Martin Zweig Investment Strategy with Portfolio Optimization

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1. Introduction

This paper will explore the implementation of an investment strategy based on the principles of famous American stock investor, Martin Zweig. His strategy revolves mainly around identifying companies with strong growth potential by looking at their earnings and sales. The idea was to use his proposed criteria to identify a portfolio of diversified investments and evaluate its performance by comparing it to a benchmark, which is the S&P 500 market index.

Firstly, the paper will go through in the detail the investment strategy of Martin Zweig and the reasons behind his chosen criteria. Then, the reasons behind why the considered assets were chosen will be discussed. Next, an individual analysis will be performed on each asset to evaluate their performance. Once this is complete, a portfolio optimization will be carried to determine the combination of assets that generates a portfolio maximizing the Sharpe Ratio. Lastly, the performance of the portfolio will be evaluated and compared with that of the benchmark.

1.1 . About Martin Zweig

As mentioned previously, Martin Zweig was a famous American Investor whose investment strategy involved picking growth stocks through fundamental analysis. Unlike Warren Buffet and Benjamin Graham, who did not live extravagantly despite their wealth, Martin Zweig lived a lavish lifestyle while also working extremely hard (Reese 2009, Page 177). He used to write a newsletter about investments called the Zweig Forecast, which between the years of 1970 to 1985 provided a risk-adjusted return of 15.9% on average per year. His newsletter went on to become very popular. Later, he founded Zweig-DiMenna Partners with his mentee, which was a long/short investment firm focusing mainly on US stocks. The hedge fund was ranked in the top 75 best hedge funds in the world in 2008 and despite the 2007/08 financial crisis, the fund still managed to obtain returns of 79.1% in 2007 (Reese 2009, Page 179). Unfortunately, during his time as chairman he passed away, but his strategy still lives on and is very highly regarded.

1.2. Martin Zweig's Investment Strategy

Martin Zweig has a very detailed approach towards choosing what stocks to invest in. His approach emphasizes on ensuring that companies have very strong earnings, which is looked

at from many different angles (majority of his criteria involves looking at earnings). These criteria are discussed with further detail in this section of the paper. He also looks at other elements related to the leverage taken on by companies to determine whether it would be a good fit for the portfolio.

1.2.1. P/E Ratio

When looking at the P/E ratio, Martin Zweig suggests that only stocks with a P/E ratio greater than 5 should be considered because anything below 5 would be an indication of a weak company. Also, he states that P/E ratio should not be more than 43 or 3 times the market P/E ratio, which is the S&P 500 market index in this case. The reason being because anything higher than these values are risky stocks (Reese 2009, Page 187). A high P/E ratio is an indication that the stock might be overpriced, which makes it risky because investors could lose money when it reverts to its fundamental value.

1.2.2. Revenue Growth

With regards to revenue growth, his strategy suggests looking at the quarterly revenue growth. So, the idea is to compare the revenue growth between the last financial quarter (**FQ**) and the same quarter in the previous year with the revenue growth between **FQ - 1** and the same quarter in the previous year. Ideally, the revenue growth in **FQ** > **FQ - 1**. Essentially, the revenue should be increasing between on a quarterly basis between the years (Reese 2009, Page 189). This would be a sign of growth.

1.2.3. Earnings Trend

Zweig's strategy also focuses on ensuring that the latest earnings are strong and indicate a positive trend for the future. The first measure that he uses to determine if this is the case is by checking if the current earnings per share (EPS) is positive. The next measure requires that the EPS for the same quarter in the previous year is also positive. The final measure requires that the growth rate of the current quarters EPS is greater than the EPS growth rate in the same quarter one year prior (Reece 2009, Page 189). If the stock satisfies these criterions, it would be a good sign of an upward trend in the future.

1.2.4. Earnings Persistence

The reason for measuring the earnings persistence of a company is to understand if they have had stable growth over a long period of time. Like the earnings trend, whether the company is considered to have earnings persistence depends on some measures. The first one being an increasing EPS for the last 5 years for each year. However, there is an exception with this measure. The exception being that 1 year is allowed to have non-increasing EPS (Reece 2009, Page 190). In addition to this, Zweig wanted to ensure that the EPS growth rate over the last 3 years is at least greater than 15%, with a value greater than 30% considered to be excellent (meetinvest, n.d.).

