Performance of Industrial Value & Momentum

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16th April, 2021

Abstract
Fama and French(1993) suggested using 3 factors(value, size and market factor) to model the cross-sectional average stock return. Jegadeesh and Titman(1993) tried to use the strategy of buying previous winner stocks and selling previous loser stock(momentum strategy) to capture abnormal returns. Carhart(1997) created a model by mixing the above 2 models to form the 4 factors(market, size, value and momentum factors) model to model the excess return of the portfolios. Asness, Moskowitz, and Pedersen(2013) found the consistency of value and momentum return premium in different markets and asset classes; and value and momentum factor are negatively correlated.

In this paper, we aim to model the industrial equity monthly returns by using the value and momentum factors and combine all the industrial equity monthly returns afterward to form the portfolio monthly return. We want to see whether modeling the equity return by industry is better than modelling the equity return(by value and momentum factor also) as a whole. The result showed that the industrial average of the combo strategy outperformed the aggregate one, but could not outperform the market return after around 1995.

Data Description
The data we use is from 1962 January to 2020 December.

Stock Return: we would pick the stocks traded on NYSE/AMEX/NASDAQ and use the monthly return data from CRSP.

Book Value of Equity: we would use the data from Compustat.

Risk Free Rate: 3-Month Treasury Bill: Secondary Market Rate from FRED Economic Data

Market Return: S&P 500 Index monthly return from Yahoo Finance

Trading Strategy
We firstly split the stocks into 10 divisions according to the SIC code:

Division	Code	Industry title
1*	01-09	Agriculture, Forestry, And Fishing
2	10-14	Mining
3	15-17	Construction
4	20-39	Manufacturing
5	40-49	Transportation, Communications, Electric, Gas, And Sanitary Services
6	50-51	Wholesale Trade
7	52-59	Retail Trade
8	60-67	Finance, Insurance, And Real

		Estate
9	70-89	Services
10*	90-99	Public Administration

For each division of stocks*, we would adopt the value and momentum strategy.

(*We found that the division 1 and 10 have a very small composition of stocks in some of the periods, which causes the industrial portfolio failing to be formed in the corresponding periods. Thus, we exclude the stocks in division 1 and 10 in our final portfolio.)

For the momentum strategy, we follow the same method adopted by Jegadeesh and Titman(1993) and Carhart(1997), in each month, splitting the stocks into 10 portfolios by ranking their lagged annual return, excluding the last month. We name the first decile as “the winner” and the last decile as “the loser”.

For the value strategy, referring to Fama and French(1993), in each month, we split the stock into 3 portfolios: high, middle and low book-to-market ratio(B/M); we set the breakpoint to be 30% and 70%. The book value of year-end t-1 is used for the computation of the B/M from July of year t to June of t+1. The market equity of December of t-1 is used for the B/M of the whole year t.

We form and rebalance our 8 portfolios by adopting 50% of the value strategy and 50% of the momentum strategy, same as the strategy adopted by Asness, Moskowitz, and Pedersen(2013), where:

The Value Strategy: Buying the high B/M stock and selling the low B/M stock
The Momentum Strategy: Buying “the winner” stock and selling “the loser” stock

And the corresponding monthly return in each industrial portfolios is:

$$r_i = 0.5 r_{i,\,value} + 0.5 r_{i,\,momentum}$$

,where i is the industry.

We create our first industrial portfolios at the end of June of 1963 and rebalance our industrial portfolios annually in the same period each year. Both the Value and Momentum Returns are value-weighted using the market equity of the previous month, i.e. the amount of buying/selling of each stock is according to the value-weight and the totals of long and short in each strategy are with the same amount.

