Connor McHugh

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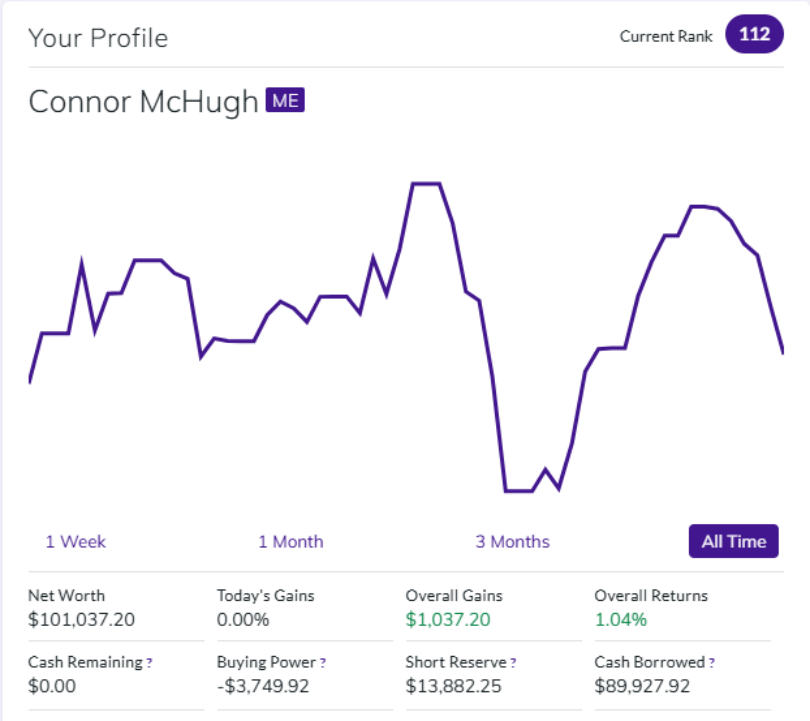
Financial Analytics 454

10 December 2024

VSE Report Introduction



In the VSE simulation exercise, I am given $100,000 to trade from October 10th, 2024, to December 6th, 2024. At the end of December 6th, 2024, my overall gain is $1,037 with an overall return of 1.037%. My overall return is computed as $1,037/$100,000. I have $0 cash remaining, and my rank is #112 in my class. Above is a snapshot of my player profile, and below is a snapshot of my player holdings Excel sheet.

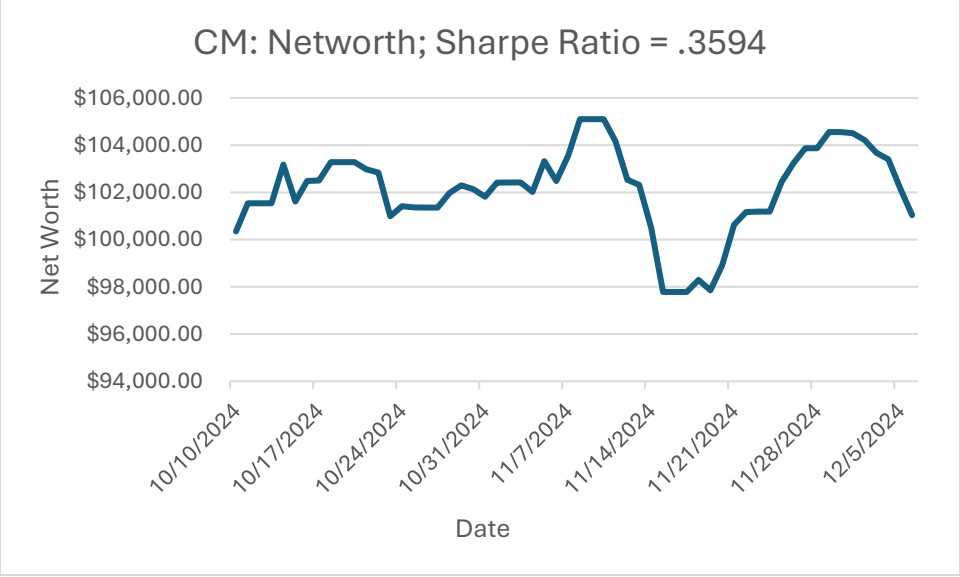
Symbol	Shares	% Holdings	Type	Price	Price Change	Price Change %	Value	Value Gain/Loss	Value Gain/Loss %	Players Holding
XLB	147	7%	BUY	$91.91	-2.24	0.54%	$13,510.77	($310.17)	-2.24%	N/A
XLK	30	4%	BUY	$240.84	2.12	-0.41%	$7,225.20	$150.15	2.12%	N/A
XLP	728	29%	BUY	$82.38	2.95	0.22%	$59,972.64	$1,718.08	2.95%	N/A
XLRE	39	< 1%	SHORT	$43.77	0	0.10%	$1,707.03	($13.65)	-0.81%	N/A
XLU	30	1%	BUY	$79.69	0.65	-0.83%	$2,390.70	$15.45	0.65%	N/A
XLV	751	53%	BUY	$144.28	-2.06	0.23%	$108,354.28	($2,277.56)	-2.06%	N/A
XLY	39	4%	SHORT	$232.80	0	-0.03%	$9,079.20	($541.52)	-6.34%	N/A