1.2.5. Total Debt-to-Equity Ratio

When looking at the total debt-to-equity ratio, Zweig suggests that the companies should have a total debt-to-equity that is less than their industry average. This is a good indication of how much debt the company is taking on relative to its peers (Reece 2009, 192).

2. Proposed Investment Strategy

The foundation of the strategy is to follow the criteria set by Martin Zweig. So, the proposed investment strategy is to create a diversified portfolio of stocks from several industries that each meet Zweig's strategy's requirements. As it was challenging to find stocks that met all the criteria proposed by Martin Zweig, stocks that met most of the criteria were considered. Hence, minor violations in some of the criteria were still considered to be acceptable stocks.

In addition to these stocks, the First Trust NASDAQ Clean Edge Green Energy Index Fund ETF (**QCLN**) was also considered as environmentally friendly stocks are growing more popular due to the increased environmental concerns over the past few decades. Environmentally friendly companies (or stocks) have huge growth potential and are becoming one of the main elements of consideration when choosing what to invest in. Hence why the ETF was also chosen to be part of the portfolio. As the name suggests, the ETF invests in clean energy companies that are listed in the United States.

Lastly, a portfolio optimization was carried out on the portfolio of proposed investments to determine which combination of assets would maximize the Sharpe Ratio of the portfolio. As a result of running the portfolio optimization, some stocks had to be dropped because they did contribute to the portfolio of assets that yielded the maximum Sharpe Ratio. The final portfolio consisted of 3 stocks that met Zweig's criteria and the Clean Edge Green Energy Index Fund ETF.

2.1 Selected Assets

As stated before, the ETF was chosen along with several other stocks at the initial stage. These stocks along with their ticker symbols and the sectors that they belong to can be seen in **Table 1** below:

Stock/Company	Ticker	Industry	Sector
First American Financial	FAF	Financial Services	Insurance
Whirlpool Corporation	CLFD	Consumer Cyclical	Home Appliances
Clearfield Incorporated	WHR	Technology	Communications Equipment
Atlas Air Worldwide Holdings	AAWW	Industrials	Airports & Air Services
Meritage Homes	MTH	Consumer Cyclical	Residential Construction
Quest Diagnostics Incorporated	DGX	Healthcare	Diagnostics & Research

Table 1: *Brief Description of chosen stocks/companies*

In combination with the ETF, this creates a diversified range of options to invest in, from the insurance sector all the way to the real estate sector. Plotting the monthly returns of each of these assets, together with the benchmark (**S&P500**) and the 13-week treasury bills, the following figure is obtained:
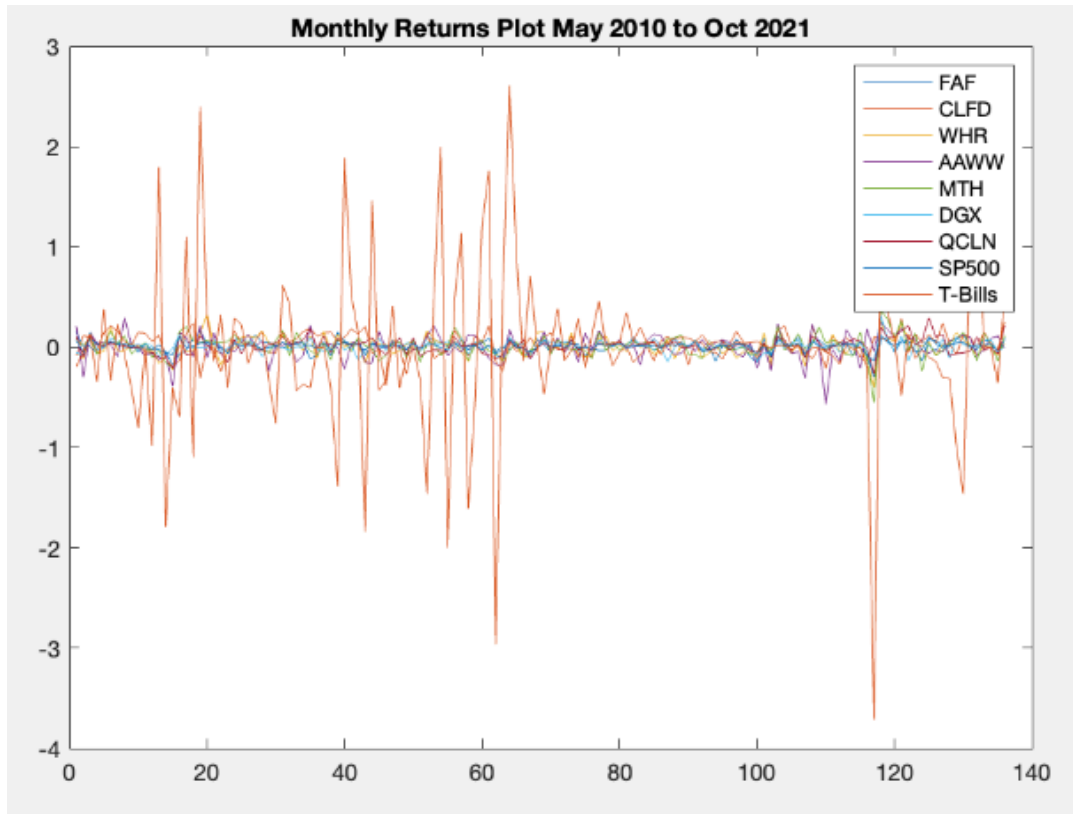
Figure 1: *Monthly returns of selected assets*

