

Assignment 1 Review OLS

Due 28/1/2021

From the given data set, `assign1.dta`, estimate the following models:

Capital Asset Pricing Model (CAPM)

$$\text{CAPM:} \quad r_{jt} = \alpha_j + \beta_{j1}r_{mt} + \varepsilon_{jt} \quad (1)$$

Fama & French three-factor Model (FF)

$$\text{Fama \& French:} \quad r_{jt} = \alpha_j + \beta_{j1}r_{mt} + \beta_{j2}r_{smbt} + \beta_{j3}r_{hmlt} + \varepsilon_{jt} \quad (2)$$

Carhart four-factor Model

$$\text{Carhart:} \quad r_{jt} = \alpha_j + \beta_{j1}r_{mt} + \beta_{j2}r_{smbt} + \beta_{j3}r_{hmlt} + \beta_{j4}r_{wmlt} + \varepsilon_{jt} \quad (3)$$

- Where:
- r_{jt} = excess return on mutual fund j at time t and $j = 1, 2, \dots, 20$.
 - r_{mt} = excess return on market portfolio at time t – representing market risk premium.
 - r_{smbt} = return on a small-stock portfolio minus the return on a large-stock portfolio (Small Minus Big) at time t – representing size premium.
 - r_{hmlt} = return on a value-stock portfolio minus the return on a growth-stock portfolio (High Minus Low) at time t – representing value premium.
 - r_{wmlt} = return on a winners portfolio minus the return on a losers portfolio (Winners Minus Losers) at time t – representing momentum premium.

- (a) From CAPM, determine top 3 mutual fund in term of their performance based on Jensen Alpha.
- (b) From FF, determine top 3 mutual fund in term of their performance based on Jensen Alpha.
- (c) From Carhart, determine top 3 mutual fund in term of their performance based on Jensen Alpha.
- (d) From the estimated result of Carhart four-factor model (3) of mutual fund #1, evaluate whether there exist Autocorrelation and Multicollinearity problem or not? Which model between Carhart or FF should be employed in this case? Why? Also, make evaluation of the estimated results of Carhart model in term of (i) sign and meaning of the estimated coefficients; (ii) overall test; (iii) coefficient of determination; and (iv) individual test.
- (e) Based on (a), (b), and (c), which result is the most appropriated one? Why?

Hint: In order to speed up your analysis, you can employ the loop command by using forvalue command, as follows:

Example do-file command

```
set more off

mat Alpha_CAPM=(0,9999)

forvalue i=1(1)20 {
    qui reg r`i' rmrf
    est store capm`i'
    mat beta=e(b)
    sca a_capm`i'=e1(beta,1,2)
    mat Alpha_CAPM=(Alpha_CAPM \ `i',a_capm`i')
}
est table capm*, star(.1 .05 .01) stat(N rss F r2 r2_a)
mat list Alpha_CAPM
```