Among others, 728 shares of XLP provided the most value, with a gain of $1,718. 751 shares of XLV provided the least value, with a loss of $2,277. The 728 shares of XLP was my top performer, with a 2.95% value gain, and 39 shares of XLY are my bottom performer, with a loss of 6.34% of the value.

Below is a screenshot of my portfolio performance. The left screenshot is my net worth earlier in the game and the right on is my net worth later into the game.

Rank	Date	Cash	Cash Inter	Net Worth	% Return
0	10/8/2024	$100,000.00	$0.00	$100,000.00	0.00%
0	10/9/2024	$100,000.00	$0.00	$100,000.00	0.00%
5	10/10/2024	$0.00	$0.00	$100,342.96	0.34%
4	10/11/2024	$0.00	$0.00	$101,540.11	1.54%
4	10/12/2024	$0.00	$0.00	$101,540.11	1.54%
4	10/13/2024	$0.00	$0.00	$101,540.11	1.54%
4	10/14/2024	$0.00	$0.00	$103,174.48	3.17%
5	10/15/2024	$0.00	$0.00	$101,609.51	1.61%
4	10/16/2024	$0.00	$0.00	$102,483.95	2.48%
4	10/17/2024	$0.00	$0.00	$102,501.30	2.50%
4	10/18/2024	$0.00	$0.00	$103,278.58	3.28%
4	10/19/2024	$0.00	$0.00	$103,278.58	3.28%
4	10/20/2024	$0.00	$0.00	$103,278.58	3.28%
3	10/21/2024	$0.00	$0.00	$102,973.22	2.97%
3	10/22/2024	$0.00	$0.00	$102,837.89	2.84%
5	10/23/2024	$0.00	$0.00	$100,988.38	0.99%
6	10/24/2024	$0.00	$0.00	$101,418.66	1.42%
6	10/25/2024	$0.00	$0.00	$101,363.14	1.36%
6	10/26/2024	$0.00	$0.00	$101,352.73	1.35%
6	10/27/2024	$0.00	$0.00	$101,352.73	1.35%
5	10/28/2024	$0.00	$0.00	$101,973.86	1.97%
6	10/29/2024	$0.00	$0.00	$102,300.04	2.30%
8	10/30/2024	$102,137.36	$0.00	$102,137.36	2.14%
6	10/31/2024	$0.00	$0.00	$101,813.02	1.81%
2	11/1/2024	$0.00	$0.00	$102,412.09	2.41%
2	11/2/2024	$0.00	$0.00	$102,417.89	2.42%
2	11/3/2024	$0.00	$0.00	$102,417.89	2.42%
2	11/4/2024	$0.00	$0.00	$102,022.23	2.02%
4	11/5/2024	$0.00	$0.00	$103,320.59	3.32%
67	11/6/2024	$0.00	$0.00	$102,478.94	2.48%
59	11/7/2024	$0.00	$0.00	$103,552.05	3.55%
57	11/8/2024	$0.00	$0.00	$105,099.05	5.10%