Looking at the monthly returns, we can see that the general observations is that all the assets excluding the 13-week treasury bills seem to generate constant/stable returns over the given time. The monthly returns tend to stay around 0 and some assets seem to be more volatile than others. Something that sticks out is the monthly returns of the 13-week treasury bills. From the graph, the implication is that the returns of the treasury bills are extremely volatile. They experience very high highs and low lows relative to the selected assets. The exact average monthly returns along with some descriptive statistics are shown in **Table 2** over a period of 136 months beginning at 28-May-2010:

	Mean	Max	Min	Std	Skewness	Kurtosis
FAF	0.0129	0.1567	-0.2974	0.0684	-0.9849	5.4819
CLFD	0.0227	0.2891	-0.3819	0.1224	-0.5546	3.3249
WHR	0.0064	0.3302	-0.3989	0.1023	-0.0584	4.5837
AAWW	0.0039	0.2955	-0.5687	0.1305	-0.8353	5.2612
MTH	0.0140	0.3644	-0.5528	0.1098	-0.6827	7.7325
DGX	0.0080	0.3157	-0.2782	0.0659	-0.0897	7.7718
QCLN	0.0129	0.2911	-0.2675	0.0807	0.0945	4.4643

^GSPC	0.0110	0.1194	-0.1337	0.0392	-0.5175	4.4172
^IRX	-0.0093	2.6101	-3.7136	0.8270	-0.5182	7.6042

Table 2: *Descriptive statistics of all the assets.*

Note: ^GSPC is the ticker for the S&P500 and ^IRX for the 13-week treasury bills.

Looking at the descriptive statistics of the monthly returns, the stock that yields the highest monthly returns is Clearfield Incorporated (**CLFD**), with an average monthly return of 2.27%. At its peak, the stock yielded a huge monthly return of 28.91%. However, among all the stocks it also has the highest Sharpe Ratio, which is consistent with the whole concept of "*high risk and high reward.*" Majority of the selected stocks have an average monthly return that is more than the S&P500 market index, which has an average monthly return of 1.1%. The stock that yields the lowest average monthly return is Whirlpool Corporation (**WHR**), with a return of 0.64%. Now, the extreme volatility of the 13-week treasury bill that was observed in **Figure 1** is emphasized even further in when looking at its descriptive statistics. It has a standard deviation of 0.8270, which is significantly higher than the selected stocks. The treasury bill also yields a negative average return of -0.93% every month.