The industrial average portfolio’s monthly return is:

$$r_{overall} = 1/N \sum_{i=1}^{10} r_i$$

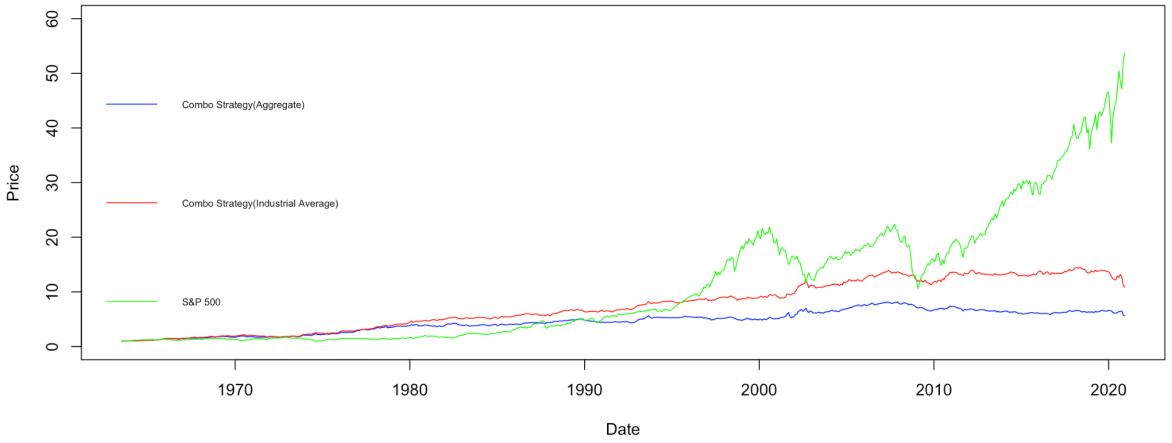
,where N is the number of industrial returns included

We would compare the monthly return of the above strategy with the S&P 500 monthly return and the monthly return of the one that adopts the value and momentum strategy as a whole, to analyze the performance.

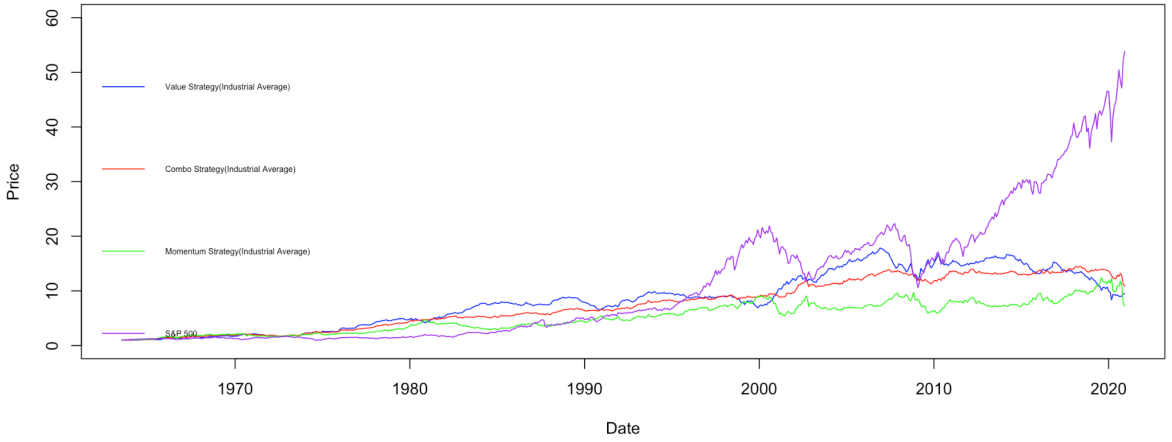
Result

Cumulative Return

We found that the industrial average combo(0.5value + 0.5momentum) strategy outperform the aggregate combo strategy, but cannot outperform the market portfolio after around 1995:



We also found that, by taking industrial average, combo strategy cannot outperform the value strategy in most of the period:



Correlation Matrix

Correlation Matrix of Combo Strategy Excess Return and Market Excess Return:

	Combo_Return(Aggregate)	*Combo_Return_2*	*Combo_Return_3*	*Combo_Return_4*	*Combo_Return_5*	*Combo_Return_6*	*Combo_Return_7*	*Combo_Return_8*	*Combo_Return_9*	*Combo_Return(Industrail_Avg)*	*Market*

Combo_Return(Aggregate)	1										
Combo_Return_2	0.27320002	1									
Combo_Return_3	0.18576118	0.07237026	1								
Combo_Return_4	0.81873745	0.15168538	0.13066902	1							
Combo_Return_5	0.39232986	0.18622245	0.11100224	0.17679368	1						
Combo_Return_6	0.22396436	0.08481608	0.10451665	0.21362638	0.05990338	1					
Combo_Return_7	0.3101896	0.15143916	0.06459693	0.18204566	0.08225471	0.10662433	1				
Combo_Return_8	0.32064583	0.1167662	0.1330148	0.15828072	0.17355208	0.05650597	0.17116665	1			
Combo_Return_9	0.34092651	0.0933836	0.04515191	0.22307217	0.11928912	-0.0096996	0.25679157	0.16885139	1		
Combo_Return(Industrail_Avg)	0.67601113	0.48506506	0.52885376	0.5039886	0.45281074	0.45011206	0.48756106	0.48661022	0.45705702	1	
Market	-0.0545005	-0.0223689	-0.0308428	0.02249532	-0.1729935	0.04689696	0.06858088	-0.0358999	-0.0208334	-0.0355493	1

It shows that the combo excess return of division 4 has a strong correlation with the aggregate combo strategy's excess return and there is a positive correlation between the aggregate and the industrial average combo strategy's excess return. Besides, it shows that the market excess return is almost independent to the excess return of all the combo strategies, except that of division 5.

Correlation Matrix of Value Excess Return and Market Excess Return:

	Val(Aggregate)	*Val_2*	*Val_3*	*Val_4*	*Val_5*	*Val_6*	*Val_7*	*Val_8*	*Val_9*	*Val(Industrial_Avg)*	*Market*
Val(Aggregate)	1										
Val_2	0.12504252	1									
Val_3	0.2355012	0.15815982	1								
Val_4	0.77588586	0.13970454	0.16994965	1							
Val_5	0.45700136	0.0436296	0.12103256	0.16535735	1						
Val_6	0.33458172	0.01122037	0.14740189	0.40339083	0.06764418	1					
Val_7	0.49345069	0.13617587	0.24084297	0.51705372	0.10643773	0.34043169	1				
Val_8	0.43431145	0.06302484	0.15640764	0.3398124	0.09799953	0.15903843	0.20390863	1			
Val_9	0.56351682	0.0451036	0.07532573	0.44859305	0.24242727	0.14560419	0.35720133	0.29735654	1		
Val(Industrial_Avg)	0.71552886	0.39886344	0.62490181	0.66705026	0.35228043	0.5386753	0.66350458	0.45892485	0.53774916	1	
Market	-0.1082395	0.09817584	0.01638148	0.09067741	-0.2839453	0.08663459	0.14729197	-0.0609576	-0.0705601	0.03407984	1

It shows that the excess return of the value strategy of division 4 has a strong correlation with the excess return of the aggregate value strategy and there is a strong positive correlation between the excess return of the aggregate value strategy and the industrial average value strategy. It also shows that the market excess return is almost independent to the excess return of the industrial average value strategy and the value strategy in some divisions.

