

5th set of assignments Financial Econometrics

1. Estimate a CAPM with help of the system environment in EViews. The stochastic discount factor  $m$  is specified as:

$$m = a + b(R^m - R^f)$$

Moment conditions result from:

$$E(mR - 1) = 0$$

Test for the significance of  $b$  and compute and interpret the  $J$ -statistic as well as its  $p$ -value (see hint below).

- Use the data set `cochrane_deciles_from_lecture.wf1` provided on the home page of the course
- For  $R^m$ , optionally, the series `avvwret` or `avewret` can be chosen
- $R^f$  is the series `avustret`
- The returns  $R$  are collected in the series `decile1` to `decile10`
- Hint for the  $J$ -statistic: The  $J$ -statistic, EViews returns and displays has to be multiplied with the number of observations used for estimation. Computation of the  $J$ -statistic and the  $p$ -value can be conducted in the following way: Save your system and name it (e.g. as "CAPM"). Then use the commands (see User Guide, page 293):  
`scalar jval=CAPM.@regobs*CAPM.@jstat`  
`scalar pval=1-@cchisq(jval,8)`

2. Estimate a CAPM for *excess returns* with help of the system environment in EViews. The stochastic discount factor  $m$  is still specified as:

$$m = a + b(R^m - R^f)$$

Moment conditions do now result from:

$$E(mR^e) = 0$$

Note: Mind the trap!!!

Test for the significance of  $b$  and compute and interpret the  $J$ -statistic as well as its  $p$ -value (see hint above).

- Use the data set `cochrane_deciles_from_lecture.wf1` provided on the home page of the course
- For  $R^m$ , optionally, the series `avvwret` or `avewret` can be chosen
- $R^f$  is the series `avustret`
- The returns  $R$  are collected in the series `decile1` to `decile10`. To compute excess returns, subtract `avustret` from the return of each decile.

3. Estimate the famous Fama/French model based on *excess returns*, i.e. using  $E(mR^e) = 0$  with help of the system environment in EViews. Here, the stochastic discount factor  $m$  is formulated as a linear function of three factors:

$$m = a + b_1 f_1 + b_2 f_2 + b_3 f_3$$

where

$$\begin{aligned} f_1 &= (R^m - R^f) \\ f_2 &= (R^H - R^L) \\ f_3 &= (R^S - R^B) \end{aligned}$$

$R^S$  denotes the return of a portfolio of *small* firms (in terms of market capitalization).  $R^B$  denotes the return of a portfolio of *big* firms.  $R^H$  denotes the return of a portfolio of firms with a *high* ratio of book value to market value.  $R^L$  denotes the return of a portfolio of firms with a *low* book to market ratio. In order to construct those portfolios, distribution deciles of the respective variable (e.g. book value/market value) are created for a set of assets. Then, portfolios are constructed according to those deciles. Typically, one uses the upper decile and the lower decile for calculating the return difference. Note, that all factors in the Fama/French model are excess returns.

Test for the significance of  $b$  and compute and interpret the  $J$ -statistic as well as its  $p$ -value (see hint above). Additionally, conduct an  $F$ -test for joint significance of  $b$ , where the null hypothesis is  $H_0: b_1 = b_2 = b_3 = 0$  (see hint below)

- Use the data set `cochrane_deciles_from_lecture.wf1` provided on the home page of the course
- $f_1$  can be constructed from  $R^m$  (optionally, the series `avvwret` or `avewret` can be chosen) and  $R^f$  (`avustret`) as above for the CAPM
- $f_2$  is provided directly in `HML_r`
- $f_3$  is provided directly in `SMB_r`
- The returns  $R$  are collected in the series `decile1` to `decile10`. To compute excess returns, subtract `avustret` from the return of each decile as above.
- Hint for the  $F$ -test: To conduct a test for joint significance, click on `VIEW` in the system object and choose `WALD COEFFICIENT TESTS`, then enter your restrictions.