As we are dealing with growth strategy, we are interested in medium to long term returns. Hence, it would be interesting to look at the yearly returns of each asset. This is shown in **Figure 2** below:
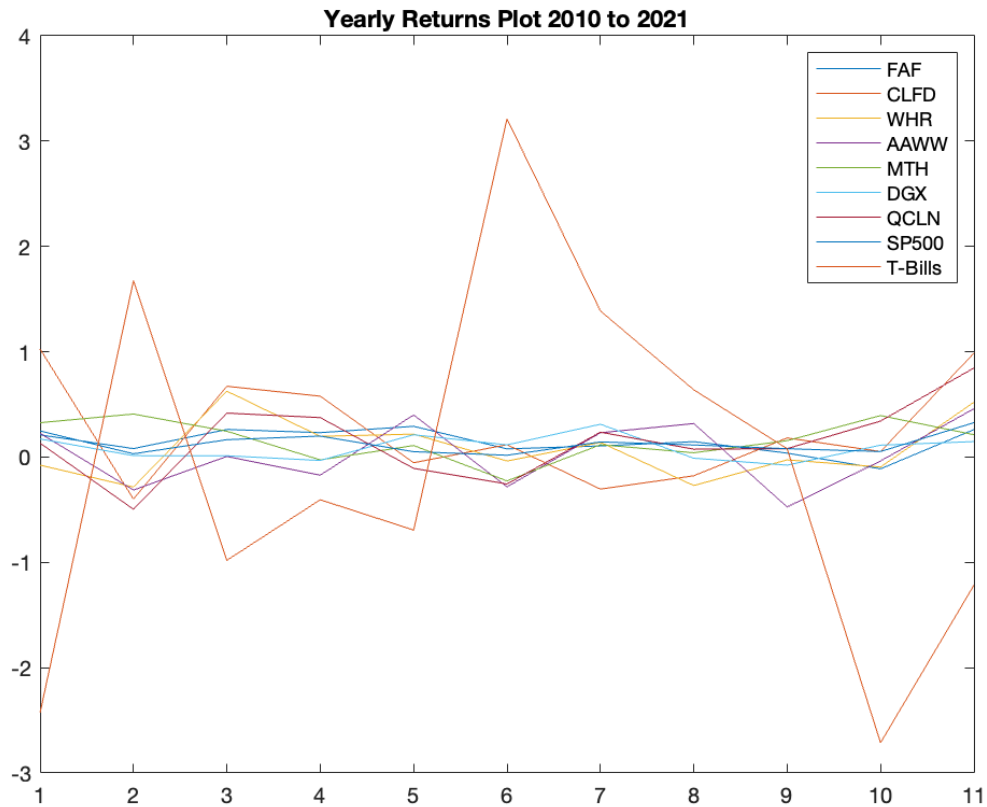
Figure 2: *Yearly returns of the selected assets*

When looking at the selected stocks, Clearfield Incorporated (**CLFD**) seems to have returns higher than the other stocks most frequently but also has the greatest volatility. The clean energy ETF also seems to be performing well on a yearly basis. As in the case with monthly returns, the treasury bills seem to have the most volatile returns even on a yearly basis. The descriptive statistics of each stock can be seen in **Table 3.**

	Mean	Max	Min	STD	Skewness	Kurtosis
FAF	0.1448	0.2919	-0.1118	0.1218	-0.6645	2.7113
CLFD	0.2436	1.0260	-0.3992	0.4996	0.3917	1.8154
WHR	0.0827	0.6259	-0.2849	0.2940	0.5865	2.3577
AAWW	0.0328	0.4592	-0.4739	0.3159	-0.1552	1.6873
MTH	0.1595	0.4084	-0.2267	0.1890	-0.5008	2.7041
DGX	0.0887	0.3115	-0.0768	0.1183	0.3519	2.1836
QCLN	0.1493	0.8457	-0.4961	0.3618	0.0513	2.8822
^GSPC	0.1298	0.3265	0.0172	0.0981	0.6840	2.4366
^IRX	-0.1315	3.2108	-2.7130	1.7776	0.2950	2.3719

Table 3: *Descriptive statistics of yearly returns*

The stock that has the highest average return is Clearfield Incorporated (CLFD), which has an average return of 14.48% however, it also has the highest volatility of 49.96%. First American Financial (FAF) and Meritage Homes (MTH) seem to produce good returns as well, with also a low standard deviation relative to CLFD. The case is similar with the ETF (QCLN) with the exception that it has a higher standard deviation. The benchmark (S&P500) also has good returns with a low standard deviation of 9.81%, which is expected due to its diversity. The 13-week treasury bills did not seem to perform well at all, yielding a negative return of -13.15% along with an enormous standard deviation of 177.76%.

