Practical Analysis of Stock Market Under ESG

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ABSTRACT

In today's era, climate change brought about by the greenhouse effect is gradually bringing more and more economic losses and natural disasters. In order to mitigate the negative impact of climate change, many countries have jointly formulated a 1.5°C climate scenario, which has brought a lot of impact on the global economy and industry development (Henderson et al., 2020). At the same time, my client commissioned me to build a portfolio that complies with the 1.5°C climate scenario, and the shares must be included in the S&P 500 Net Zero 2050 Climate Transition ESG Index as of 30/09/2022. The total portfolio is $100,000, and the benchmark designates the S&P 500 Net Zero 2050 Climate Transition ESG Index. Because the investment horizon is short and only six weeks, I chose semi-active management in my portfolio management process, and the rebalancing method was selected as percentage rebalancing. Finally, based on macro and industry analysis and relative valuation and technical analysis of the corresponding stocks, I selected ten stocks: Starbucks Corporation, Tesla, Inc., Amgen Inc., Cisco Systems, Inc., Eversource Energy, The Coca-Cola Company, and Expeditors International of Washington, Inc., Trans Digm Group Incorporated，Netflix, Inc., S&P Global Inc. I calculated their respective shares using the Markowitz model and bought and rebalanced, but unfortunately, my portfolio did not work as expected. The sector index fell by 4.87% in the week of the investment term, but my portfolio fell by 7.45% and performed poorly. Among them, the collapse of Tesla due to special events and my previous judgment of Tesla were greatly affected, and although its share price was only 9.94%, its share price fell by 33.74%. Although the late-stage rebalancing gave me hope for the better, the short investment horizon became a significant obstacle to the improvement of my portfolio.

KEYWORDS

1. INTRODUCTION

The core of fundamental analysis, according to Bodie et al. (2018), is analyzing profit forecasts and other factors. The key events the company encounters in operation will affect its profitability to a certain extent[1]. Changes in macroeconomic conditions will force companies to face different challenges or opportunities, which in turn will make them adjust their strategic planning to meet the trend of economic development. Investors could analyze companies' development prospects and competitiveness through the macroeconomic environment in different periods (Zenghelis, 2012)[2].

1.1. Policy analysis

On 4 April 2022, the IPCC published the Working Group III Report: Climate Change 2022: Mitigation. Governments worldwide have begun to emphasize industrial emission reduction, renewable energy development, energy efficiency improvement and emerging city establishment, and

advised investors to pay attention to technology-based industries, new energy industries or low-carbon intensity industries to comply with ESG investment philosophies (IPCC PRESS RELEASE, 2022).

On 16 August, US time, the "2022 Inflation Reduction Act" was promulgated. The new law contains a number of subsidy projects in the field of clean energy, involving solar energy, wind power, electric vehicles and other industries. The scale of funds has reached the highest in history, at $369 billion (Zandi and Lafakis, 2022). The new law continues and strengthens the "$7,500 electric vehicle subsidy" policy proposed by the Obama administration and cancels the subsidy ceiling of 200,000 vehicles for car companies (Bown and Dziczek, 2022). This law dramatically benefits new energy vehicle companies represented by Tesla and logistics companies in the reform era (such as EXPD)[3].

1.2. Industry Analysis

In recent years, the cost of solar and wind energy has gradually decreased, and the promulgation of laws and policies has promoted energy efficiency, which has extensively promoted the development of new energy enterprises (European Commission, n.d.). While limiting fossil energy use and reducing emissions, government policy has harmed traditional heavy industries and high pollution enterprises. The development of agriculture, forestry and other land-use industries has also been affected, as their carbon emissions account for 23% of global greenhouse gas emissions (IPCC, 2019)[4]. While traditional industries face severe challenges, the development of IT, finance, and some other industries has received more attention. Scientific and technological innovation has promoted the increase in the scale of low-carbon emissions, and computer hardware and software companies have also contributed to traditional enterprises' energy conservation and emission reduction. The investor began to gradually lean towards the promising new energy, internet, computer hardware and other industries[5]. Considering the ROE indices of various industries:

Table 1 In 2021, major industries' return on equity

Industry name	ROE（unadjusted）	ROE (adjusted for R&D)
Auto & Truck	13.68%	10.12%
Bank (Money Center)	14.97%	14.97%
Beverage (Soft)	32.80%	31.60%
Business & Consumer Services	13.67%	13.57%
Financial Svcs. (Non-bank & Insurance)	0.28%	0.28%
Household Products	35.95%	31.29%
Investments & Asset Managemen	23.77%	23.56%
Machinery	21.13%	19.08%
Oil/Gas (Production and Exploration	3.30%	3.29%
R.E.I.T.	7.81%	7.81%
Retail (Online)	44.11	20.06%
Software (Internet)	-11.29%	-4.12%
Software (System & Application)	30.47%	19.27%
Telecom (Wireless)	5.93	5.99%
Telecom. Equipment	24.93%	15.73%
Telecom. Services	10.41%	10.25%
Transportation	40.24%	40.18%
Utility (General)	8.44%	8.44%
Total Market	18.12%	16.04%
Total market (without financials)	17.96%	15.34%

Source: Pages.stern.nyu.edu, Return On Equity. (Damodaran, 2021)

Under the requirement that the stock must include in the S&P 500 Net Zero 2050 Climate Transition ESG Index, we can compare the specific development of the relevant industries[6]. The Beverage (soft) and Transportation sectors are doing well during Financial Svcs. (Non-bank & Insurance) and Software (Internet) is not doing so well. As the beneficiaries of policy subsidies, choosing EXPD and TSLA will be more suitable and valuable for long-term investment. At the same time, the leading position of traditional corporation KO in the consumer market is still the same, so it can continue to be valued to a certain extent, which is part of the reason why I noticed this when I chose these stocks[7].

2. SECURITY SELECTION

Macroeconomics analysis and industry analysis can help us determine the industry's future direction and development trend, providing a general direction for our portfolio building[8]. At the same time, we can specifically choose the stocks we want to invest in through fundamental and technical analysis (Majaski, 2019).

2.1. Fundamental Analysis

In addition to the prospects of the industry, the establishment of the portfolio also needs to consider the fundamentals. Fundamental analysis also plays a vital role in stock selection (Bohl and Frederick, 2021). A discount cash flow valuation (intrinsic valuation) and a multiple valuation are two of the most common methods for valuing companies[9].

A company's intrinsic value is determined by discounting the future cash flow that it is expected to generate. This is done by using the sum of the discounted value as its current value[10]. Investors should expect a return equal to the discount rate if the current stock price equals the net present value. Investors should expect a return below the discount rate if the current stock price exceeds its net present value. Stocks that are priced below their net present value are undervalued, and investors should expect returns above the discount rate (Torre, 2021). The net present value, however, cannot be definitive because the future is uncertain[11].

The relative valuation method relies more on the comparison. Important indicators are ROE, PEG ratio, P/E ratio, P/B ratio and others. I selected my portfolio based on the ROE metric, which is derived from the division of net income by shareholder equity (Diaz and Pandey, 2019)[12].

The equation is:

ROE = Net Profit/Shareholders' Equity.

So based on the above formula, the ROE for Coca-Cola is: 41% = US$10.0b ÷ US$24b (Based on the trailing twelve months to September 2022). This means that for every dollar of shareholder equity generated, the company generates $0.41 in profit, which is also higher than the three-year average for the beverage industry during the same period (15%) (Yahoo Finance, 2022)[13]. At the same time, Coca-Cola is also working tirelessly to meet its science-based targets and has now achieved a 25% reduction in total carbon emissions by 2020, in line with sustainable development needs (Coca-Cola, 2022). So, investing in Coca-Cola is a good choice.

As one of the most important indexes of enterprise judgment, P/E is the ratio of a stock's market price to its earnings per share (Murphy, 2020). Its economic meaning is "dividends at current earnings per share, which many years after buying stocks at the current stock price to recoup the cost of investment"[14].

A formula can derive the P/E ratio:

$$P0/E1=(D0(1+g)/k-g)/(D1/(1-b))=(1-b)/(k-ROE*b)=(1-b)/(k-g), \text{ where } g=ROE*b. \quad (1)$$

According to the result, we could find that the growth of the P/E ratio is inversely proportional to the size of k – g, which means that if the ROE value is greater than the capitalization rate K, the P/E ratio will increase[15]. Yahoo Finance state(2022), as of 30 September 2022, SPGI's P/E ratio was 28.32. Investors were confident in it, and the price-to-book ratio (P/B) was 2.9, with low risk and high investment value. At the same time, SPGI's five-year average PEG index is 4.46, well above 1, which shows that the fundamentals of SPGI are good, the company is stable, and it is worth long-term investment[16].

