Problem Set 4

Name: Xiyuan Dong
Who I discuss with: Xiahao Wang, Ruqing Xu, Yimeng Wang

Question 1

Decisions:

1. For CompStat, use USD and INDL only.
2. The way that I calculate BE are as the same as defined by Fama French.
3. Use LINKTABLE to match company identity
4. Sum up the market cap for companies with multiple securities (same PERMCO but might have multiple PERMNO)
5. Use NYSE stocks as breakpoint to sort all stocks in all three exchanges
6. The BE used in June of year t is the book equity for the last fiscal year end in t-1. ME is price times shares outstanding at the end of December of t-1.
7. ME < 0 (not used); bottom 30%, middle 40%, top 30%
8. BE = 0 (not used); small 50%, big50%

Question 2

	1	2	3	4	5	6	7	8	9	10	LongShort
Excess Return	0.0876	0.0851	0.0905	0.0836	0.0872	0.0781	0.0770	0.0844	0.0738	0.0631	0.0272
Standard Deviation	0.2218	0.2259	0.2110	0.2048	0.1976	0.1827	0.1845	0.1760	0.1638	0.1508	0.1686
Sharpe Ratio	0.3949	0.3769	0.4288	0.4084	0.4410	0.4276	0.4171	0.4796	0.4506	0.4184	0.1615
Skewness	-0.1796	-0.2365	-0.5111	-0.5649	-0.4888	-0.5739	-0.5790	-0.4944	-0.5081	-0.3626	0.8441
Correlation	0.9900	0.9934	0.9953	0.9937	0.9915	0.9933	0.9838	0.9964	0.9940	0.9980	0.9821

