Big Data Asset Pricing

Exercise 3: Factor Replication Analysis

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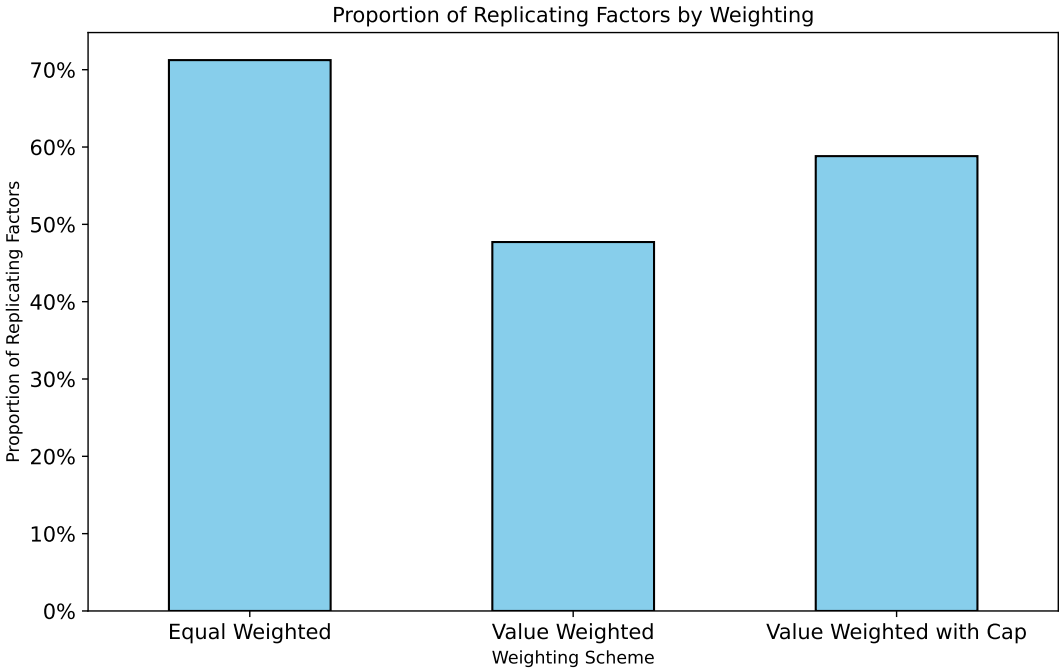
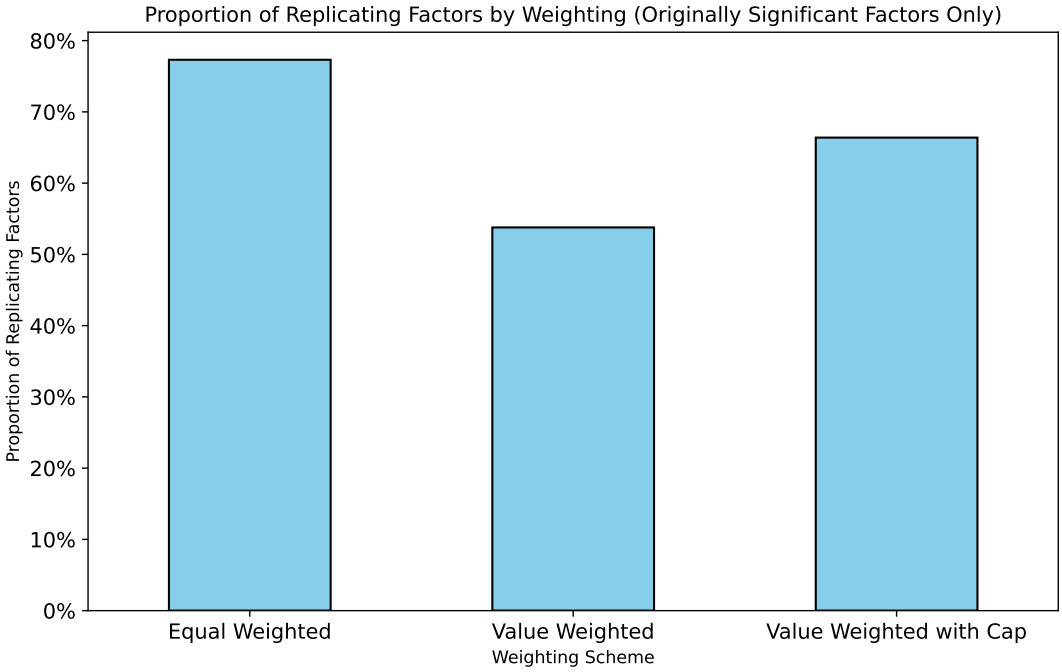
Statement: I certify with my signature that I have solved the exercise according to the Code of Professional Conduct and Ethics. For example, I have not plagiarized others, but, instead, solved the exercise myself (possibly with allowed collaboration with other students), and I have referenced my sources appropriately.