Rank	Date	Cash	Cash Inter	Net Worth	% Return
57	11/8/2024	$0.00	$0.00	$105,099.05	5.10%
57	11/9/2024	$0.00	$0.00	$105,099.05	5.10%
57	11/10/2024	$0.00	$0.00	$105,099.05	5.10%
73	11/11/2024	$0.00	$0.00	$104,159.42	4.16%
80	11/12/2024	$0.00	$0.00	$102,533.62	2.53%
84	11/13/2024	$0.00	$0.00	$102,320.41	2.32%
95	11/14/2024	$0.00	$0.00	$100,497.74	0.50%
119	11/15/2024	$0.00	$0.00	$97,783.71	-2.22%
119	11/16/2024	$0.00	$0.00	$97,783.71	-2.22%
119	11/17/2024	$0.00	$0.00	$97,783.71	-2.22%
116	11/18/2024	$0.00	$0.00	$98,294.42	-1.71%
122	11/19/2024	$0.00	$0.00	$97,852.31	-2.15%
115	11/20/2024	$0.00	$0.00	$98,918.16	-1.08%
101	11/21/2024	$0.00	$0.00	$100,629.40	0.63%
101	11/22/2024	$0.00	$0.00	$101,165.38	1.17%
101	11/23/2024	$0.00	$0.00	$101,185.82	1.19%
101	11/24/2024	$0.00	$0.00	$101,185.82	1.19%
91	11/25/2024	$0.00	$0.00	$102,436.13	2.44%
91	11/26/2024	$0.00	$0.00	$103,232.12	3.23%
83	11/27/2024	$0.00	$0.00	$103,866.23	3.87%
83	11/28/2024	$0.00	$0.00	$103,866.23	3.87%
85	11/29/2024	$0.00	$0.00	$104,554.74	4.55%
85	11/30/2024	$0.00	$0.00	$104,554.74	4.55%
85	12/1/2024	$0.00	$0.00	$104,503.78	4.50%
80	12/2/2024	$0.00	$0.00	$104,217.50	4.22%
85	12/3/2024	$0.00	$0.00	$103,672.26	3.67%
95	12/4/2024	$0.00	$0.00	$103,398.54	3.40%
101	12/5/2024	$0.00	$0.00	$102,177.34	2.18%
112	12/6/2024	$0.00	$0.00	$101,037.20	1.04%



To create this graph, I plotted the net worth of my portfolio against the day of the game. Two somewhat significant drop-offs in net worth can be seen, occurring right after November 7th and November 28th. The presidential election can explain the first drop, as it added uncertainty

to the market and made some ETFs more favorable than others. The second drop could be explained by Black Friday. Leading up to Black Friday, my portfolio was gaining value as people were going shopping. After Black Friday, my portfolio started to lose value, as stock prices were starting to come down after being inflated by Black Friday sales. My annualized Sharpe Ratio is .3594. I calculated this in Excel by finding the daily portfolio return and then using those daily returns to find the mean daily return and the daily return standard deviation. I then calculated my Sharpe Ratio and multiplied it by the square root of 252 to find my annualized Sharpe ratio. A Sharpe Ratio of .3594 means that for every unit of risk I take on, I received .3594% excess return.

This graph shows that, looking past the post-election net worth drop, my portfolio performed somewhat well overall. The only time my net worth dropped below the original $100,000 I was given to trade was between November 15th and 20th, with my portfolio quickly gaining its value back after that. Even though I finished with only a 1.04% overall gain, my gains were at about 4.5% 5 days before the game ended. If this return held steady until the game ended, I would've ended up in around the top 80 instead of the position I ended up in. Given that this is my first time trying out investing and investing with a strategy in mind, I am pleased with my performance.