2.2. Technical analysis

At the same time, technical analysis also needed to be addressed in the stock selection. I studied the market direction through charts and some technical indicators and speculated on the price movement, as detailed in Table 2:

Figure 1

Source: Yahoo! Finance, 2022 (finance.yahoo.com, 2023)

The chart shows the trend chart of TSLA stock price in November. According to Yahoo Finance (2022) data, we can see that in November, the price was basically below the 20-day moving average overall, and the price broke through the lower Bollinger band at the beginning of the month, which means that buying operations can be carried out at this time[17]. At the same time, the data of the momentum indicator at this stage is also below 0, and there is a trend further beyond 0 after the 14th, so I firmly bought the stock.

3. PORTFOLIO OPTIMIZATION

The expected return on securities is a significant concern for economists, and risks cannot be ignored. Markowitz (1952) proposed the mean-variance optimization model, which defined risk as the volatility of return, and applied mathematical and statistical methods to study portfolio selection for the first time (Du, et al., 2019)[18]. Besides revealing the factors affecting portfolio asset risk, this study also reveals the critical conclusion that "the size of an asset's own risk determines its expected return": essentially, the asset price (individual asset as well as portfolio asset) is determined by the size of its risk: the variance or standard deviation of one asset determines its price, while the covariance of a portfolio asset determines its price. Nevertheless, Marling and Emanuelsson (2012) proposed that one of the Markowitz model's shortcomings is that a portfolio's variance needs to measure the risk investors take fully[19]. By combining actively managed securities with passively managed index funds, the Treynor-Black model maximizes a portfolio's Sharpe ratio (Hayes, 2019).

Nevertheless, short-selling restrictions and the difficulty of picking stocks in accordance with the model limit the ability of investment managers or investors to leverage market efficiency and generate alpha[20]. In diversified investing, the connection between stocks cannot be ignored because the systemic risk problem in a diversified portfolio is the decisive issue, so the impact of its covariance should be considered more than the variance of a single stock when constructing a portfolio (Chen, 2021). After thinking about it, the Markowitz mean-variance model applies to my portfolio.

Then I calculated the build the Markowitz model using Excel and industry return data and finally got Table 2.

Table 2 The Markowitz model

From this, we can derive the average rate of return, which is expressed as:

$$E(R) = \frac{price_{i,t} - price_{i,t-1}}{price_{i,t-1}} \tag{2}$$

That is, the average rate of return is the difference between the price of two consecutive months divided by the price of the previous month[21].

The standard deviation can also be seen simultaneously. From the chart above, the adjusted Tesla has the highest average return, reaching 0.0666, but at the same time, its standard deviation is also the largest, with a value of 0.7273, which means that Tesla's stock is volatile, and high returns are accompanied by higher risks. The average return of stock ES is low, only 0.0123, but its standard deviation is also very small, at 0.1888, indicating that its stock price fluctuations are relatively flat and the overall stock price is stable[22].

To calculate the correlation between the stocks, I used the calculated earnings data and put the results into Panel C. Generally, higher correlation coefficients indicate stronger correlations; a zero-correlation coefficient implies no correlation (Nickolas, 2021). From Table 2, the strongest correlation is Aerospace & Defense's TDG and Beverages' KO, with a coefficient of 0.6536; the least obvious is Entertainment's NFLX and KO, with a correlation coefficient of -0.051[23].

Next, by calculating the optimal solution of the weights (Panel D), I get the expected payoff of the combination and then find the root and the standard deviation. As a result, the maximum Sharpe ratio is 0.1155 (Guerreiro and Fonseca, 2020) when the portfolio mean is divided by the standard deviation (risk-adjusted performance index).

According to Panel E, SPGI, TDG, and AMGN are the most worthwhile investments and have the most weight in the portfolio[24].

Through the calculation results of the model, I made my own portfolio plan, which consists of SBUX (7.52%), TSLA (9.94%), AMGN (12.06%), CSCO (7.52%), ES (7.52%), KO (7.52%), EXPD (7.52%), TDG (14.44%), NFLX (7.52%), SPGI (18.44%).