2024-01

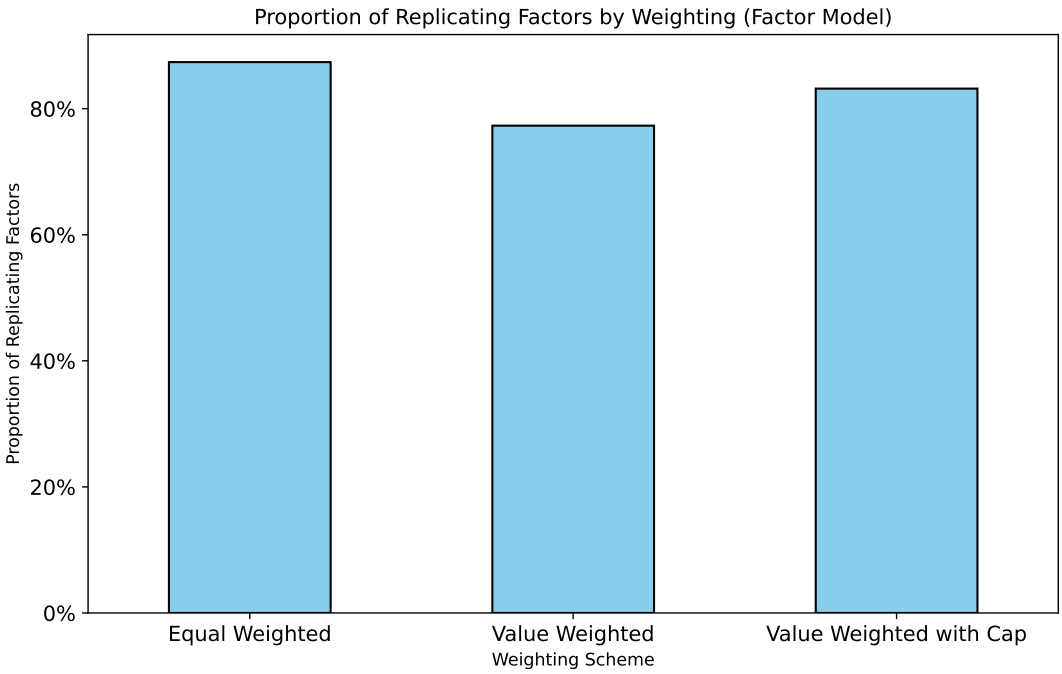
1


Proportion of Replicating Factors by Weighting
Proportion of Replicating Factors
70%
60%
50%
40%
30%
20%
10%
0%
Equal Weighted
Value Weighted
Value Weighted with Cap
Weighting Scheme