Transaction Dairy

Transaction 1: SPY

On October 10th, 2024, I used a daily return sample of SPY from October 10th, 2020, to October 10th, 2024, to perform analysis

My analysis is based on my knowledge of "Capital Allocation to Risky Assets"

First, I downloaded the data and computed the excess return.

Then I calculated my risk premium, which is 1.167.

Next, I calculated the risk premium and standard deviation of the SPY Excess Return.

Finally, I computed my portfolio weight for SPY, which is 1. From my code, I got that my y0* = 3.19. Because the maximum we can invest is 200,000, I will only invest this amount even though my R Code tells me to invest more. To do this, I set my y0* to 2 and then did the rest of the calculations as usual. The current price of SPY on October 10th, 2024, is 575.28. This means I will propose to buy 347 shares of SPY at the market price on October 10th, 2024. The rest of my wealth is cash. There was an error when buying the shares, which resulted in the two transactions seen below. Initially, my code told me to buy one set of shares. Then, I had to edit my code due to errors encountered during class. This edit changed the number of shares of SPY that was optimal for me to invest in, resulting in the two SPY trades seen below. In the future, I will hold off buying until I know with 100 percent certainty the number of shares I will be purchasing.

Transactions

HISTORY PENDING ORDERS Download

Symbol	Order Date/Time	Transaction Date/Time	Type	Amount	Ex. Price
SPY	10/10/24 3:09p ET	10/10/24 3:09p ET	Buy	197	$574.95
SPY	10/10/24 2:31p ET	10/10/24 2:31p ET	Buy	150	$575.26

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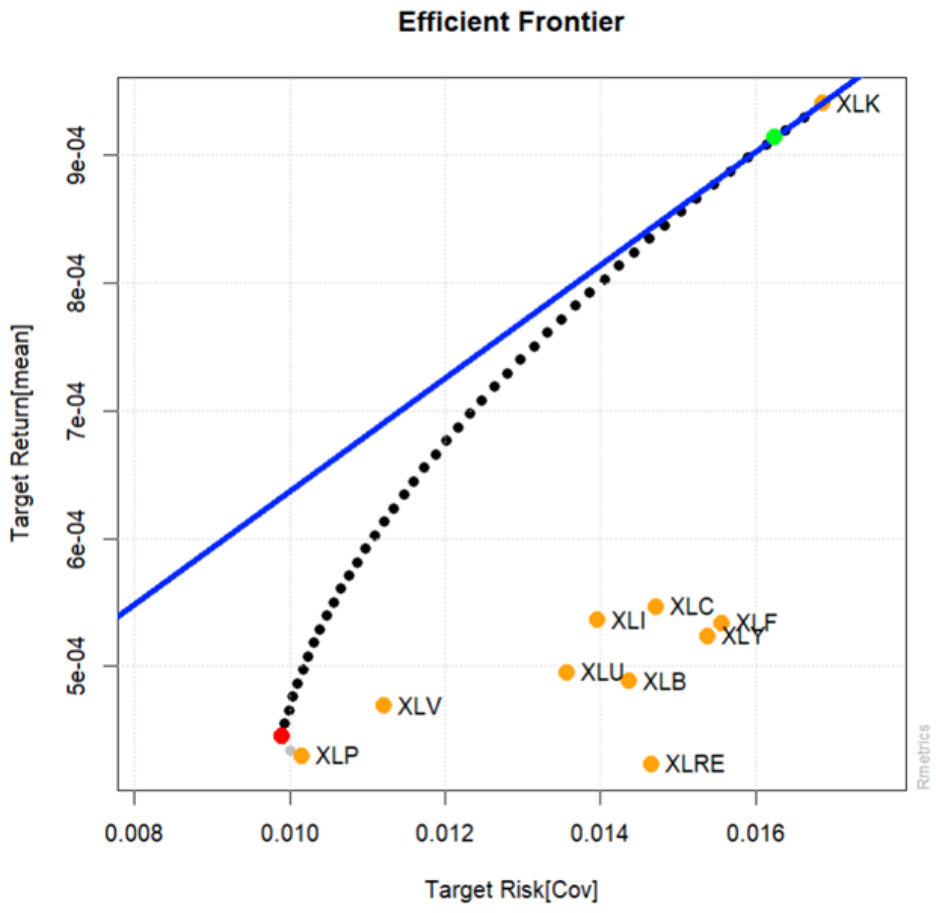
My R code for this analysis is from line 1 to line 28 in the "VSE_ConnorMcHugh.R"

In fact, I bought 347 SPY at the market price of 575.26/574.95 on October 10th, 2024. And 0 is in cash.