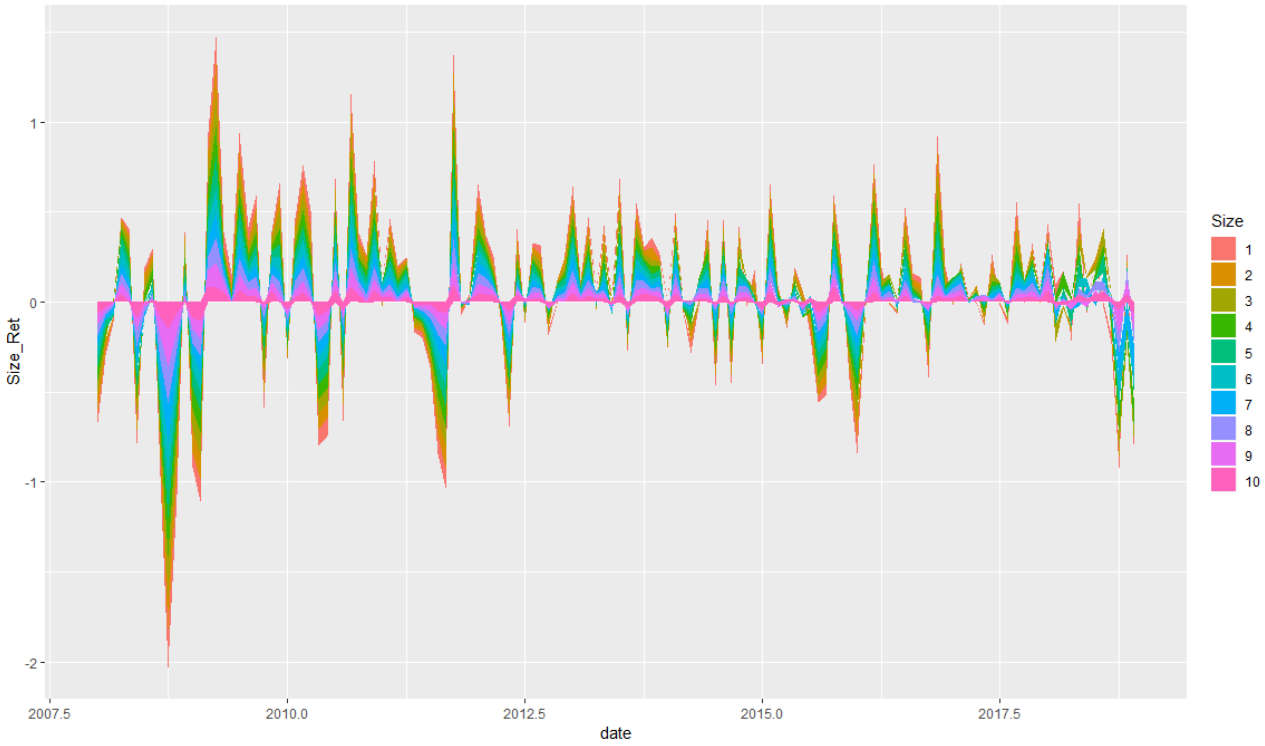
Question 3

	1	2	3	4	5	6	7	8	9	10	LongShort
Excess Return	0.0588	0.0743	0.0774	0.0799	0.0713	0.0817	0.0822	0.0723	0.0993	0.1011	0.0483
Standard Deviation	0.1840	0.1648	0.1641	0.1713	0.1600	0.1617	0.1583	0.1696	0.1705	0.2037	0.1669
Sharpe Ratio	0.3194	0.4509	0.4717	0.4664	0.4458	0.5054	0.5192	0.4263	0.5825	0.4964	0.2892
Skewness	-0.2838	-0.5405	-0.5251	-0.4947	-0.5355	-0.3817	-0.1707	-0.5129	-0.4417	-0.0127	0.7586
Correlation	0.9805	0.9756	0.9630	0.9628	0.9540	0.9352	0.9307	0.9323	0.9460	0.9311	0.9787

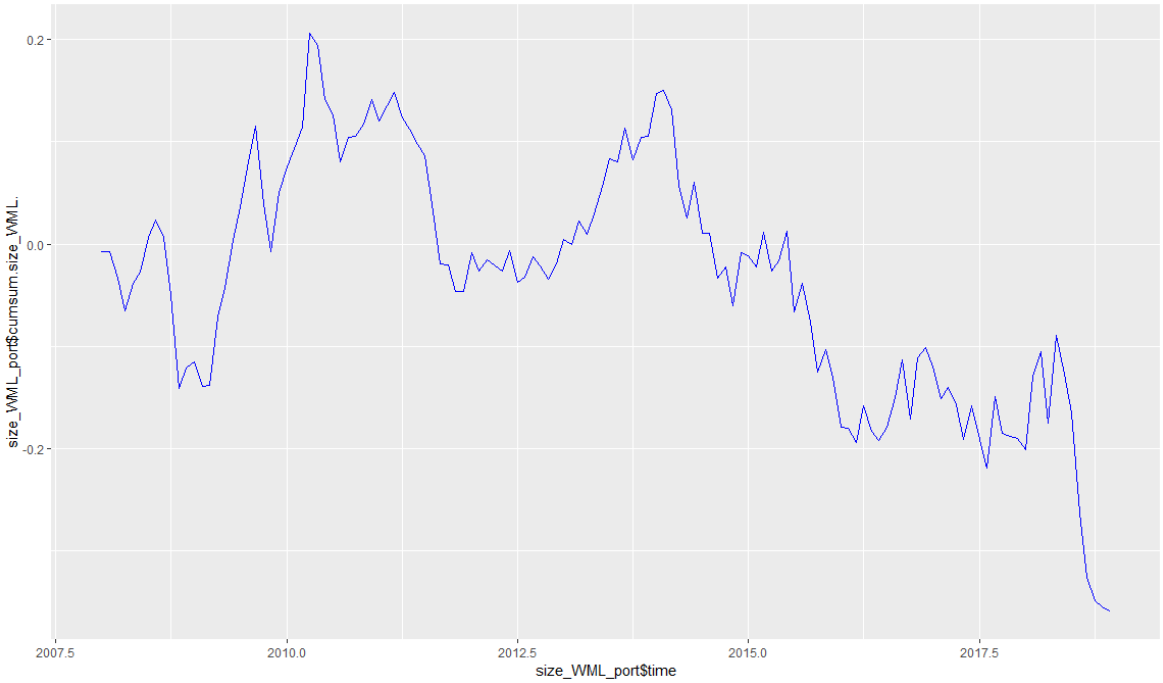
Question 4

We investigate the performance of size and BtM after 2008.

