

Module 4 Report

Part 1

The lowest average industry ranking and the highest average industry ranking where the duration of this time period starts at 1927/07 and ends at 2018/01 can be seen in Table 1 below.

Table 1: Best and Worst Industries

Industry	Average Rank
Other (lowest)	9.0267
ElcEq (highest)	13.2769

Note: These rankings were performed amongst a total sample size of 30

These rankings were produced by analyzing their average return for each specific industry over the time period previously defined. Over this time period rankings were assigned to each industry and on each specific year. Finally we obtained the average rank over this time period where the worst rank (lowest return) was Other while the highest rank (highest return) was ElcEq.

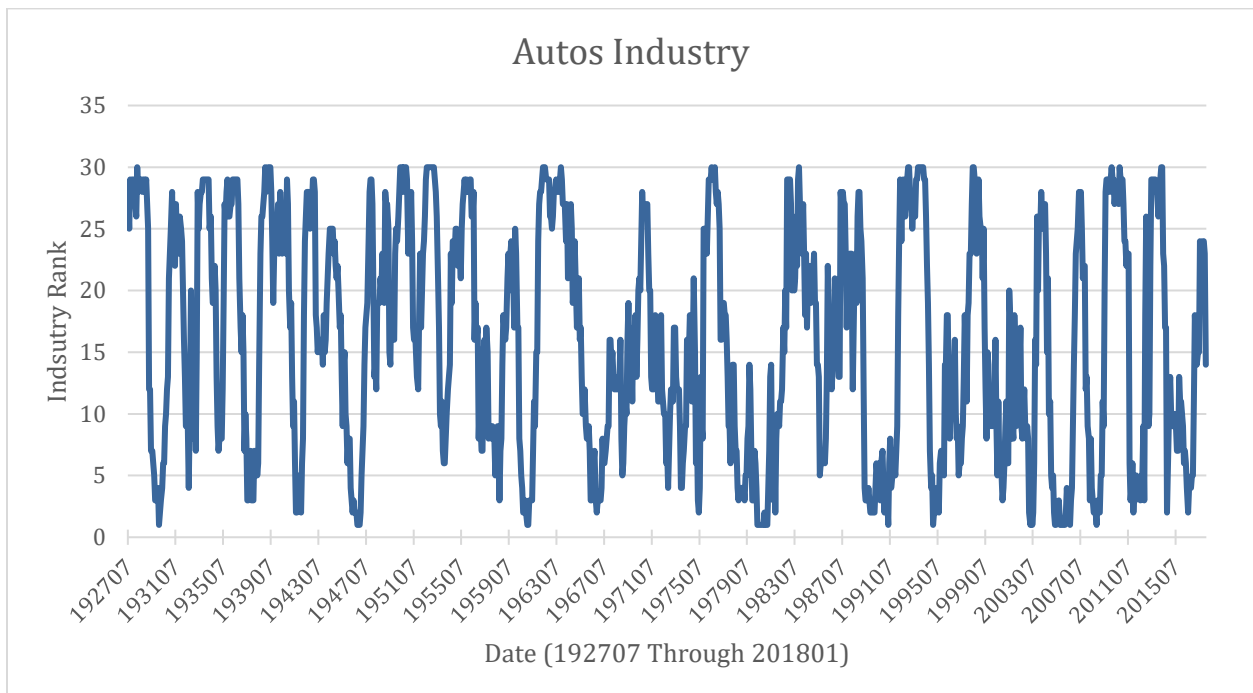


Figure 1: Automobile Industry Ranking

As seen in Figure 1, the automobile industry has fluctuated greatly over the past 100 years. During the ranking process as denoted at the

top of the page, we discovered that the average rank of the Auto industry to be 12.206. This average rank provides valuable information and insight to what other industries have done over the past 100 years. Auto's relatively high industry rank shows that there is a lot of movement, even amongst the top performing industries. The volatility is also high when the time horizon is set to 100 years and is further exemplified in Figure 1. Additionally this shows that industry momentum is the complete opposite of a long term bet. To efficiently capitalize on industry momentum theory, an investor must undertake a very dynamic strategy. They will buy and short their positions frequently, meaning that they will facilitate high turnover for their industry holdings. Once an industry is entering a decline, they will sell a majority of these positions and hold the short term growth securities.