4. STOCK PORTFOLIO MANAGEMENT

4.1. Portfolio management approach

Maginn et al. (2007) point out that the methods used by investors to manage portfolio equity investments can be divided into three broad categories: active management, passive management, and semi-active management. Active management aims not only to achieve average ROI but to exceed average returns, while passive management is primarily used to invest in portfolios that try to match specific benchmarks[25]. Considering the client's requirements, the return target is the S&P 500 Net Zero 2050 Climate Transition ESG Index, and because the client's risk tolerance level is average, I prefer semi-active management. The advantages of semi-active management include a lower risk profile and higher rate of return than passive management, which means it can improve performance while taking fewer risks (Maginn et al., 2007).

4.2. Stock portfolio execution, monitoring, and rebalancing

During the investment process, the proportion of the portfolio will change with the fluctuation of the market, and this change will cause the original investment ratio setting to deviate (Abramov, Radygin and Chernova, 2015). When the stock market rises, and the proportion of stocks rises, it increases the risk of the portfolio to some extent because if it encounters another decline, its proportion will be more significant so the volatility will be greater[26]. Rebalancing is based on changes in stock prices to ensure that the portfolio is adapted to current market conditions and maintains the correct composition. A rebalancing strategy can control portfolio risk while maintaining the necessary systemic exposure, according to Maginn et al. (2007).

Rebalancing is divided into calendar rebalancing, which makes portfolio adjustments based on monthly, quarterly, semi-annual or one-year time periods, and portfolio percentage rebalancing,

which determines the timing of adjustments based on the threshold of rebalancing, i.e. when the weight of individual assets exceeds a pre-set representation corridor (heyford, 2022) [27]. Considering the recent volatility of US stocks, the calendar rebalancing method may not be effective in managing the portfolio, and the investment horizon is short, only six weeks, so I decided to use the percentage rebalancing method and rebalance it with the given corridor.

In general, the market represents it as:

target allocation± (target allocation × P%)

Where p is 10%, so the updated formula is:

target allocation± (target allocation × 10%)

From this, I calculated the stock ratio, for example, in the following table:

Table 3

Name	Target allocation	-10%target allocation	+10%target allocation	P
SBUX	7.52%	6.768%	8.272%	10%
TSLA	9.94%	8.946%	10.934%	10%
AMGN	12.06%	10.854%	13.266	10%
CSCO	7.52%	6.768%	8.272%	10%
ES	7.52%	6.768%	8.272%	10%
KO	7.52%	6.768%	8.272%	10%
EXPD	7.52%	6.768%	8.272%	10%
TDG	14.44%	12.996%	15.884%	10%
NFLX	7.52%	6.768%	8.272%	10%
SPGI	18.44%	16.596%	20.284%	10%

Later, after building the portfolio, I observed its volatility and found that some stocks were moving beyond the corridor on 18 December, so I extracted the data, reddened it, and calculated it to come up with the buy and sell operations to be rebalanced. But since the market is trending downward, I had to update the number of remaining stocks to ensure that all the stocks marked the corridor while I had enough disposable funds to buy other stocks. The data is shown in the figure below：

Table 4

Name	12.18Dollr Allocation	12.18Stock price	12.18Change of stocks number
SBUX	7214.59	98.83	-3
TSLA	7661.73	150.23	10
AMGN	10963.81	267.41	-1
CSCO	7123.69	47.81	-3
ES	7284.64	82.78	-4
KO	7404.5	62.75	-7
EXPD	7055.1	108.54	-1
TDG	13931.79	605.73	-1
NFLX	6686.33	209.71	10
SPGI	17319.6	339.6	-1

After adjustment, both TSLA and NFLX return to the scale range optimized by the Markowitz model.

5. STOCK PORTFOLIO PERFORMANCE EVALUATION

Performance evaluation is very important in stock investing because it represents the measurement and evaluation of the results of investment management decisions as part of investment feedback (CFA Institute, n.d.). Performance evaluation mainly includes three parts: performance measurement, performance attribution and performance evaluation[28]. Through this process, managers and clients can clearly see the manager's investment policies and provide experience for future portfolio construction or management.

