rolling standard deviation

Step 2 : Comparing the standardized spread with the thresholds to generate the trading signal

|  |  |
| --- | --- |
| Range | Signal |
| Standardized Spread > Upper Threshold | Risk off -> Long SPXS |
| Lower Threshold < Standardized Spread < Upper Threshold | Normal Market -> Long VOO |
| Lower Threshold < Standardized Spread | Risk on -> Long SPXL |

Step 3 : We check the signal day by day and switch the holding when the signal is changed

Strategy (2) : Using the mean reversion property of the standardized spread to do long/short  
Step 1 : Computing the standardized spread based on the rolling mean and rolling standard deviation

Step 2 : Comparing the standardized spread with the thresholds to generate the trading signal

|  |  |
| --- | --- |
| Range | Signal |
| Standardized Spread > Upper Threshold | Risk off -> Long SPXS Short SPXL |
| Lower Threshold < Standardized Spread < Upper Threshold | Normal Market -> Long VOO |
| Lower Threshold < Standardized Spread | Risk on -> Long SPXL Short SPXS |

Step 3 : We check the signal day by day and switch the holding when the signal is changed

\*\*\* Why we would long VOO under Normal market? -> Market has long term positive return

**Result:**

Strategy(1)  
We would fix Upper Threshold : 2 & Lower Threshold : 0

Highlights :

|  |  |  |  |
| --- | --- | --- | --- |
| Windows | Sharpe | Annual Return | MDD |
| 10 | 1.063 | 31.367% | 26.6% |
| 15 | 1.312 | 48.133% | 23.1% |
| 30 | 1.148 | 46.718% | 25.8% |
| 60 | 1.064 | 32.416% | 32.2% |
| 90 | 0.71 | 26.398% | 57.4% |
| 180 | 0.677 | 23.420% | 55.900% |

Full Details would be posted under Apprendix

Strategy(2)  
We would fix Upper Threshold : 2 & Lower Threshold : -2

Highlights :

|  |  |  |  |
| --- | --- | --- | --- |
| Windows | Sharpe | Annual Return | MDD |
| 10 | 0.719 | 11.776% | 25.2% |
| 15 | 0.766 | 13.161% | 27.0% |
| 30 | 0.697 | 13.138% | 24.8% |
| 60 | 0.751 | 14.941% | 23.2% |
| 90 | 0.354 | 6.407% | 32.4% |
| 180 | 0.276 | 4.496% | 41.2% |

**Conclusion:**

By comparing two strategies, the spread (VOO/VTWO) would perform better when we serve it as the directional indicator. It has better Sharpe and Return in general.

For strategy (1), it is traded as the directional indicator of SPY Index. Taking the advantage of this spread, we can take the market in a smarter way. When the spread exceeds the upper threshold, the Large Cap shows some abnormal upside movement relative to the Small Cap which means that the market participants may be risk-off as they are more willing to take the exposure of the Large Cap instead of the Small Cap. We would long SPXS to have 3 times leverage exposure on Shorting Market Exposure , vice versa. When the spread stay within the range, we just take the normal market exposure by longing VOO.  
The Result suggested that we would take the rolling window of the standardization within 10 to 30 days.  
If the window is too long, the spread would be insensitive to the market sentiment.

For strategy (2), it has the market neutral property as it would do long/short to hedge away the market beta exposure. The strategy is still profitable which means that we can trade on the mean reversion of the standardized spread and we are trading the exposure of performance difference between Large Cap and Small Cap. However, the performance of this factor is worse than that of the market.

Apprendix

Strategy (1)

Windows : 10



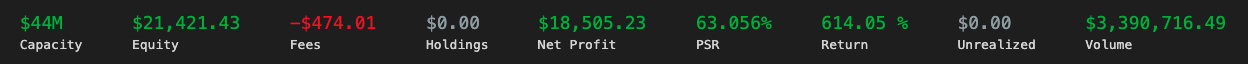
Chart, histogram

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A screen shot of a computer

Description automatically generated with low confidence

Windows : 15



Chart, line chart

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Windows : 30



Chart, line chart, histogram

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Windows : 60



Chart, line chart

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Windows : 90



Chart, line chart, histogram

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Windows : 180



Chart, line chart, histogram

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Strategy(2)

Windows : 10



Chart, histogram

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Windows : 15



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Windows : 30



Chart, line chart, histogram

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A screen shot of a computer

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Windows : 60



Chart, line chart, histogram

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Description automatically generated

Windows : 90



Chart, line chart

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Description automatically generated with low confidence

Windows : 180



Chart, line chart, histogram

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