Correlation Matrix of Momentum Excess Return and Market Excess Return:

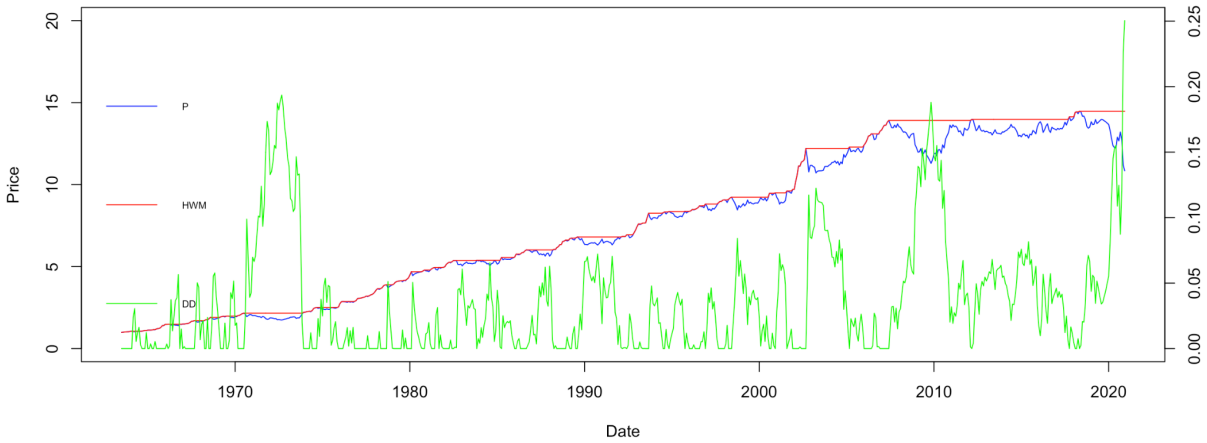
	Mom(Aggre	*Mom_2*	*Mom_3*	*Mom_4*	*Mom_5*	*Mom_6*	*Mom_7*	*Mom_8*	*Mom_9*	*Mom(Industri*	*Market*

	gate)									*al_Avg)*	
Mom(Aggregate)	1										
Mom_2	0.35119668	1									
Mom_3	0.23593619	0.07714439	1								
Mom_4	0.85869359	0.25253417	0.20715449	1							
Mom_5	0.43009851	0.23237103	0.14305772	0.27905968	1						
Mom_6	0.29574274	0.136618	0.15099398	0.24055892	0.14840809	1					
Mom_7	0.28418517	0.21880029	0.12914437	0.15073128	0.15933373	0.15944113	1				
Mom_8	0.35992647	0.11269291	0.10878706	0.16085929	0.21360419	0.09727405	0.21399788	1			
Mom_9	0.41630303	0.11684598	0.0389239	0.27047534	0.16354904	0.07152458	0.28649781	0.22187213	1		
Mom(Industrial_Avg)	0.72305817	0.55088133	0.51473632	0.55550566	0.51953778	0.50970379	0.53810662	0.477895	0.48334531	1	
Market	0.02200631	-0.0815958	-0.0509355	-0.0417049	-0.0333167	-0.0089369	-0.0407871	-0.0083976	0.02623549	-0.061761	1

It shows that the excess return of the momentum strategy of division 4 has a strong correlation with the excess return of the aggregate momentum strategy and there is a strong positive correlation between the excess return of the aggregate momentum strategy and the industrial average momentum strategy. Besides, it shows that market excess return is almost independent to the excess return of all the momentum strategies.

These show that most of the component stocks in the value & momentum portfolio of division 4 are also the component stocks in the aggregate value & momentum portfolio. Also, in the aggregate & industrial average portfolio, there are some common compositions in the value & momentum portfolio. Moreover, the industrial average value & momentum strategy is almost market neutral.

Drawdown of the Combo Strategy(Industrial Average)



We can see that the strategy performs poorly after around 2008.