The quantile payoffs for the yearly returns per $100 invested in each stock is summarized in **Table 4** below:

	One percent	Five percent	Fifty percent	Ninety-Five percent
FAF	88.8205	89.5673	114.6095	129.0406
CLFD	60.0791	60.5551	111.7294	202.4040
WHR	71.5101	71.5830	97.3178	162.0599
AAWW	52.6140	53.4175	100.5729	145.6253
MTH	77.3346	78.3335	115.5418	140.7687
DGX	92.3174	92.5389	111.2739	130.6479
QCLN	50.3890	51.5893	113.1944	182.4239
^GSPC	101.7180	101.7869	111.4857	132.2604
^IRX	-171.2976	-169.8715	59.4535	413.4000

Table 4: *Quantile payoffs per $100 invested*
Note: ^GSPC is the ticker for the S&P500 and ^IRX for the 13-week treasury bills.

These quantile payoffs are important because they give us an idea of the chance we have make up to some amount of profit if we invest $100. For example, looking at Clearfield Incorporated (**CLFD**), there is up to 1% chance that we would end up having $60.08 if we invested $100. There is a 5% chance that we would end up having $60.56, a 50% chance that we would have $111.73 and a 95% chance that we would have $202.40 if we invested $100. So, the 50% and 95% quantile indicate that we would end up making a profit on our investment and the remaining two quantiles indicate that we would end up losing money on our investment. The same interpretation can be used for the remaining stocks.

The monthly and yearly Sharpe Ratios were also computed and those values along with their level of significance can be seen in the **Table 5** & **Table 6**.

	Sharpe_Ratio	P_Value	Target P value
FAF	0.0274	0.3746	0.0073
CLFD	0.0383	0.3275	0.0073
WHR	0.0193	0.4106	0.0073
AAWW	0.0160	0.4261	0.0073
MTH	0.0288	0.3681	0.0073
DGX	0.0211	0.4025	0.0073
QCLN	0.0274	0.3746	0.0073
SP500	0.0249	0.3857	0.0073

Table 5: *Sharpe ratios of monthly returns*

	Annualized Sharpe Ratio	P_Value	Target P value
FAF	0.0948	0.3744	0.0100
CLFD	0.1325	0.3276	0.0100
WHR	0.0670	0.4104	0.0100
AAWW	0.0553	0.4258	0.0100
MTH	0.0999	0.3679	0.0100
DGX	0.0732	0.4022	0.0100
QCLN	0.0948	0.3744	0.0100
SP500	0.0862	0.3854	0.0100

Table 6: *Sharpe ratios of yearly returns*

Monthly Returns Sharpe Ratios

The Sharpe ratio is the amount of excess return that is yielded for taking on an additional unit of risk. Looking at the Sharpe ratio of the monthly returns, the general conclusion that can be made is that most of the assets have a Sharpe ratio that is above 0.02, with the exceptional case of Clearfield Incorporated (**CLFD**), which has a Sharpe ratio of 0.0383. Whirlpool Corporation (**WHR**) and Atlas Air Holdings Worldwide (**AAWW**) are the only two stocks with a Sharpe ratio that is below 0.02. However, it is important to note that none of these Sharpe ratios are statistically significant (**all their p-values are larger than the target p-values**). Thus, from a statistical point of view the Sharpe ratios of each of the stocks are not significantly different from one another for monthly returns.

Yearly Returns Sharpe Ratios

Looking at the Sharpe ratio of the yearly returns, the general conclusion that can be made is that most of the assets have a Sharpe ratio that is above 0.08, with the exceptional case of Clearfield Incorporated (**CLFD**) once again, which has a Sharpe ratio of 0.1325. Whirlpool Corporation (**WHR**), Atlas Air Holdings Worldwide (**AAWW**) and Quest Diagnostics Incorporated (**DGX**) are the only two stocks with a Sharpe ratio that is below 8%. However, it is important to note that none of these Sharpe ratios are statistically significant (**all their p-values are larger than the target p-values**). Thus, from a statistical point of view the Sharpe ratios of each of the stocks are not significantly different from one another for yearly returns.

