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Empirical Finance, Spring 2025

Exercise 1: Fama-French Factors and Portfolios

Due June 25 (at the beginning of class)

This exercise gets you started with the empirical tests of the theory covered in the course. We will revisit the result in a later exercise. Read Fama and French (1993).

Upload a PDF copy of your answer with well-documented code in separate, runnable, human-readable files on Canvas; your result should be verifiable by a third party, as many top finance and economics journals require or recommend. Keep a copy for class discussion.

1) Replicate the second panel of their Table 2 (reproduced below for convenience; similar to Table 0-1 in the introduction of Back (2017)) by "cheating" (skipping portfolio formation) as follows: Use the Fama-French 25 portfolios in SAS dataset `portfolios25.sas7bdat` or its corresponding CSV file; use statistical software of your choice. Use value-weighted returns ending in `vwret`. For the same sample period as Fama and French's (find it out), calculate the excess mean returns, standard deviations, and t-statistics, and present them in a format similar to the panel below. In addition, compute and insert a column for "High – Low" next to High and a row for "Small – Big" below Big, representing relevant zero-cost portfolios (long High short Low, and long Small short Big). Their significance, both statistically and economically, is important to support Fama and French's claim. Note that you will *not* get the same numbers as their table, because CRSP and hence the FF data are constantly revised.

2) Calculate and present the mean, standard deviation, and t-statistics of the Fama-French three factors (MKTRF, SMB, HML in SAS dataset `factors_monthly.sas7bdat`, ditto) and the momentum factor (UMD) for the same sample period.

3) Repeat Parts 1) and 2) for the period from January 1927 to December 2024. Do you find a similar pattern in this longer sample?

Dependent variables: Excess returns on 25 stock portfolios formed on ME and BE/ME

Size quintile	Book-to-market equity (BE/ME) quintiles									
	Low	2	3	4	High	Low	2	3	4	High
	Means					Standard deviations				
Small	0.39	0.70	0.79	0.88	1.01	7.76	6.84	6.29	5.99	6.27
2	0.44	0.71	0.85	0.84	1.02	7.28	6.42	5.85	5.33	6.06
3	0.43	0.66	0.68	0.81	0.97	6.71	5.71	5.27	4.92	5.69
4	0.48	0.35	0.57	0.77	1.05	5.97	5.44	5.03	4.95	5.75
Big	0.40	0.36	0.32	0.56	0.59	4.95	4.70	4.38	4.27	4.85
	t-statistics for means									
Small	0.93	1.88	2.33	2.73	2.97					
2	1.11	2.05	2.69	2.91	3.11					
3	1.18	2.12	2.39	3.04	3.15					
4	1.49	1.19	2.08	2.88	3.36					
Big	1.50	1.42	1.34	2.43	2.26					

References

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