5.1. Performance Measurement

Performance measurement is an essential part of a stock portfolio. The results of performance measurement reflect the advantages and disadvantages of stock investment, according to the S&P 500 Net Zero 2050 Climate Transition ESG Index shown by the Professor, an overall downward trend of 4.87% over the one month from portfolio creation to closing[29].

Unfortunately, my portfolio returns failed to outperform the benchmark and target returns as they fell by 7.45%. Because during the investment process, TSLA did not fluctuate as I expected. Tesla's stock has suffered a fresh sell-off in recent weeks as it offered discounts to buyers of year-end vehicles, raising concerns about demand. The company is also facing the temporary closure of its Chinese auto plant[30]. The Chinese plant is Tesla's most significant in terms of volume. During the investment period, TSLA's plunge was the main reason for the heavy loss of my portfolio. Although the TSLA rose by 1.12% on the 30th, the situation is still wrong (Bobrowsky, 2022).

5.2. Performance Attribution

As part of performance attribution, portfolios are compared against benchmarks, as well as sources of differential returns are identified and quantified (Blomvall and Hagenbjörk, 2019). Each market is divided into three parts: Selection of broad asset classes, selection of industries within those markets, and selection of securities within those markets[31].

Table 5 Performance evaluation

Economic Sectors	(1) Portfolio Weight (%)	(2) Sector Benchmark Weight (%)	(3) Portfolio Return (%)	(4) Sector Benchmark Return (%)	(5) = (1) - (2) Active/Excess Weight	(6) = (5) * (4) Sector Allocation	(7) = (3) - (4) Active/Excess Return	(8) = (7) * (1) Within- Sector Selection	(9) = (6) + (8) Total Value-Added
Information Technology	7.50	24.50	-4.59	-3.81	-17.00	0.65	-0.78	-0.06	0.59
Health Care	11.30	18.00	-7.20	0.35	-6.70	-0.02	-7.55	-0.85	-0.88
Financials	18.10	6.40	-6.35	-3.87	11.70	-0.45	-2.48	-0.45	-0.90
Consumer Discretionary	15.60	11.40	-22.00	-8.27	4.20	-0.35	-13.73	-2.14	-2.49
Communication Services	10.20	1.80	-4.57	-3.32	8.40	-0.28	-1.25	-0.13	-0.41
Industrials	22.10	9.40	-1.70	-1.50	12.70	-0.19	-0.20	-0.04	-0.23
Consumer Staples	7.60	8.80	0.13	-1.10	-1.20	0.01	1.23	0.09	0.11
Energy	0.00	7.60	0.00	-2.64	-7.60	0.20	2.64	0.00	0.20
Utilities	7.60	4.00	-0.85	2.01	3.60	0.07	-2.86	-0.22	-0.15
Real Estate	0.00	2.60	0.00	-2.85	-2.60	0.07	2.85	0.00	0.07
Materials	0.00	5.50	0.00	-3.64	-5.50	0.20	3.64	0.00	0.20
Total	100.00	100.00	-6.64	-2.75	0.00	-0.08		-3.80	-3.88

Source: S&P 500 Sectors and Quotes—Trading View—UK, 2021

According to Table 5, the portfolio appreciation rate was -3.88%. This is not an impressive return considering the benchmark was the S&P 500 Net Zero 2050 Climate Transition ESG Index. Looking at the data, we can see that the Health Care, Financials and Consumer Discretionary sectors have severe losses. Because all three sectors account for more than 10%, the impact on the overall investment yield is more pronounced[32].

5.3. Performance appraisal

During performance appraisals, portfolio managers are compared with other managers' performance. This is to decide whether to keep or modify part of the investment plan (Maginn et al., 2007)[33]. As a method of evaluating performance, Valamis (2018) cites risk-adjusted metrics such as Sharpe, Jensen alphas, and information ratios.