Efficient Frontier Graph



For my sample period, July 31st, 2018, to October 23rd, 2024, the optimal risky portfolio falls slightly below the XLK portfolio. This means that I cannot reach my optimal risky portfolio without combining a few ETFs. These ETFs most likely include a variety of ETFs with lower returns and lower risks than XLK. This portfolio would have a lower return than XLK but with a lower risk, making it optimal for me. The code for the graph can be found on line 31-110 in the "VSE_ConnorMcHugh.R" file.

Transaction 2: EF

On October 29th, 2024, I used a daily return sample of XLK, XLV, XLF, XLY, XLP, XLU, XLE, XLC, XLI, XLRE, and XLB from July 31, 2018, to October 23, 2024, to perform analysis.

My analysis is based on my knowledge of "Optimal Risky Portfolios"

I first loaded all the ETF data

Then I combined all the separate xts objects into 1 xts object

Then I computed my efficient frontier, plotted it, and added single asset points and labels. After this, I added my minimum variance point and a tangency line and point.

Then I computed the ETFs financial indicators and removed my 3 most risky ETFs, which were XLK, XLE, and XLY

Next, I selected which ETFs I want to include in my optimal portfolio, which were XLV, XLP, and XLB, and calculated my tangency portfolio.

Then, I calculated my y0*, which was 2.52. This was set to 2 so the max amount I can invest is 200,000

Lastly, I computed my portfolio weight for XLV, XLP, and XLB, which were 52.28%, 38.47%, and 9.25%, respectively. The current price of XLV is 148.12, XLP is 80.28, and XLB is 94.64. This means I will propose to sell 347 shares of SPY at the market price of 581.77 and buy 721 shares of XLV at the market price of 148.12, 978 shares of XLP at the market price of 80.28, and 199 shares of XLB at the current market price of 94.64. The rest of my wealth is cash. The reason why the price is different from when I did my analysis is because I used the market close price to perform analysis, and I bought at the market open price. The difference is marginal, however, and still let me purchase my optimal number of shares. Also, there is about a week between when I performed the analysis and when I bought. This was because I was instructed to wait until the next week to trade so I could get more gains from my SPY shares.

Transactions

HISTORY PENDING ORDERS Download

Symbol	Order Date/Time	Transaction Date/Time	Type	Amount	Ex. Price
XLV	10/30/24 5:25p ET	10/31/24 9:31a ET	Buy	721	$147.24
XLP	10/30/24 5:24p ET	10/31/24 9:31a ET	Buy	978	$80.02
XLB	10/30/24 5:23p ET	10/31/24 9:31a ET	Buy	199	$94.02
SPY	10/29/24 6:36p ET	10/30/24 9:30a ET	Sell	347	$581.33

My R code for this analysis is from line 31 to line 138 in the "VSE_ConnorMcHugh.R"

In fact, I bought 721 of XLV, 978 of XLP, and 199 of XLB at the market open price opening price on October 31, 2024. And the cash amount is 0.

Transaction 3: IR

On November 11th, 2024, I used a daily return sample of XLK, XLV, XLF, XLY, XLP, XLU, XLE, XLC, XLI, XLRE, XLB from June 31st, 2018, to November 11th, 2024, to perform analysis.

My analysis is based on my knowledge of "Single Index Models"

I first loaded all the ETF data

Then I created a loop to pull out all the ETF data

Then I downloaded my risk-free rate using the DGS3MO function

Then I merged my ETF data, risk free rate, and market returns

Next, I created a linear model and viewed information in it regarding the slope, alpha, and other important data.