2.2. Portfolio Optimization

The next step was to perform Markowitz's portfolio optimization on the selected assets, and this was done so using several functions in the financial toolbox packages in MATLAB. The goal of the portfolio optimization was to find the portfolio that maximized the Sharpe ratio. The model obtained the following portfolio in **Figure 3** below, which had the highest Sharpe ratio among all the different portfolio combinations. It was performed using monthly data.
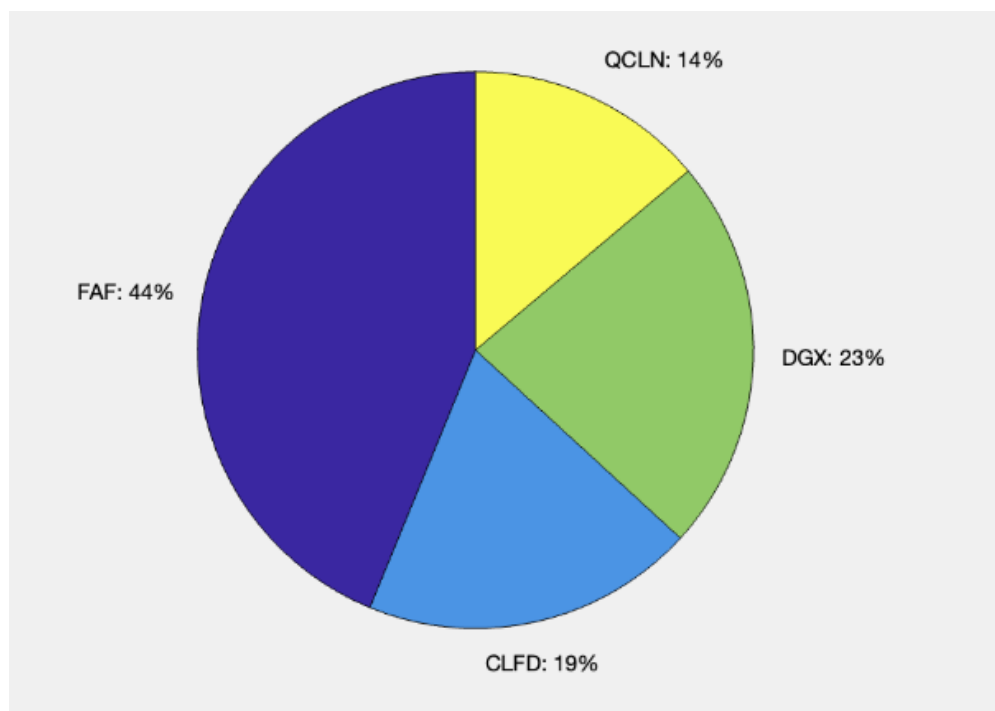
Figure 3: *Optimal portfolio composition*

After the optimization, the portfolio only included 3 stocks (First American Financial, Quest Diagnostics Incorporated & Clearfield Incorporated) and the First Trust NASDAQ Clean Edge Green Energy Index Fund ETF (**QCLN**). The rest of the stocks did not contribute to the portfolio with the maximum Sharpe ratio.

The average monthly return and standard deviation of the portfolio and benchmark (S&P500) are summarized in **Table 7** below:

	Final Portfolio	S&P 500
Mean	1.37 %	1.10 %
Standard Deviation	5.42 %	3.92 %

Table 7: *Summary of average return and standard deviation of investment strategy versus benchmark*

Based on the monthly returns, the investment strategy has a mean return that is larger than the S&P 500 by 0.27% however, for the excess return there is also an excess in volatility by 1.5%.