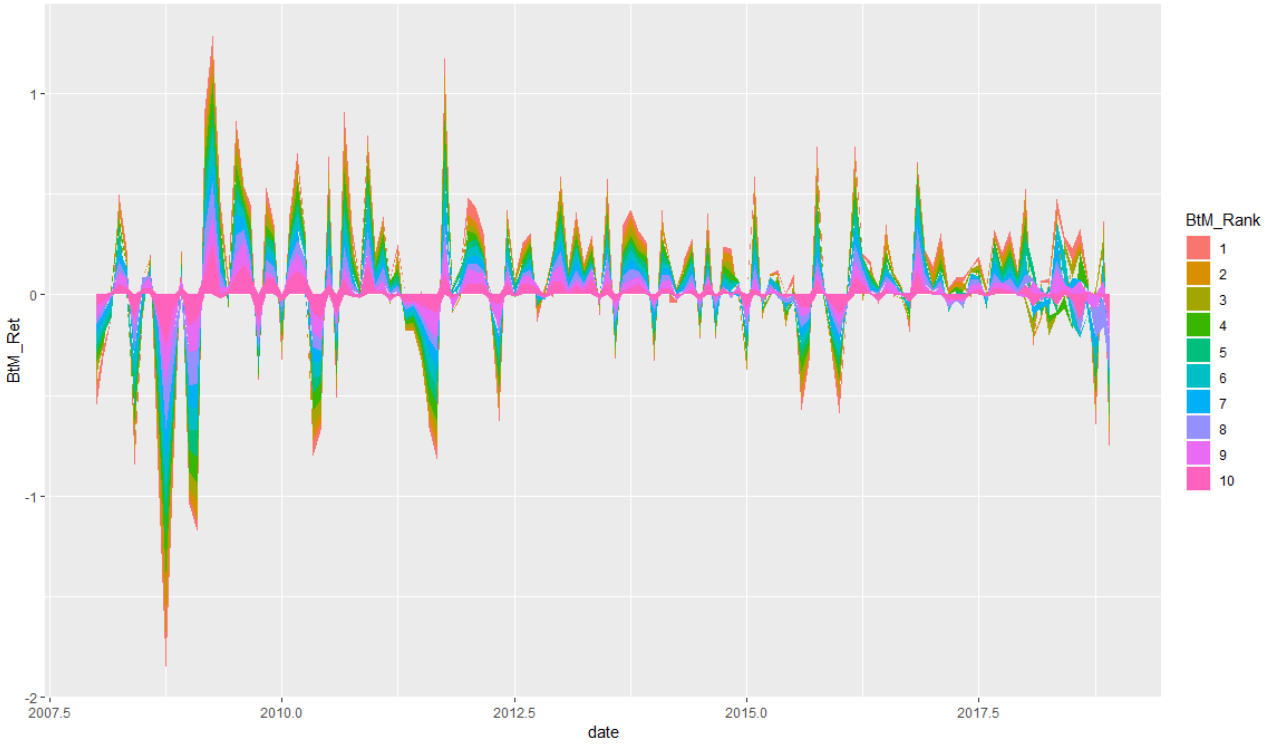
We plot the monthly return of each SIZE portfolio.