Part 2

Table 2: Winner Portfolio

Average Monthly Return in Excess of the Risk Free Rate	0.9519%
Standard Deviation of Monthly Excess Returns	5.5555
Monthly Sharpe Ratio	0.1714
Annual Sharpe Ratio	0.5936

Table 2 above shows the summarized data for the winner portfolio. We distinguished between the winner and loser portfolios by analyzing the monthly returns for each month and assigning the top 15 as Winners (ranked by their returns) and the bottom 15 as the Losers. It is important to note that for each new month, there was a new list of Winners and Losers. The average monthly return was achieved by taking the average of the 15 industries within the Winners portfolio. Then we subtracted out the market risk free rate to obtain the monthly excess return. In order to calculate the standard deviation, the same process was performed for the 15 industries. Monthly Sharpe ratio was then calculated by dividing the average monthly return by the standard deviation. Lastly, the annual Sharpe ratio was computed by multiplying the monthly Sharpe ratio by the square root of 12.

Part 3

Table 3: Losers Portfolio

Average Monthly Return in Excess of the Risk Free Rate	0.5330%
Standard Deviation of Monthly Excess Returns	5.9718
Monthly Sharpe Ratio	0.0893
Annual Sharpe Ratio	0.3092
Annualized Sharpe Ratio of the Overall Market Index	0.4266

Table 3 above shows the summarized data performed on the Losers portfolio. The process of calculating these values is the same as defined in Part 2, where the only difference is the industry input for the Losers. The only additional step performed in Table 3 is the annualized Sharpe ratio of the market. The same process was performed to compute the value of 0.4266 only using the market data (Mkt-RF).

As one would expect upon analysis of Tables 2 and 3, the Winners portfolio drastically outperformed both the Losers portfolio and the market with a higher Sharpe ratio of 0.5936 as opposed to 0.3092, and .04266 respectively.

Part 4

Table 4.1: Industry Momentum Portfolio

Average Monthly Return in Excess of the Risk Free Rate	0.4189%
Standard Deviation of Monthly Excess Returns	2.5914
Annual Sharpe Ratio	0.5600

As shown in Table 4.1 above, the annual Sharpe ratio for the Industry Momentum portfolio is better than the Losers, but worse than the Winners portfolio. It has a much smaller average return than both the Losers and Winners, but it also is much less volatile.

Table 4.2: CAPM Model Regression

CAPM	Monthly a	Annual a	b
Coefficients	0.4623	5.5478	-0.0657
t-Stat	5.89	-	-4.52

The CAPM model regression shows that Industry Momentum does add α , but also that the portfolio is slightly negatively affected by the market return. The t-stats are all statistically significant.

Table 4.3: Fama-French 3 Factor Model Regression

3 Factor Model	Monthly a	Annual a	b (Mkt-RF)	b (SMB)	b (HML)
Coefficients	0.4999	5.9983	-0.0493	0.0331	-0.1462
t-Stat	6.46	-	-3.20	1.31	-6.49

From the Fama-French 3 Factor Model Regression shown above, Industry Momentum still generates α at a significant level. It also indicates that Industry Momentum is slightly negatively affected by HML and positively affected by SMB, meaning it capitalizes on growth stocks and smaller stocks. All the factors are statistically significant with SMB being the smallest with a t-stat of 1.31.

