VWAP, Sharpe and Alpha Analysis

**CUNY SPS MSDS**

**Professor Samuel Gralnick**

**Team Sugar Cane: Euclid Zhang, Jie Zou, Zhenni Xie**

**Fall 2022**

In this analysis, we are performing calculations of the Volume-Weighted Average Price (VWAP), Sharpe Ratio, and Alpha of our investment portfolio and the individual assets in the portfolio, based on the asset prices from 8/25/2022 to 10/7/2022.

Our investment portfolio includes the following assets, with purchasing prices (close prices) from 9/16/2022. In this analysis, **we will not include the U.S. 30 Year Treasury bonds in our calculation** because the metrics we are calculating are created to the compare portfolios of equities.

| **Ticker** | **Type** | **Sector** | **Units** | **Amount** |
| --- | --- | --- | --- | --- |
| US30Y | U.S. 30 Year Treasury | NaN | 467317.00 | 42262981.19 |
| HSON | Common Stock | COMMERCIAL SERVICES | 36138.24 | 1263031.49 |
| GOGO | Common Stock | COMMUNICATIONS | 94822.19 | 1263031.57 |
| JAKK | Common Stock | CONSUMER DURABLES | 54044.99 | 1263031.42 |
| CALM | Common Stock | CONSUMER NON-DURABLES | 22216.91 | 1263031.33 |
| HRB | Common Stock | CONSUMER SERVICES | 28111.09 | 1263031.27 |
| HDSN | Common Stock | DISTRIBUTION SERVICES | 159071.98 | 1263031.52 |
| BELFA | Common Stock | ELECTRONIC TECHNOLOGY | 44285.81 | 1263031.30 |
| ARLP | Common Stock | ENERGY MINERALS | 52890.76 | 1263031.35 |
| CI | Common Stock | HEALTH SERVICES | 4350.03 | 1263031.21 |
| SRTS | Common Stock | HEALTH TECHNOLOGY | 85339.97 | 1263031.56 |
| LNG | Common Stock | INDUSTRIAL SERVICES | 7551.75 | 1263030.19 |
| BSM | Common Stock | MISCELLANEOUS | 80447.87 | 1263031.56 |
| HUDI | Common Stock | NON-ENERGY MINERALS | 42612.40 | 1263031.54 |
| CF | Common Stock | PROCESS INDUSTRIES | 12810.95 | 1263031.56 |
| CSL | Common Stock | PRODUCER MANUFACTURING | 4335.84 | 1263030.19 |
| MUSA | Common Stock | RETAIL TRADE | 4561.65 | 1263029.65 |
| AZPN | Common Stock | TECHNOLOGY SERVICES | 5579.50 | 1263031.42 |
| ASC | Common Stock | TRANSPORTATION | 126303.15 | 1263031.50 |
| ED | Common Stock | UTILITIES | 12966.13 | 1263030.72 |
| YCS | ETF | NaN | 25261.96 | 1599839.93 |
| UUP | ETF | NaN | 54416.32 | 1599839.81 |
| EUO | ETF | NaN | 47870.73 | 1599839.80 |
| EWV | ETF | NaN | 79832.33 | 1599839.89 |
| DIG | ETF | NaN | 44390.67 | 1599839.75 |
| TTT | ETF | NaN | 23645.28 | 1599839.64 |
| ERX | ETF | NaN | 29349.47 | 1599839.61 |
| TMV | ETF | NaN | 13430.49 | 1599839.97 |
| TBT | ETF | NaN | 54509.02 | 1599839.74 |
| TYO | ETF | NaN | 127782.74 | 1599839.90 |

The Volume-Weighted Average Price (VWAP) is calculated using the following formula

The Sharpe Ratio is calculated using the following formula

For the risk-free rate, we use the yield rate of the U.S. 3 Month Treasury Bill as of 10/07/2022, 3.365% (<https://www.marketwatch.com/investing/bond/tmubmusd03m?countrycode=bx>). We calculated the daily return using 251 trade days in a year. The gain is 0.01319% per trading day.

The Alpha is derived from the following regression model

In this analysis, we calculate three different alphas using the S&P 500 ("^GSPC"), Dow Jones ("^DJI"), and Nasdaq Composite ("^IXIC") indexes as benchmarks. The historical yield rates of the U.S. 3 Month Treasury Bill during the same time frame are used to calculate the risk-free return per trading day.

