Empirical Asset Pricing: Problem Set 6

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0.0.1 a

The table below shows the time-series average return, t-statistic, annualized Sharpe ratio and standard deviation on this 1-month, 1-month industry momentum portfolio.

	Average return	t-statistic	Annualized Sharpe ratio	Standard deviation
1-month,1-month IND MOM	0.6936	4.1919	0.4411	5.4477

0.0.2 b

For the 1-month, 1-month strategy, we decompose its returns as follows:

$$Mom = \sigma_{\mu}^2 + \sigma_{\beta}^2 cov(\tilde{F}_t, \tilde{F}_{t-1}) + \frac{1}{N}\sum_{j=1}^{N} cov(\epsilon_{j,t}, \epsilon_{j,t-1})$$

Here, we used CAPM to get the μ, β and ϵ as follows:

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{mt} - r_{ft}) + \epsilon_{it}$$

By comparing the number in the table below, we find out that the third term, $\frac{1}{N}\sum_{j=1}^{N} cov(\epsilon_{j,t}, \epsilon_{j,t-1})$, which is the serial covariation in firm-specific components, is the greatest contributor to momentum profits.

	σ_{μ}^2	$\sigma_{\beta}^2 cov(\tilde{F}_t, \tilde{F}_{t-1})$	$\frac{1}{N}\sum_{j=1}^{N} cov(\epsilon_{j,t}, \epsilon_{j,t-1})$
Mom	0.0122	0.1337	0.6351

0.0.3 c

The table below shows the time-series average return, t-statistic, annualized Sharpe ratio and standard deviation on this 12-month, 1-month industry momentum portfolio.

	Average return	t-statistic	Annualized Sharpe ratio	Standard deviation
12-month,1-month IND MOM	0.8583	4.5857	0.4849	6.1310

0.0.4 d

The table below shows the time-series average return, t-statistic, annualized Sharpe ratio and standard deviation on this 12-month, 1-month, skip 1 month industry momentum portfolio and differences between this strategy and the 12-month, 1-month, no skipping momentum strategy above. From the table, we can see this strategy achieves 0.0701 percent more average monthly returns, higher t-statistics, 0.0414 bigger annual Sharpe ratio and 0.0200 lower standard deviation. The difference shows the 12-month, 1-month, skip 1-month momentum strategy performs better than 12-month, 1-month, skip 1 month momentum strategy.

	Average return	t-statistic	Annualized Sharpe ratio	Standard deviation
12-1 month,skip 1 month IND MOM	0.9284	4.9765	0.5263	6.1110
12-1 month, no skip IND MOM	0.8583	4.5857	0.4849	6.1310
Difference	0.0701	0.3908	0.0414	-0.0200

0.0.5 e

The table below shows the alpha and betas of three momentum strategies using the following regression,

$$r_{MOM,t} = \alpha + \beta_{RMRF}(r_{mt} - r_{ft}) + \beta_{SMB} r_{SMB,t} + \beta_{HML} r_{HML,t} + \epsilon_t$$

From the table, we can see the α of three regressions are all quite big and apparently different from zero, which suggests that the Fama-French model can not price the momentum strategies.

	α	β_{RMRF}	β_{SMB}	β_{HML}
1-1 month IND MOM	0.6924	-0.0634	-0.0514	0.1329
12-1 month,no skip,IND MOM	1.0449	-0.1365	0.0509	-0.2796
12-1 month,skip 1 month,IND MOM	1.1076	-0.1321	0.0845	-0.2866