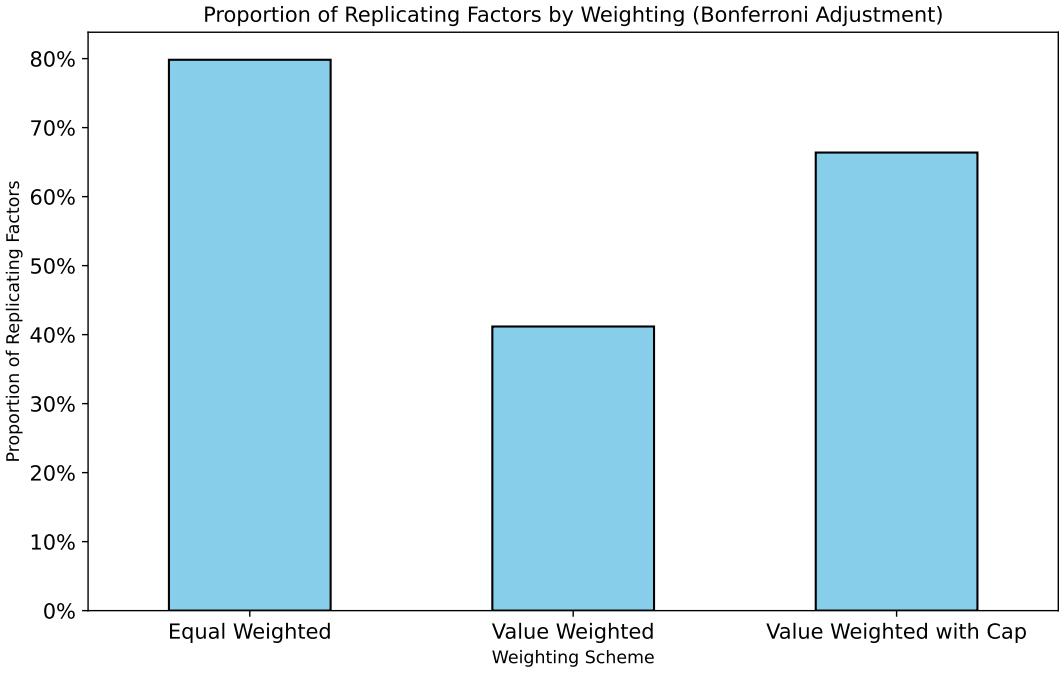
2


Proportion of Replicating Factors by Weighting (Originally Significant Factors Only)
Proportion of Replicating Factors
80%
70%
60%
50%
40%
30%
20%
10%
0%
Equal Weighted
Value Weighted
Value Weighted with Cap
Weighting Scheme