Then, I calculate my information ratio and created a table that shows the information ratio, alpha, beta, and sigma for the 11 ETFS

Lastly, I chose which ETFS I want to invest in.

Finally, I got that I want to buy XLK, XLU, and XLV. I will sell 250 shares of XLP at the market opening price of 80.74 and 52 of XLB at the market opening price of 94.45 to finance this trade. This trade will leave me with about 28,000 of capital that I can invest equally in my two trades, meaning that I will use 14,000 of capital to finance this trade. The market opening price of XLK is 235.84, XLU is 79.18, and XLV is 149.06. This means I will propose to buy 30 shares each of

XLK, XLU, and XLV, as my portfolio is equally weighted. The rest of my wealth is cash. A screenshot of this transaction can be seen below.

XLV	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy	30	$149.06
XLU	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy	30	$79.18
XLK	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy	30	$235.84

I also got that I want to short sell XLY, XLRE, and XLB. I will sell 250 shares of XLP at the market opening price of 80.82 and 52 of XLB at the market opening price of 94.47 to finance this trade. This trade will leave me with about 14,000 in capital to invest after making my previous trade. The market opening price of XLY is 218.92, XLRE is 43.42, and XLB is 93.62. This means I will propose to buy 39 shares each of XLY, XLRE, and XLB, as my portfolio is equally weighted. The rest of my wealth is cash. A screenshot of this transaction can be seen below. The reason why there are two cancelled transactions is because I accidentally bought XLB and XLRE normally instead of selecting the short selling option. Since I made the trade after hours, the trade didn't go through, and I was able to cancel it. This mistake did not have any impact on my ability to make my trades.

XLB	11/11/24 4:46p ET	11/12/24 9:30a ET	Short	39	$93.62
XLRE	11/11/24 4:45p ET	11/12/24 9:30a ET	Short	39	$43.42
XLB	11/11/24 4:42p ET		Buy ⚠	39	N/A
XLRE	11/11/24 4:41p ET		Buy ⚠	39	N/A
XLY	11/11/24 4:41p ET	11/12/24 9:30a ET	Short	39	$218.92

My R code for this analysis is from line 139 to line 213 in the "VSE_ConnorMcHugh.R"

In fact, I bought 30 of XLK, 30 of XLU, 30 of XLV, 39 of XLY, 39 of XLRE, and 39 of XLB at the market opening price on November 12th. And my cash amount is 0.

Transaction History

Below, you can find screenshots of my transaction history.

Symbol	Order Date	Transaction Date	Type	Cancel Reason	Amount	Price
XLB	11/11/24 4:46p ET	11/12/24 9:30a ET	Short		39	$93.62
XLRE	11/11/24 4:45p ET	11/12/24 9:30a ET	Short		39	$43.42
XLB	11/11/24 4:42p ET		Buy	User Initiated	39	N/A
XLRE	11/11/24 4:41p ET		Buy	User Initiated	39	N/A
XLY	11/11/24 4:41p ET	11/12/24 9:30a ET	Short		39	$218.92
XLV	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy		30	$149.06
XLU	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy		30	$79.18
XLK	11/11/24 4:39p ET	11/12/24 9:30a ET	Buy		30	$235.84
XLB	11/10/24 10:54a ET	11/11/24 9:30a ET	Sell		52	$94.45
XLP	11/10/24 10:53a ET	11/11/24 9:31a ET	Sell		250	$80.74
XLV	10/30/24 5:25p ET	10/31/24 9:31a ET	Buy		721	$147.24
XLP	10/30/24 5:24p ET	10/31/24 9:31a ET	Buy		978	$80.02
XLB	10/30/24 5:23p ET	10/31/24 9:31a ET	Buy		199	$94.02
SPY	10/29/24 6:36p ET	10/30/24 9:30a ET	Sell		347	$581.33
SPY	10/10/24 3:09p ET	10/10/24 3:09p ET	Buy		197	$574.95
SPY	10/10/24 2:31p ET	10/10/24 2:31p ET	Buy		150	$575.26