Problem Set 4
Econ 40357 Financial Econometrics
University of Notre Dame
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Fall 2022

Due Thursday 10 November 2022 before class, through Canvas. As usual, submit the pdf for your group and an appendix with everyone's computer work.

Use the Eviews workfile ps4.wf1. Both sheets contain the same raw data. They are monthly returns of 25 Dow-component firms, the S&P and the 3-month T-Bill rate. All returns are in annual percent. The returns are listed as r01,...,r25. For your information, the associated ticker symbols these firms are AAPL, AXP, BA, CAT, CVX, DD, DIS, GE, HD, IBM, INTC, JNJ, JPM, KO, MCD, MMM, MRK, MSFT, NKE, PFE, PG, TRV, UTX, VZ, XOM.

Problems 1-5 will use the time-series method to estimate and test the model

$$\bar{r}^e_{it} = \lambda\beta_i \tag{1}$$

$$r^e_{it} = \alpha_i + \beta_i r^e_{mt} + \epsilon_{it} \tag{2}$$

where r^e_{it} is the excess return on asset i and r^e_{mt} is the excess return on the market. This is a single factor model where $f_t = r^e_{mt}$. Before starting, construct excess returns for each of the stocks.

1. Using the time-series method, estimate the factor (market) risk premium. Report your estimate of λ, the naive t-ratio and the Newey-West t-ratio.

2. Estimate the alphas and betas for each firm. Plot the betas against the average excess returns. Put the excess returns on the y axis.

3. Report the alphas and their t-ratios for the Dow-component stocks.

4. Test the hypothesis that the alphas are jointly zero. Report the test statistic and the p-value of the test.

5. Would you say the CAPM works, or does not work for the Dow stocks?

Eviews programming hints

How to construct mean excess returns $re1, ..., re25$ and to store them in a vector named MEAN_ER

```
vector(25) MEAN_ER
for !j = 1 to 25
       MEAN_ER(!j) = @mean(re{!j})
next
```

@coefs(k) will pull out the k-th coefficient in the regression

@tstat(k) will pull out the t-ratio for k-th coefficient in the regression

How to compute the betas and store in a matrix named betas

```
vector(25) betas
for !j = 1 to 25
       equation eq1.ls(n) re!j c (rm-rf)
       betas(!j) = @coefs(2)
next
```

Okay, now we're going to redo the analysis with Fama-MacBeth. We have already computed the mean excess returns and the betas.

- To run the period-by-period cross-sectional regressions, we need to group the excess returns together, turn them into a matrix then transpose the matrix. In Eviews, we do this by creating a group and converting it to a matrix. Call the group EXCESS_RETURNS.

```
group EXCESS_RETURNS
for !j = 1 to 25
       excess_returns.add er{!j}
next
stom(excess_returns,ER_Mat) ' CONVERT EXCESS RETURN SERIES TO A MATRIX
matrix CX_Mat = @transpose(ER_Mat) ' TRANSPOSE THE MATRIX OF EXCESS RETURNS
```

- We need to create a new page with sample size 25 then copy the excess returns and betas to the new page. Call the new page FMB

```
pagecreate(page=FMB) u 1 25 ' CREATE NEW SHEET CALLED FMB FOR 25 OBSERVATIONS

copy workfile\CX_MAT ' COPY THE EXCESS RETURNS FROM SHEET FMB
copy workfile\MEAN_ER ' COPY MEAN RETURNS AND BETAS FROM SHEET FMB
copy workfile\betas ' COPY THE BETAS
```

- Convert the matrix of excess returns into time-series. After they are converted, Eviews calls them ser01–ser362. We'll want to rename them.

```
mtos(cx_mat,cx_series) ' CONVERT THE MATRIX OF EXCESS RETURNS INTO SERIES

for !j = 1 to 9 ' RENAME THE SERIES
rename ser0{!j} timeperiod_{!j}
timeperiod_{!j}.displayname timeperiod_{!j}
next
for !j = 10 to 362
```

```
rename ser{!j} timeperiod_{!j}
timeperiod_{!j}.displayname timeperiod_{!j}
next
```

- Convert the mean returns and betas into series as well.

```
mtos(betas,BETA_S) ' CONVERT THE MEAN RETURNS AND BETAS INTO SERIES
mtos(mean_er,MEAN_RE) 'RENAME
```

- Do the Fama-Macbeth cross-sectional regressions for each time period to get a time-series of lambdas

```
vector(362) lambda
vector(362) gamma
for !j = 1 to 362
equation eq0.ls(n) timeperiod_{!j} c beta_s
lambda(!j) = @coefs(2)
gamma(!j) = @coefs(1)
next
```

- Go back to the workfile with 363 observations, copy the lambdas and gammas to this page. Convert them to time series, regress them on a constant and do Newey-West

```
pageselect workfile ' GO BACK TO SHEET workfile (SAMPLE SIZE OF 363)
copy FMB\lambda ' COPY VECTOR LAMBDA
copy FMB\gamma ' COPY VECTOR GAMMA
mtos(lambda,lambda_s) ' CONVERT THE VECTORS TO SERIES
mtos(gamma,gamma_s)
equation eqlam.ls(n) lambda_s c
show eqlam
equation eqgam.ls(n) gamma_s c
show eqgam
```

6. Run the single cross-sectional regression of the mean excess returns on the betas with constant. Report your results. Point out your point estimate for γ and λ.
7. Report the Fama-Macbeth t-ratio on λ
8. Report the Fama-Macbeth t-ratio on γ