

Portfolio Construction using Black-Litterman Model and Factors

Alvaro Cea

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1 Introduction

1.1 Develop computational tools and external libraries

- `getFamaFrenchFactors` <https://pypi.org/project/getFamaFrenchFactors/>

2 Theory

2.1 Fama-French Model

It is one of the multi-factor models which is widely used in both academia and industry to estimate the excess return of an investment asset. It is an extension to Capital Asset Pricing Model (CAPM) by adding two additional factors apart from the market risk when estimating the excess returns of an asset. The three factors considered in this model are:

Market factor (MKT) — Excess market return Size factor (SMB) — Excess return with a small market cap over those with a large market cap Value factor (HML) — Excess return of value stocks over growth stocks.

The Fama-French model is widely known as a stock market benchmark to evaluate investment performance.

3 Results

3.1 Portfolio and Factor analysis

3.1.1 Asset selection

3.1.2 Factor collection

OLS Regression Results						
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Dep. Variable:	y	R-squared:		0.608		
Model:	OLS	Adj. R-squared:		0.587		
Method:	Least Squares	F-statistic:		28.98		
Date:	Mon, 31 Jul 2023	Prob (F-statistic):		1.92e-11		
Time:	12:17:38	Log-Likelihood:		126.50		
No. Observations:	60	AIC:		-245.0		
Df Residuals:	56	BIC:		-236.6		
Df Model:	3					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	0.0155	0.004	3.671	0.001	0.007	0.024
Mkt-RF	0.8628	0.094	9.194	0.000	0.675	1.051
SMB	-0.3160	0.152	-2.084	0.042	-0.620	-0.012
HML	-0.3282	0.109	-3.022	0.004	-0.546	-0.111
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Omnibus:	2.381	Durbin-Watson:		2.596		
Prob(Omnibus):	0.304	Jarque-Bera (JB):		1.661		
Skew:	0.160	Prob(JB):		0.436		
Kurtosis:	3.750	Cond. No.		39.9		
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Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

- 3.1.3 P&L and backtesting
- 3.2 Black-Litterman implementation
 - 3.2.1 Prior and posterior returns construction
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 - 3.2.3 Covariance treatment
 - 3.2.4 Portfolio weights optimisation
 - 3.2.5 Analysis and discussion
 - 3.2.6 Performance comparison