

VWAP, Sharpe and Alpha Analysis

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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 do not include the U.S. 30 Year Treasury bonds in our calculation** because the metrics we are calculating are created to compare portfolios of equities.

Ticker	Type	Sector	Units	Amount
US30Y	U.S. 30 Year Treasury	NaN	467317.00	42262981.19
HSN	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

Ticker	Type	Sector	Units	Amount
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

$$VWAP = \frac{\sum[(daily\ high\ price + daily\ low\ price + daily\ close\ price) * daily\ trading\ volume]}{\sum daily\ trading\ volume}$$

The Sharpe Ratio is calculated using the following formula

$$Sharpe\ Ratio = \frac{return\ of\ portfolio - risk\ free\ rate}{standard\ deviation\ of\ the\ portfolio's\ return}$$

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

$$return\ of\ investment - risk\ free\ rate = alpha + beta * (return\ of\ benchmark - risk\ free\ rate)$$

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

	VWAP	Purchased Price	2022-10-07	Sharpe Ratio	Alpha SP500	Alpha Dow Jones	Alpha Nasdaq
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
HSN	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
Equities	76.93	76.79	78.40	0.040293	0.002527	0.002414	0.002599

We purchased the sub-portfolio of equities 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 equities has a better return 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.