Table 6 Performance evaluation

Table 1 : Data and Inputs of the pperormence evalaution									
Trading Days	Date	Market Value of Portfolio	Daily Return on Portfolio	Cumulative Retun on Portfolio	Benchmark Value	Return on Benchmark	Cumulative Retun on Benchmark	Active Return of Portfolio	Risk-Free Rate (10Y US Treasury)
1	2022/11/27	$100,000.00	0.00%	0.00%	1863.66	0.00%	0.00%	0.00%	4.29%
2	2022/11/28	$100,000.00	0.00%	0.00%	1835.33	-1.52%	-1.52%	1.52%	4.30%
3	2022/11/29	$100,008.22	0.01%	0.01%	1829.66	-0.31%	-1.82%	0.32%	4.36%
4	2022/11/30	$100,016.44	0.01%	0.02%	1890.47	3.32%	1.44%	-3.32%	4.35%
5	2022/12/1	$100,216.02	0.20%	0.22%	1891.54	0.06%	1.50%	0.14%	4.33%
6	2022/12/2	$100,689.23	0.47%	0.69%	1889.61	-0.10%	1.39%	0.57%	4.31%
7	2022/12/3	$100,689.35	0.00%	0.69%	1889.61	0.00%	1.39%	0.00%	4.31%
8	2022/12/4	$100,689.47	0.00%	0.69%	1889.61	0.00%	1.39%	0.00%	4.31%
9	2022/12/5	$98,739.67	-1.94%	-1.26%	1854.69	-1.85%	-0.48%	-0.09%	4.30%
10	2022/12/6	$97,867.15	-0.88%	-2.13%	1828.44	-1.42%	-1.89%	0.53%	4.31%
11	2022/12/7	$97,596.62	-0.28%	-2.40%	1825.08	-0.18%	-2.07%	-0.09%	4.32%
12	2022/12/8	$98,154.75	0.57%	-1.85%	1839.99	0.82%	-1.27%	-0.25%	4.30%
13	2022/12/9	$97,618.74	-0.55%	-2.38%	1824.42	-0.85%	-2.11%	0.30%	4.30%
14	2022/12/10	$97,618.86	0.00%	-2.38%	1824.42	0.00%	-2.11%	0.00%	4.30%
15	2022/12/11	$97,618.98	0.00%	-2.38%	1824.42	0.00%	-2.11%	0.00%	4.30%
16	2022/12/12	$97,856.19	0.24%	-2.14%	1850.83	1.45%	-0.69%	-1.20%	4.28%
17	2022/12/13	$98,148.61	0.30%	-1.85%	1866.03	0.82%	0.13%	-0.52%	4.30%
18	2022/12/14	$97,639.11	-0.52%	-2.36%	1853.39	-0.68%	-0.55%	0.16%	4.33%
19	2022/12/15	$95,198.61	-2.50%	-4.80%	1804.7	-2.63%	-3.16%	0.13%	4.32%
20	2022/12/16	$94,129.30	-1.12%	-5.87%	1783.63	-1.17%	-4.29%	0.04%	4.30%
21	2022/12/17	$94,129.42	0.00%	-5.87%	1783.63	0.00%	-4.29%	0.00%	4.30%
22	2022/12/18	$94,185.64	0.06%	-5.81%	1783.63	0.00%	-4.29%	0.06%	4.30%
23	2022/12/19	$93,537.44	-0.69%	-6.46%	1765.96	-0.99%	-5.24%	0.30%	4.27%
24	2022/12/20	$92,643.15	-0.96%	-7.36%	1768.19	0.13%	-5.12%	-1.08%	4.31%
25	2022/12/21	$94,011.44	1.48%	-5.99%	1795.58	1.55%	-3.65%	-0.07%	4.34%
26	2022/12/22	$92,483.26	-1.63%	-7.52%	1767.65	-1.56%	-5.15%	-0.07%	4.33%
27	2022/12/23	$92,503.05	0.02%	-7.50%	1777.44	0.55%	-4.63%	-0.53%	4.32%
28	2022/12/24	$92,502.96	0.00%	-7.50%	1777.44	0.00%	-4.63%	0.00%	4.32%
29	2022/12/25	$92,502.87	0.00%	-7.50%	1777.44	0.00%	-4.63%	0.00%	4.32%
30	2022/12/26	$92,502.78	0.00%	-7.50%	1777.44	0.00%	-4.63%	0.00%	4.32%
31	2022/12/27	$91,434.57	-1.15%	-8.57%	1767.6	-0.55%	-5.15%	-0.60%	4.31%
32	2022/12/28	$90,769.37	-0.73%	-9.23%	1746.04	-1.22%	-6.31%	0.49%	4.46%
33	2022/12/29	$92,829.49	2.27%	-7.17%	1778.24	1.84%	-4.58%	0.43%	4.41%
34	2022/12/30	$92,552.02	-0.30%	-7.45%	1772.9	-0.30%	-4.87%	0.00%	4.42%