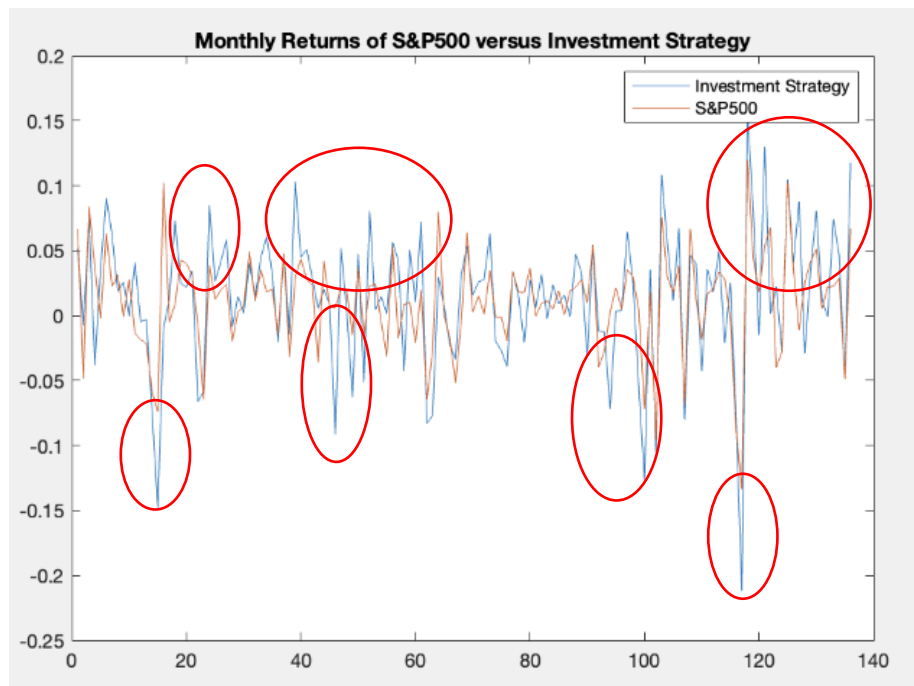The excess volatility is evident in the following figure, which has been drawn out by the red circles:

Figure 4: *Benchmark versus investment startegy monthly returns*

The monthly return for the benchmark and investment strategy was then annualized to obtain the yearly returns, which is summarized in **Table 8**.

	Final Portfolio	S&P 500
Mean	16.40 %	13.21 %
Standard Deviation	18.78 %	13.60 %

Table 8: *Summary of average return and standard deviation of investment strategy versus benchmark (**annualized**)*

Based on the annualized returns, the investment strategy has a mean return that is larger than the S&P 500 by 3.19% however, for the excess return there is also an excess in volatility by 5.18%. The yearly returns can be seen visually in **Figure 5** below:
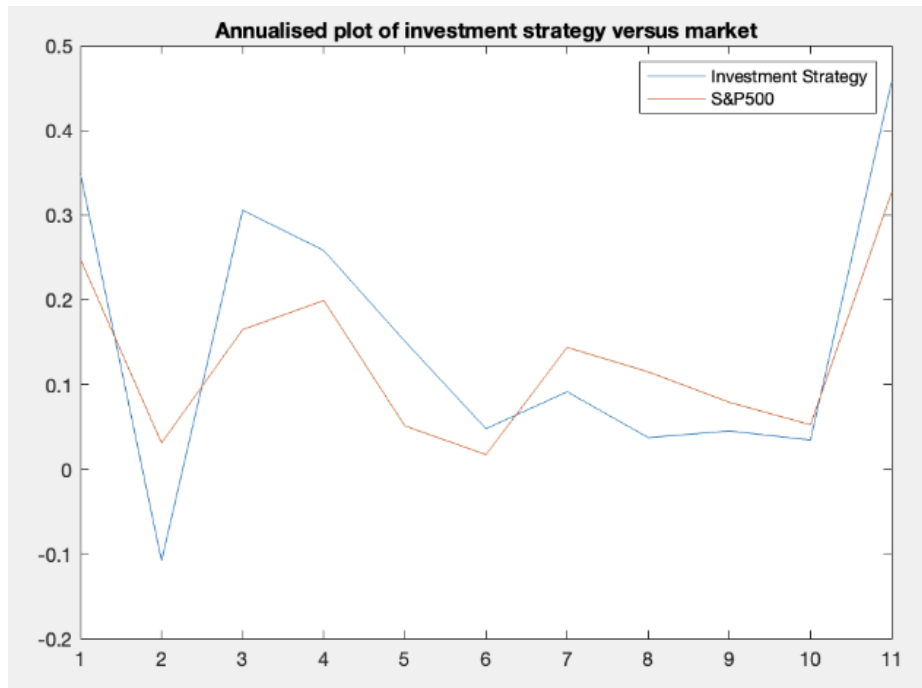
Figure 5: *Benchmark versus investment startegy yearly returns*

The graph shows that for the most part, the investment strategy yield returns that are higher on a yearly basis. Hence, the investment strategy does perform better than the benchmark over the given time period however, the only caveat is the slightly higher volatility.

The monthly and annualized Sharpe ratios for the investment strategy were also computed and those values along with their level of significance can be seen in the **Table 9** & **Table 10**.