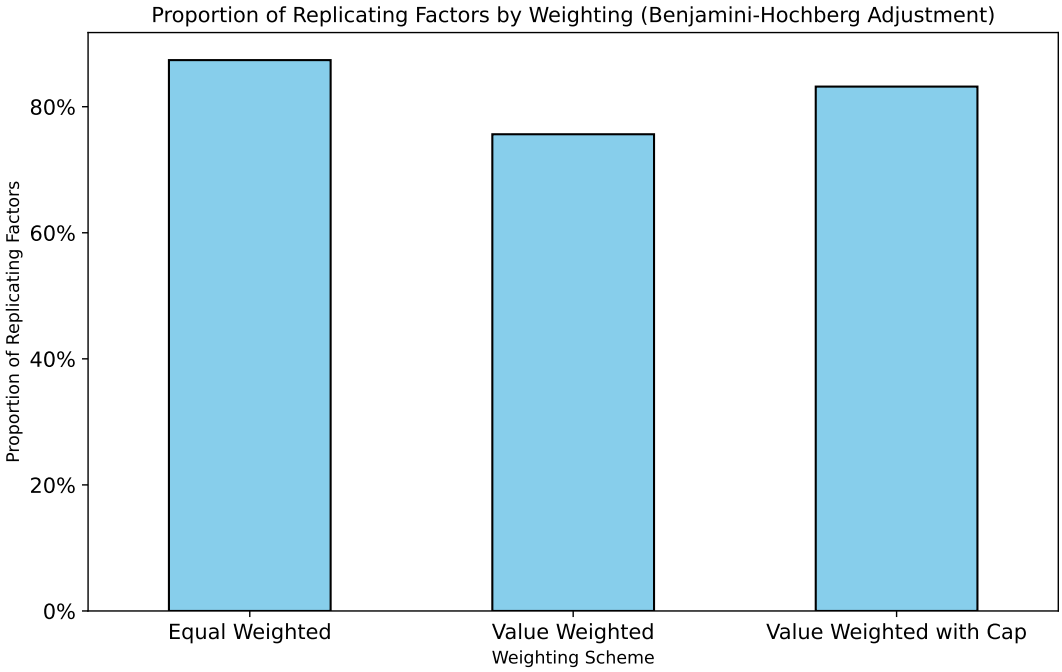
3


Proportion of Replicating Factors by Weighting (Factor Model)
Proportion of Replicating Factors
80%
60%
40%
20%
0%
Equal Weighted
Value Weighted
Value Weighted with Cap
Weighting Scheme

4


Proportion of Replicating Factors by Weighting (Bonferroni Adjustment)
Proportion of Replicating Factors
80%
70%
60%
50%
40%
30%
20%
10%
0%
Equal Weighted
Value Weighted
Value Weighted with Cap
Weighting Scheme

5



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	Low Leverage	Size	Investment	Value	Low Risk	Debt Issuance	Quality	Seasonality	Accruals	Profitability	Profit Growth	Short-Term Reversal	Momentum
Low Leverage	0.39	0.07	-0.29	-0.37	-0.34	0.06	0.07	-0.04	-0.01	-0.24	0.12	-0.12	0.04
Size	0.07	0.33	0.05	0.01	-0.11	0.04	-0.09	0.02	0.02	-0.17	-0.09	-0.01	-0.12
Investment	-0.29	0.05	0.39	0.32	0.24	0.09	-0.13	0.04	0.09	0.08	-0.14	0.07	-0.02
Value	-0.37	0.01	0.32	0.42	0.32	-0.02	-0.06	0.04	0.02	0.22	-0.15	0.13	-0.11
Low Risk	-0.34	-0.11	0.24	0.32	0.40	-0.05	0.01	0.03	-0.03	0.26	-0.08	0.14	0.01
Debt Issuance	0.06	0.04	0.09	-0.02	-0.05	0.28	0.05	0.03	0.03	-0.03	0.08	-0.03	0.09
Quality	0.07	-0.09	-0.13	-0.06	0.01	0.05	0.29	0.02	-0.10	0.17	0.11	0.02	0.08
Seasonality	-0.04	0.02	0.04	0.04	0.03	0.03	0.02	0.07	0.01	0.03	0.01	0.01	0.02
Accruals	-0.01	0.02	0.09	0.02	-0.03	0.03	-0.10	0.01	0.27	-0.10	-0.01	-0.02	-0.01
Profitability	-0.24	-0.17	0.08	0.22	0.26	-0.03	0.17	0.03	-0.10	0.37	0.02	0.11	0.01
Profit Growth	0.12	-0.09	-0.14	-0.15	-0.08	0.08	0.11	0.01	-0.01	0.02	0.24	-0.04	0.15
Short-Term Reversal	-0.12	-0.01	0.07	0.13	0.14	-0.03	0.02	0.01	-0.02	0.11	-0.04	0.28	-0.06
Momentum	0.04	-0.12	-0.02	-0.11	0.01	0.09	0.08	0.02	-0.01	0.01	0.15	-0.06	0.37

I calculate the Σ^{block} and C^{block} as mentioned in the exercise.

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I could not manage to run the maximum likelihood estimation for estimating the τ_c and τ_w parameters.

Appendix

Here you can find the python code that I used to solve the exercise. Link to the GitHub repository.