

1 Motivational Simulation

Model	DF	log margLike
Mkt.RF + SMB + HML	4	7187.32
Mkt.RF + SMB + HML + CMA	4	7177.05
Mkt.RF + SMB + HML + MSFT	4	7170.99
Mkt.RF + SMB + HML + RMW	4	7170.24
Mkt.RF + SMB + HML	6	7169.59

Table 1: Simulation Results

In order to motivate our research we simulate asset returns and demonstrate that the true model is selected. The returns are assumed to be follow the famous Fama-French 3 factor(Mkt.RF, HML and SMB) structure without intercept. The errors follow Student-t distribution with 2.5 degrees of freedom. The simulation is based on posterior means obtained when fitting the model to the real data. Other parameters are the same as in the original sample. The pool of candidate models includes all combinations of Fama-French 5 factors(Mkt.RF, HML, SMB, RMW and CMA), a constant and a non-factor asset - Microsoft stock (MSFT). We assume that the researcher does not know the true distribution. Considered distributions include normal and Student-t with 4, 6, 8, 10 and 12 degrees of freedom. We fit in total $6 \times 2^7 = 768$ model. The simulation is based on the sample range Apr 1986 - Dec 2014 (345 observations). The training sample includes observations Apr 1986 - Dec 1990 (57 observations).

The simulation setup is described below:

1. Fit the Fama-French 3 factor model without an intercept to 10 value-weighted industry portfolios using the full sample. The errors are assumed to follow Student-t distribution with 4 degrees of freedom.
2. Simulate a dataset assuming the true parameters γ and Ω^{-1} to be equal to the posterior means:

- Simulate errors:

$$\epsilon_t^s \sim t_{10,2.5}(0, \Omega)$$

- Simulate returns using values of Fama-French 3 factors observed in the data:

$$\mathbf{y}_t^s = X_t \gamma + \epsilon_t^s$$

3. Estimate all candidate models and evaluate the likelihood. Run the usual two step estimation procedure using the training sample to construct priors for each model.

The best model selects the true factors. The distribution is the closest to the truth.

2 Big Run

Example of a table for the big run. So far $3 \times (2^{13}) = 24576$ models were explored. The distributions include normal and Student-t 4 and 12. For all best models errors follow Student-t distribution with 6 degrees of freedom.

Model	DF	log margLike
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE	6	9690.77
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE	6	9689.14
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME	6	9688.97
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	6	9688.26
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	6	9687.89

Table 2: Best Big Run Models

Model	DF	log margLike
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE	4	9684.65
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME	4	9683.9
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	4	9683.75
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE	4	9683.24
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + IA	4	9683.08

Table 3: Student-t with 4 degrees of freedom

Model	DF	log margLike
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE	8	9685.24
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE	8	9684.32
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	8	9683.73
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	8	9683.5
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME	8	9682.56

Table 4: Student-t with 8 degrees of freedom

Model	DF	log margLike
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE	10	9677.6
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	10	9676.08
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE	10	9675.6
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	10	9675.02
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE + HMLDev	10	9674.87

Table 5: Student-t with 10 degrees of freedom

Model	DF	log margLike
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE	12	9669.05
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	12	9667.82
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ROE	12	9667.35
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	12	9667.15
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + IA + ROE	12	9666.27

Table 6: Student-t with 12 degrees of freedom

Model	DF	log margLik
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	∞	9517.35
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + HMLDev	∞	9515.86
MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + IA + HMLDev	∞	9515.84
MOM + Mkt.RF + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	∞	9514.79
constant + MOM + Mkt.RF + SMB + HML + RMW + CMA + QMJ + ME + ROE + HMLDev	∞	9514.64

Table 7: Gaussian