	Sharpe Ratio	P-Value	Target P-value
Investment Strategy	0.0282	0.3710	0.0073

Table 9: *Investment strategy monthly Sharpe ratio*

	Annualized Sharpe Ratio	P-Value	Target P-value
Investment Strategy	0.0976	0.3708	0.0100

Table 10: *Investment strategy annualized Sharpe ratio*

Both the monthly and annualized Sharpe ratios are statistically not significant (**p-value larger than target p-value**). So, for the monthly returns, the Sharpe ratio is 2.82% and for the yearly

returns, the Sharpe ratio is 9.76%. Both the monthly and yearly Sharpe ratio are larger than that of the S&P500, which has a monthly Sharpe ratio of 2.49% and yearly Sharpe ratio of 8.62%. Despite the insignificance of these results based on the p-values, the Sharpe ratios indicate that the investment strategy has "*more bang for your buck.*"

Observing the histogram of the monthly returns we can see that a lot of the returns tend to be around 0, with more data being above 0. There is some tail risk, which can be seen by the extreme outliers circled in the figure below however, the positive returns and returns on the right tail seem to outweigh the returns on the left tail. This is indication that investors can expect more positive returns from this investment strategy than negative returns.
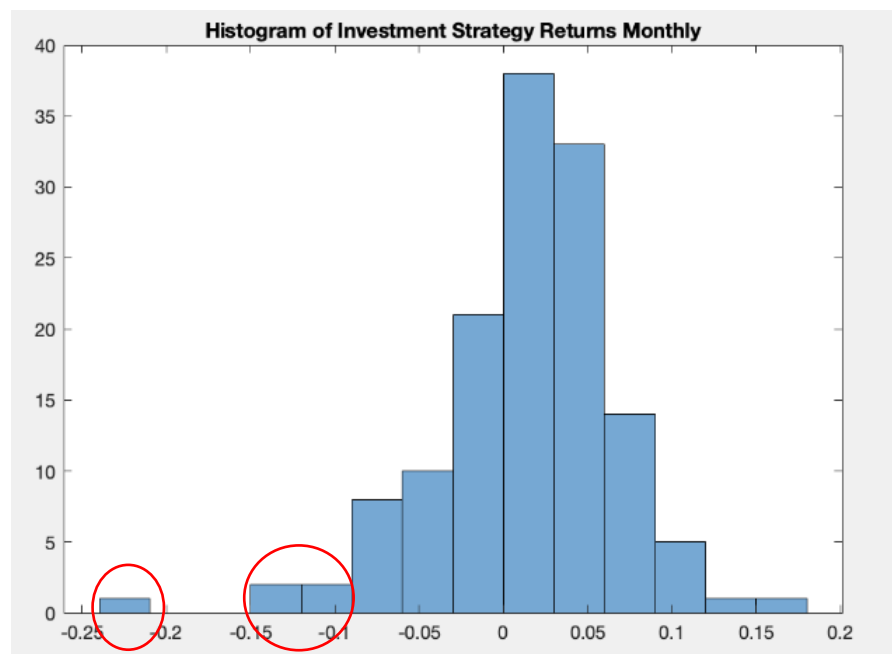

Figure 6: *Histogram of monthly returns of investment strategy*

3. Conclusion

After reviewing the results that were obtained, it is difficult to determine if the investment strategy is better than the benchmark (**S&P500**). Although the average returns of the investment strategy are better than just investing in the market index, it still has a higher volatility. Conversely, the returns of the S&P500 are less than the investment strategy and the volatility is also less.

At the end of the day, whether an investment is attractive depends on the investors risk preferences. A risk averse person who is contempt with an investment yielding fairly good returns with relatively stable volatility would be better off investing solely in the S&P500 market index. Whereas an investor who is slightly more risk loving might prefer the proposed investment strategy because in comparison to only investing in the benchmark, it has the "*higher risk and higher reward*" element to it.

4. References

Forehand, J. and Reese, J., 2013. *The Guru Investor: How to beat the market using history's best investment strategies*. Hoboken, N.J.: Wiley.

meetinvest. 2021. *Stock Screener: Martin Zweig Winning on Wall Street | meetinvest*. [online] Available at: <https://meetinvest.com/stockscreener/martin-zweig> [Accessed 22 November 2021].