Homework 5

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I follow the following steps to replicate the table asked for:

1. I download the CRSP daily, CRSP Monthly, Fama French 3 Factor Daily, and Fama French 3 Factor Monthly Data
2. I conduct the next three steps on CRSP daily as well as the CRSP monthly data. I set the date format and filter by exchange code. (I use only Exchange Codes 1,2,3 which correspond to NYSE, Amex and NASDAQ)
3. Next, I keep only the numeric returns and calculate the Net returns as per the rule given on slide 29/110 in the Lecture_1_2018_MFE.pdf. I take $r_{i,t}$ as:

   $r^h_{i,t}$ if $r^d_{i,t}$ is missing,

   $r^d_{i,t}$ if $r^h_{i,t}$ is missing, and

   $(1 + r^h_{i,t})(1 + r^d_{i,t}) - 1$ if both are not missing.

   If both are missing, I ignore all the data of that day for that stock.
4. I extract the month and the year from the date to be used further ahead.
5. Only for the monthly data, I calculate the market capitalization on every date for every stock by multiplying the price (PRC) by the number of shares outstanding (SHROUT). To deal with negative values in PRC or SHROUT, I took the absolute value of the respective PRC or SHROUT values.

   I then lag this market capitalization by 1 month for every PERMNO.
6. I calculate the volatility for each month using the Net Returns column (TOTRET) from the CRSP daily data.
7. I calculate from the CRSP daily data the number of observations of Net Return for every month, for every PERMNO.
8. I use only the rows where the number of observations calculated in the previous step is greater than 17.
9. I lag the volatility by 1 month to consider the effects of non-synchronous trading.
10. I then create quintiles (5 portfolios) based on the lagged volatility for each month and calculate the value weighted returns on the portfolio.
11. I calculate the Mean as the arithmetic mean of monthly returns, standard deviation as the standard deviation of monthly returns, percentage market share as the average percentage of market share of the stocks in each quintile over the sample period, and the size as the mean of the log of the market capitalization for every month. The CAPM Alpha column is the intercept of the regression of the returns of a portfolio on the market factor of the Fama French 3 Factors and similarly, the FF3 Alpha column is the intercept of the regression of the returns of a portfolio on all the Fama French 3 factors (MktRf, HML, SMB). The t-statistics of the intercepts are the robust Newey West statistics which consider the effect of heteroskedasticity.
12. The statistics are summarized in the table below.

Panel A (Portfolios sorted by aggregate volatility)

Rank	Mean%	Std.Dev%	%Mkt Share	Size	CAPM Alpha	FF-3 Alpha	t CAPM Alpha	t FF-3 Alpha
1	1.10	2.69	30.74	6.54	0.17	0.12	0.77	0.52
2	1.16	3.10	35.89	7.29	-0.01	-0.02	-0.16	-0.27
3	1.05	3.62	20.39	6.81	-0.29	-0.26	-1.78	-1.54
4	0.48	4.11	9.56	6.04	-0.86	-0.74	-2.07	-2.02
5	0.26	4.87	3.42	4.97	-1.10	-1.00	-1.66	-1.64

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1. Next, I merge the daily CRSP data and the daily Fama French 3 Factor data by Day, Month and Year to have a consistent regression for the idiosyncratic volatility.
2. I filter my data from the same rule as mentioned in step 7. I remove the missing returns and regress the returns on the daily Fama French 3 Factors on a monthly level as defined in the paper. I use the residual standard deviation from these regressions as the idiosyncratic volatility for that month. I then lag this residual volatility to account for non-synchronous trading.
3. Next, I follow the same procedures as described in steps 9 and 10, now forming portfolios sorted on the lagged idiosyncratic volatility. The statistics are summarized below:

Panel B (Portfolios sorted by idiosyncratic volatility)

Rank	Mean%	Std.Dev%	%Mkt Share	Size	CAPM Alpha	FF-3 Alpha	t CAPM Alpha	t FF-3 Alpha
1	1.14	3.04	38.48	6.84	0.01	-0.03	0.09	-0.22
2	1.14	3.03	31.76	7.23	0.00	-0.01	0.01	-0.11
3	0.80	3.41	17.87	6.73	-0.44	-0.41	-2.19	-2.16
4	0.66	4.12	8.65	5.97	-0.74	-0.64	-1.86	-1.70
5	0.29	4.63	3.25	4.88	-0.96	-0.85	-1.44	-1.43