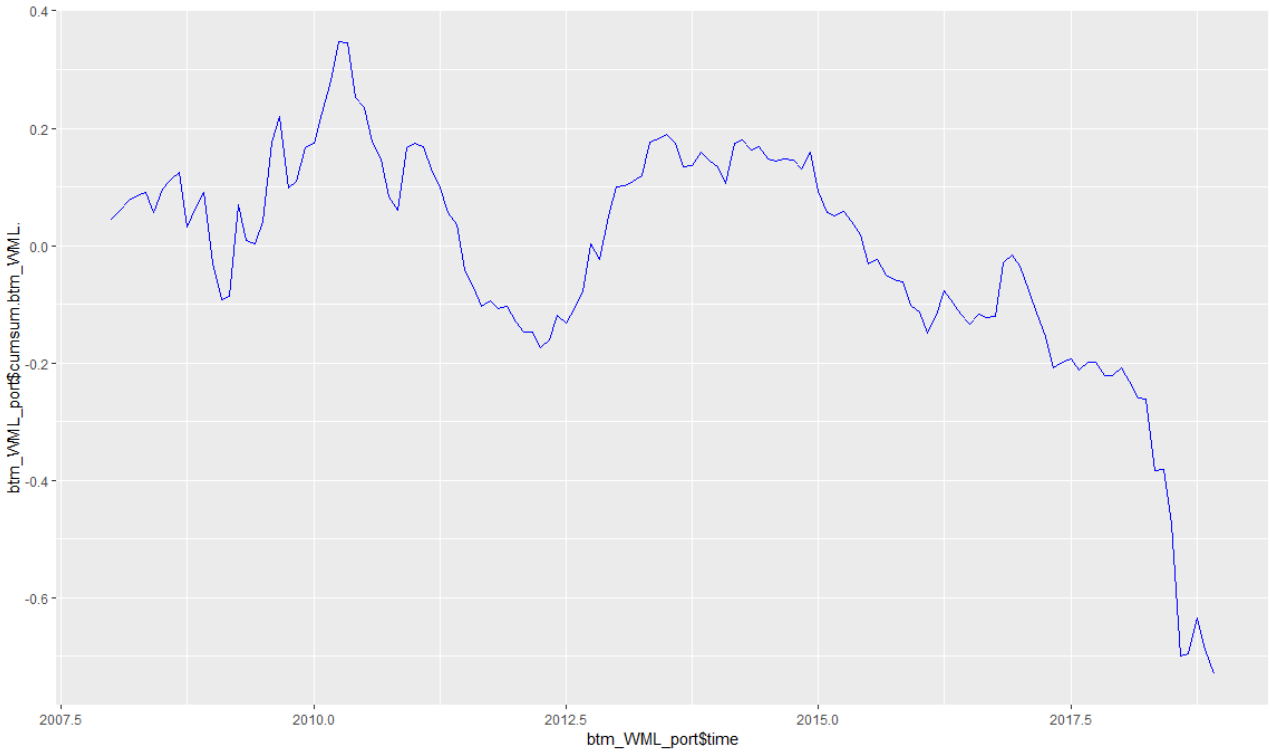


Small size stocks should generally have higher return in theory but it's not the case from observing the plot. We then plot the Long Short portfolio (Size 1 – Size10) cumulative log return from 2008 to 2018 and find the portfolio kept losing value in these years.



We then plot the monthly return of each VALUE portfolio.
High BtM stocks should generally have higher return in theory but it's also not the case from observing the plot. We then plot the Long Short portfolio (BtM 10 – BtM1) cumulative log return from 2008 to 2018 and find the portfolio also kept losing value in these years.





Thus, we conclude that the value and size anomaly worked in the past few years

Question 5

	SMB
Excess Return	0.01902
Standard Deviation	0.100589
Sharpe Ratio	0.189091
Skewness	0.516675
Correlation	0.956245

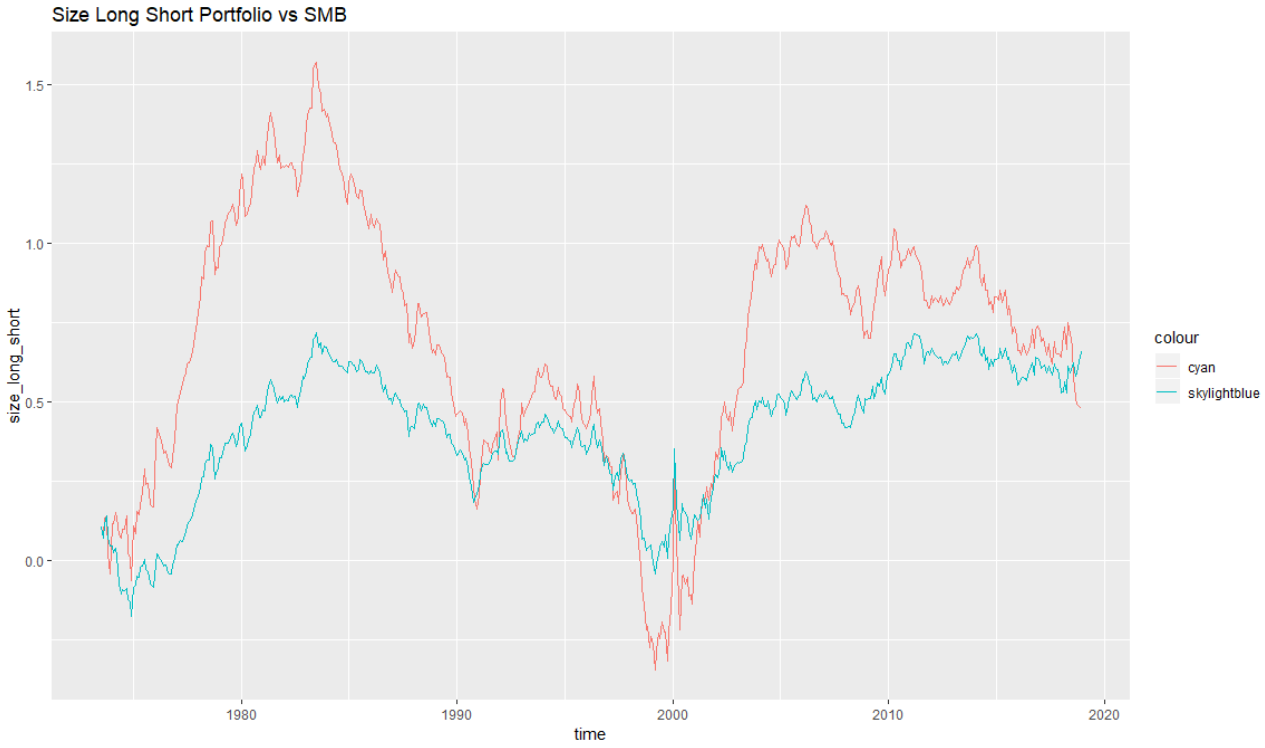
	HML
Excess Return	0.025932
Standard Deviation	0.109388
Sharpe Ratio	0.237067
Skewness	-0.13202
Correlation	0.936173