The results of our calculations are showed below:

|  | **VWAP** | **Purchased Price** | **2022-10-07** | **Sharpe Ratio** | **Alpha SP500** | **Alpha Dow Jones** | **Alpha Nasdaq** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ARLP** | 24.59 | 23.88 | 24.31 | -0.037640 | 0.002477 | 0.002153 | 0.002812 |
| **ASC** | 9.72 | 10.00 | 9.53 | -0.005351 | 0.000966 | 0.000789 | 0.001041 |
| **AZPN** | 228.50 | 226.37 | 253.41 | 0.278757 | 0.008350 | 0.008068 | 0.008586 |
| **BELFA** | 29.62 | 28.52 | 29.03 | -0.105511 | -0.001059 | -0.001097 | -0.000781 |
| **BSM** | 15.97 | 15.70 | 17.36 | 0.106568 | 0.005186 | 0.005072 | 0.005357 |
| **CALM** | 57.21 | 56.85 | 53.63 | -0.031122 | 0.001702 | 0.001442 | 0.001986 |
| **CF** | 102.63 | 98.59 | 104.80 | -0.093633 | 0.000446 | 0.000400 | 0.000516 |
| **CI** | 286.76 | 290.35 | 288.38 | -0.022557 | 0.002893 | 0.003031 | 0.002774 |
| **CSL** | 294.12 | 291.30 | 292.45 | -0.137457 | 0.001818 | 0.001723 | 0.001823 |
| **DIG** | 35.23 | 36.04 | 38.81 | -0.009746 | 0.008873 | 0.008822 | 0.008746 |
| **ED** | 94.15 | 97.41 | 81.58 | -0.368656 | -0.002916 | -0.002964 | -0.003033 |
| **ERX** | 55.00 | 54.51 | 59.27 | -0.009438 | 0.008908 | 0.008876 | 0.008772 |
| **EUO** | 34.34 | 33.42 | 35.28 | 0.104874 | -0.001111 | -0.001157 | -0.001083 |
| **EWV** | 20.58 | 20.04 | 21.42 | 0.257220 | 0.000566 | 0.000408 | 0.000542 |
| **GOGO** | 13.11 | 13.32 | 12.71 | -0.269087 | -0.004542 | -0.004563 | -0.004492 |
| **HDSN** | 8.17 | 7.94 | 7.52 | -0.254706 | -0.004986 | -0.005030 | -0.004891 |
| **HRB** | 43.78 | 44.93 | 38.05 | -0.323418 | -0.004123 | -0.004386 | -0.003896 |
| **HSON** | 34.68 | 34.95 | 32.57 | -0.241838 | -0.003422 | -0.003121 | -0.003893 |
| **HUDI** | 23.48 | 29.64 | 25.09 | 0.198391 | 0.022074 | 0.021163 | 0.022817 |
| **JAKK** | 22.78 | 23.37 | 19.88 | -0.193696 | -0.001289 | -0.001708 | -0.000933 |
| **LNG** | 164.29 | 167.25 | 174.00 | 0.037121 | 0.002856 | 0.002854 | 0.002778 |
| **MUSA** | 281.62 | 276.88 | 269.14 | -0.185857 | -0.000360 | -0.000268 | -0.000545 |
| **SRTS** | 13.05 | 14.80 | 11.93 | -0.086363 | 0.000191 | -0.000218 | 0.000397 |
| **TBT** | 29.77 | 29.35 | 32.60 | 0.257472 | 0.005416 | 0.005410 | 0.005470 |
| **TMV** | 122.16 | 119.12 | 138.59 | 0.258431 | 0.008075 | 0.008051 | 0.008168 |
| **TTT** | 69.32 | 67.66 | 78.91 | 0.258891 | 0.008250 | 0.008234 | 0.008341 |
| **TYO** | 12.78 | 12.52 | 13.84 | 0.291776 | 0.003927 | 0.003936 | 0.004014 |
| **UUP** | 29.78 | 29.40 | 30.30 | 0.186173 | -0.000043 | -0.000070 | -0.000018 |
| **YCS** | 63.35 | 63.33 | 65.74 | 0.317407 | 0.002917 | 0.002848 | 0.002791 |
| **Portfolio** | 76.93 | 76.79 | 78.40 | 0.040293 | 0.002527 | 0.002414 | 0.002599 |

We purchased the portfolio with a price (76.79 per unit) lower than the VWAP (76.93 per unit) and the current value of a unit is 78.40. We are making a profit and we may consider selling some assets that the current value is higher than the VWAP. The Sharpe Ratio is positive, indicating that our portfolio is performing better than the risk-free investment. Some of the individual assets have a negative Sharpe Ratio, we may sell some of them and reallocate the fund to risk-free investments or other equities. The Alphas calculated using three different benchmarks are showing that our portfolio outperformed the three market indexes. Overall, our portfolio is performing well. Some minor adjustments may be good, but we can hold the assets for now as the observation is based on a few weeks only.