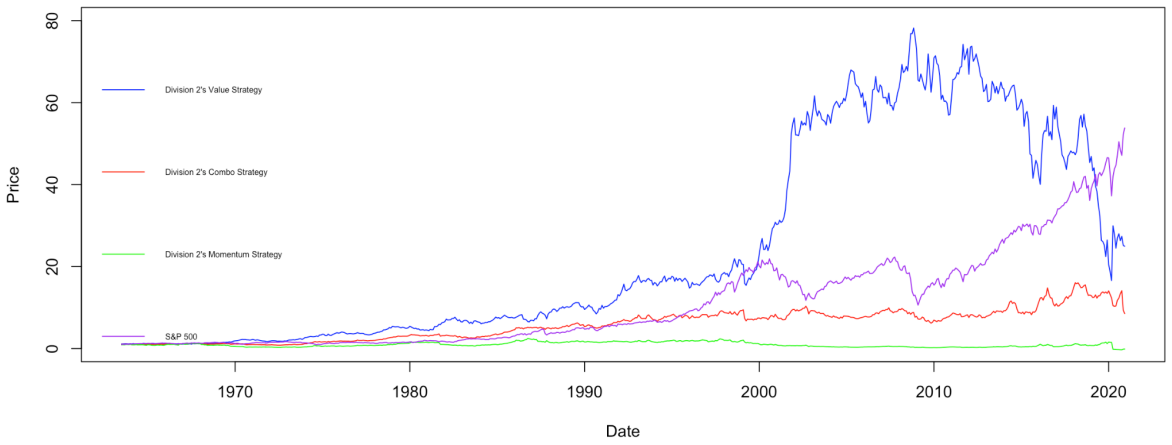
Performance Measurement

	Combo Strategy(Aggregate)	Combo Strategy(Industrial Average)	S&P500
Sharpe Ratio(Annualized)	-0.1510871	-0.007133321	0.2431123
Alpha(Annualized)	-0.9015365%(-0.896*)	0.09343913%(0.101*)	Nil
Skewness(Annualized)	-0.074947	-0.048883	-0.12488
Kurtosis(Annualized)	0.47335	0.52858	0.40439
95% VaR	3.29805%	2.91218%	6.3526%

*t-test value

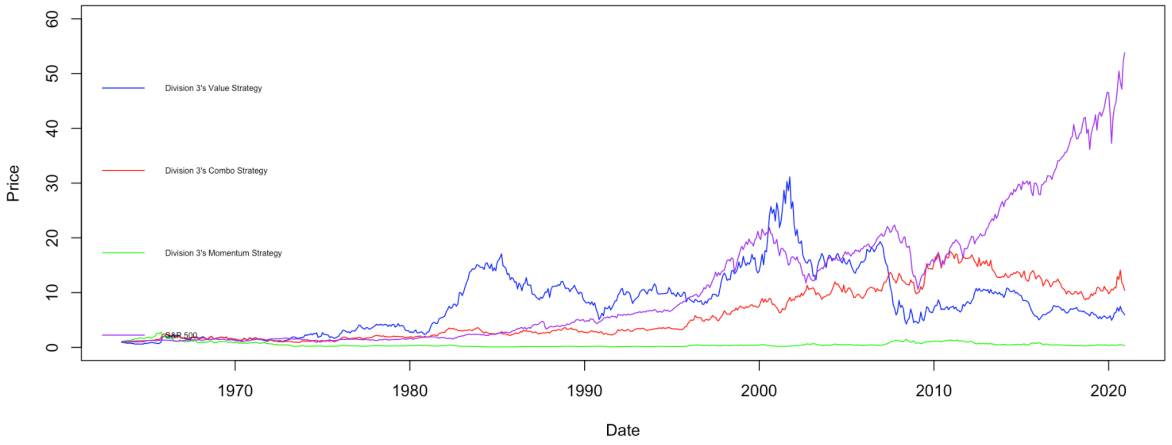
The above table shows that the Combo Strategy(Industrial Average) has a higher Sharpe ratio than that of the aggregate one, but still performs poorer than that of the market portfolio. One of the possible reasons is that: When we consider strategies for different industries, combo strategy is possibly not their best strategy.