Question 6

We first plot the cumulative log Size Long-Short Portfolio return (characteristics) vs SMB portfolio return (factors).

Cyan: Size Long-Short Portfolio

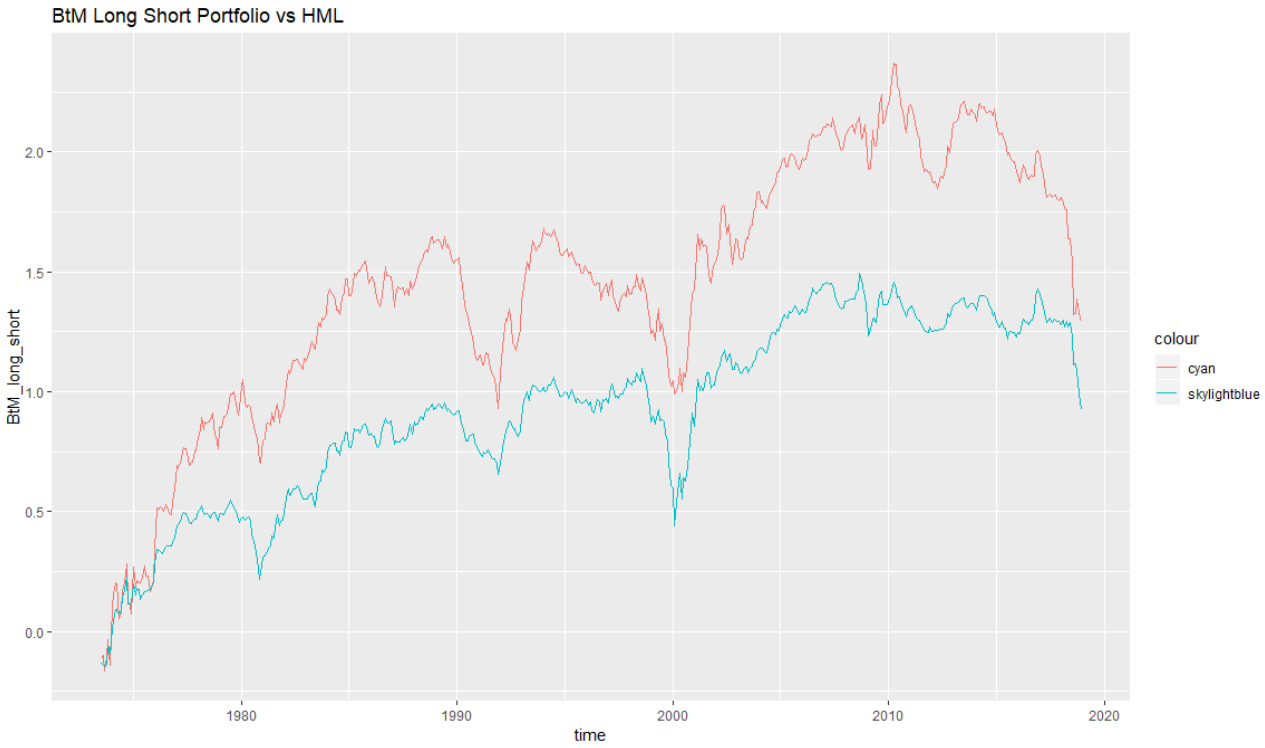
Skylightblue: SMB portfolio return



We then plot the cumulative log Value Long-Short Portfolio return (characteristics) vs HML portfolio return (factors).

Cyan: Value Long-Short Portfolio

Skylightblue: HML portfolio return



From empirical evidence, we may conclude that the characteristic portfolios give generally higher but more volatile returns.