Portfolio Average Daily return	-0.23%			
Portfolio Daily Standard Deviation	0.88%			
Average Daily Risk Free Rate	0.0120%	Portfolio Holding Period Return	-7.45%	
Benchmark Average Daily Return	-0.14%	Benchmark Holding Period Return	-4.87%	
Average Daily Active Return (Alpha)	-0.09%	Portfolio Return Objective (Benchmark + 0%)	-4.87%	
Active Risk (St. Dev. of Daily Active Return)	0.75%	Has the portfolio achieved the return objective?	NO	
Sharpe Ratio	-0.27			
Information Ratio	-0.11			

The Sharpe ratio reflects the extent to which the growth rate of the net value of the unit venture fund exceeds the risk-free rate of return. If the Sharpe ratio is positive, the fund's average net value growth rate exceeds the risk-free interest rate during the measurement period. In the case of the bank deposit rate for the same period as the risk-free rate, it means that investing in stocks is better than bank deposits. The formula is the average of the equity net worth growth rate minus the risk-free interest rate divided by the standard deviation of the equity net value growth rate[34].

Although the Sharpe ratio was 0.116 when the portfolio was initially constructed, the later value dropped to -0.27, indicating that the excess return obtained by taking a certain amount of risk is small or no excess return, which is not indicative. At the same time, the alpha value, which focuses more on systemic risk, is also negative (alpha correlates the excess return of a portfolio to the systemic risk it bears), so this portfolio should be adjusted to diversify the risk better. Finally, the information ratio

is also negative, which means that the overall portfolio underperforms the performance benchmark, and I need to invest more aggressively and manage my projects to achieve excess returns (Gilligan, 2020). Overall, my portfolio underperformed and did not achieve excess returns to meet client needs. It was not comprehensive enough at the time of its design, and there were flaws in management. This is a valuable lesson for me and will make me more comfortable managing new portfolios in the future.

6. CONCLUSION

This portfolio exercise exposed many of my problems, and I also learned a lot of helpful knowledge and skills. First of all, I have a new understanding of the establishment of the portfolio: the establishment of the portfolio should consider many objective conditions, such as macroeconomic policy, monetary policy, fiscal policy, industry trend, investor expectations, technological innovation and many other elements because a good portfolio establishment is inseparable from the all-round systematic analysis. And when constructing a portfolio, attention should be paid to the three issues of individual securities selection, investment timing selection and diversification: individual securities selection is mainly to predict the price trend of individual securities and their fluctuations, diversification refers to the construction of a portfolio with the least risk under certain income conditions under certain realistic conditions. Over time, the portfolio may no longer be optimal, and as a reflection of this change, it is necessary for investors to make adjustments to the existing portfolio (calendar rebalancing, percentage rebalancing) to identify a new portfolio. Since there are costs associated with restructuring a portfolio, investors should make a choice after weighing the benefits of adjusting the portfolio against the costs paid. During this period, my management also exposed a lot of problems.

1. Insufficient consideration when selecting stocks: the grasp of policy does not match market analysis, which leads to the volatility of some stocks in the short term beyond their expectations and even the situation of reverse volatility (TSLA).

At the same time, there is a Representativeness Bias in my investments: At the very beginning, I forgot that many investors suffer from the representativeness bias, their demand for one stock will push stock prices above their fundamental values. Stocks of "good companies" will become overpriced. Eventually, the market price will converge back to a fair price, generating negative abnormal returns (Barone, 2019). Therefore, in future investments, I should try my best to avoid the impact of the emotional account on me to make a relatively rational choice.

2. Lack of complete timeliness in portfolio monitoring: It is only possible to detect portfolio fluctuations after they leave the corridor, leading to untimely rebalancing.

3. Failure to pay attention to the reduction of unnecessary costs, the operation of some stocks is not cost-effective, and it is slightly frequent, which increases transaction costs to a certain extent and brings unnecessary losses. This portfolio practice can bring valuable experience to my future work, let me clearly understand my own abilities and shortcomings, and make me more aware of the rules and precautions of this industry.

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