Division 2's Breakdown:



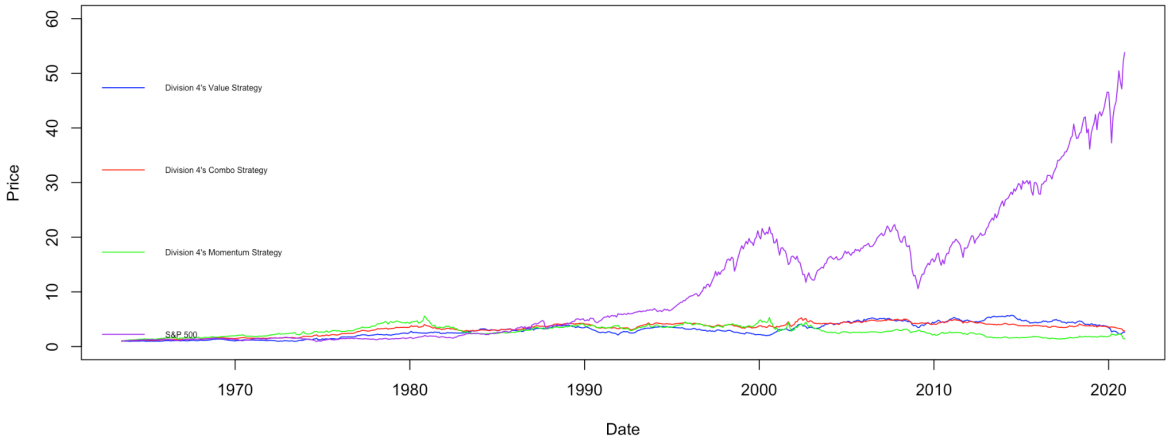
Value strategy is the best for division 2.

Division 3 Breakdown:



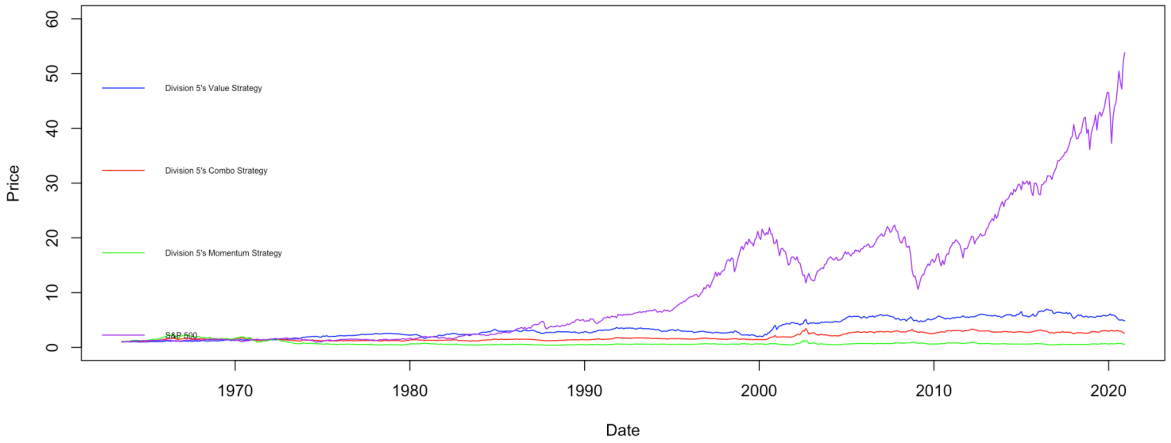
Before around 2008, value strategy was the best, and after around 2008, combo strategy was the best for division 3.

Division 4's Breakdown:



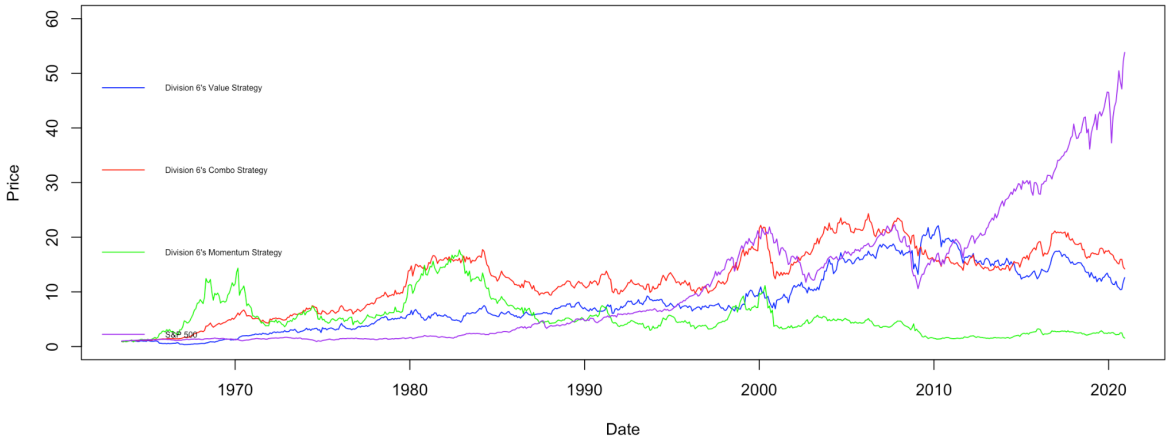
There are no big differences between the 3 strategies.

Division 5's Breakdown:



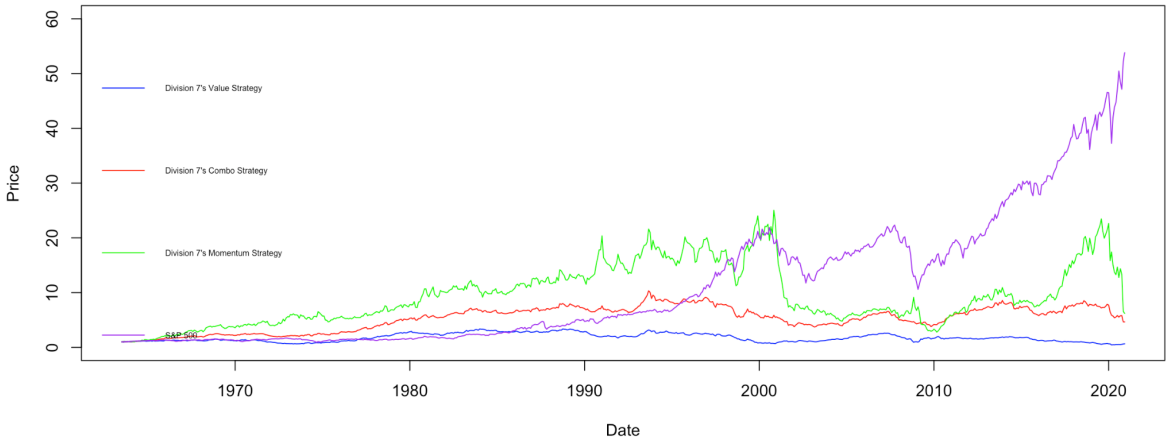
Value Strategy is the best in division 5.

Division 6's Breakdown:



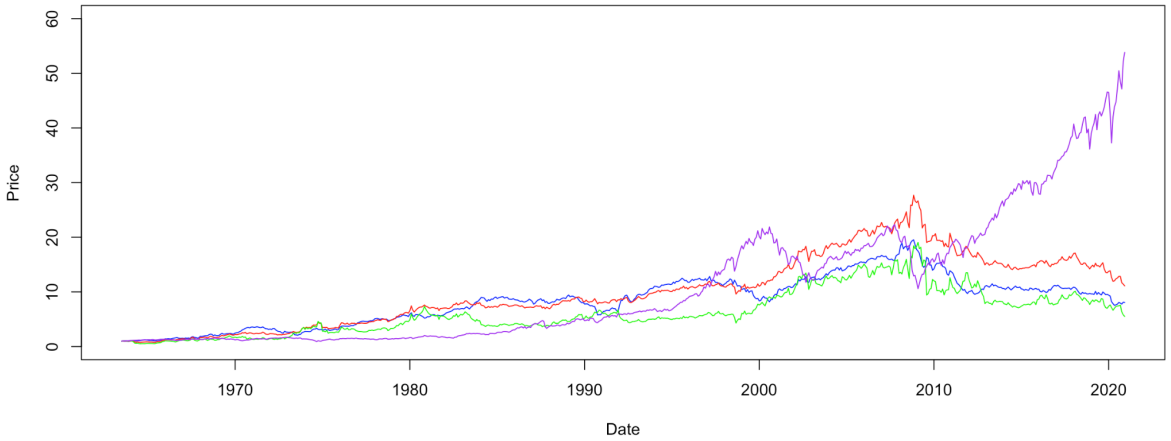
Combo Strategy is the best after around 1972 in division 6.