Part 5

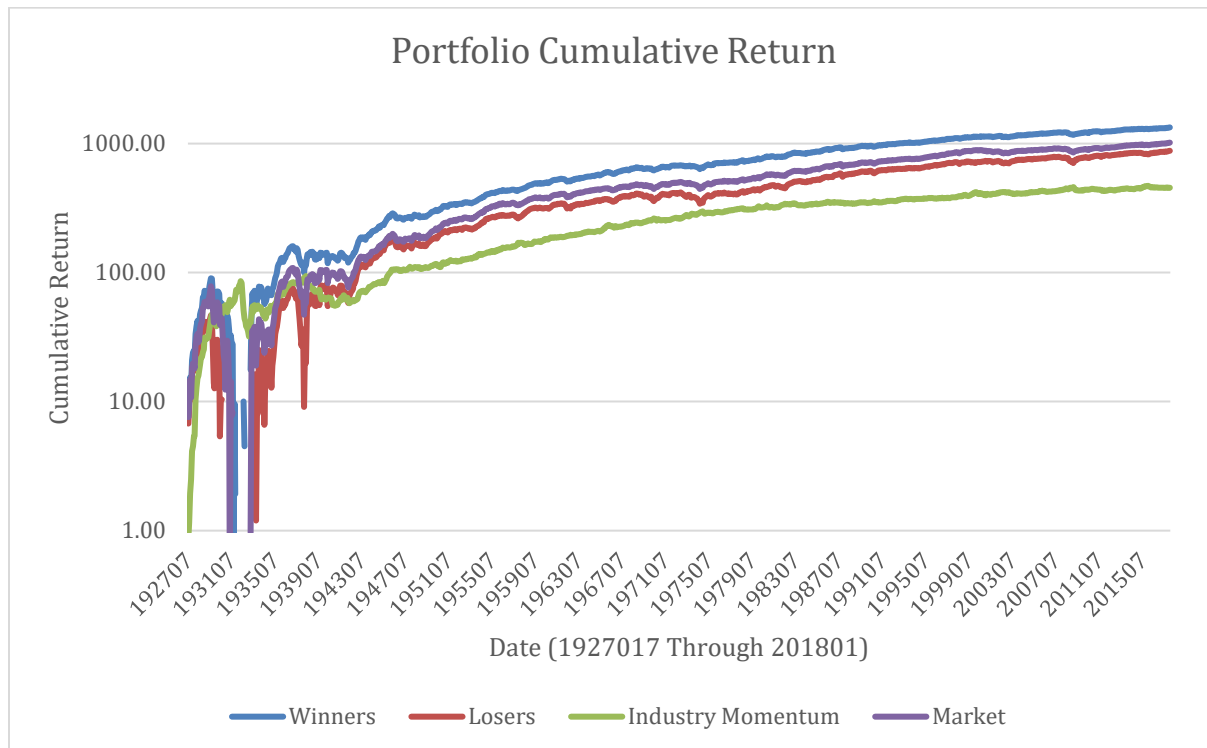


Figure 2: Portfolio Cumulative Return vs. Time

The cumulative returns shown in Figure 2 above show that Industry Momentum has the lowest cumulative returns, with the other portfolios following the logical order of Losers, market, and Winners doing the best. Referring back to the Industry Momentum volatility, it explains why the Industry Momentum does much better when all the other portfolios are performing badly. It also isn't surprising Industry Momentum has the lowest cumulative returns due to it having the smallest average monthly return.

Part 6

The table below shows three months during the year of 2009 that industry momentum experienced huge losses as compared to positive returns from the market.

Table 6: Industry Momentum Poor Performance

Ind-Mom Losses	Ind-Mom	Mkt-RF
Month	Return	Return
2009-March	-11.54	8.95
2009-April	-34.39	10.19
2009-May	-12.44	5.21

The reason for this large disparity between the market and momentum lies within the natural functionality of momentum theory. General behavior of industry momentum can exhibit both high returns and high Sharpe ratios given the right economic environment. However, in times following a market crash (housing crash of 2008), industry momentum theory may prove to be ineffective. This theory relies on a stable market, whereas times following a market crash are extremely volatile. Hence, these losses could have been predicted as they tend to occur in times of market stress, decline, high volatility, and coetaneous with market "rebounds".