Division 7's Breakdown:



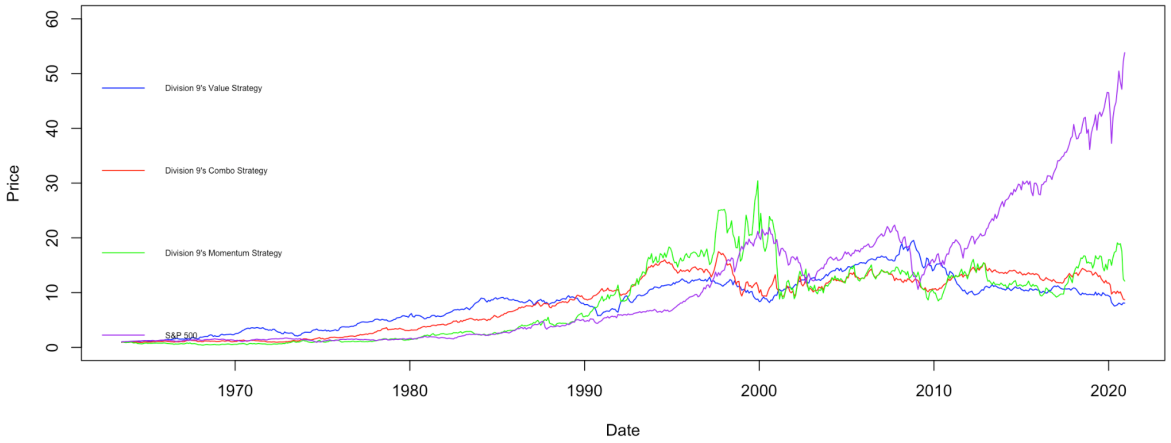
Momentum strategy is the best in most of the period in division 7.

Division 8's Breakdown:



Combo Strategy is the best after around 1999 in division 8.

Division 9's Breakdown:



The performance of the 3 strategies vary over time in division 9.

Conclusion

Our Research finds that adopting the combo strategy(value and momentum) by taking the industrial average is better than taking the combo strategy aggregately. One of the possible reasons is that taking the industrial average is helpful to hedge the sector risk. However, the performance of our strategy still underperforms the market portfolio. The reason is that each industry has its own best strategy. It is not suitable to fit the combo strategy to all the industry. For further research, we suggest investigating the best strategy for each industry. We believe the model can be improved by doing this.

Bibliography

Carhart, M. (1997). On Persistence in Mutual Fund Performance. The Journal of Finance., 52(1), 57-82.

Clifford S. Asness, Tobias J. Moskowitz, & Lasse Heje Pedersen. (2013). Value and Momentum Everywhere. The Journal of Finance (New York), 68(3), 929-985.

Fama, Eugene F, & French, Kenneth R. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33(1), 3-56.

FRED, Federal Reserve Bank of St. Louis.(1st April, 2021*). 3-Month Treasury Bill: Secondary Market Rate (TB3MS).* Retrieved from https://fred.stlouisfed.org/series/TB3MS.

Narasimhan Jegadeesh, & Sheridan Titman. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. The Journal of Finance (New York), 48(1), 65-91.