# ECONOMETRIC METHODS

**FIN5EME**

Semester 2, 2013

## ASSIGNMENT 1

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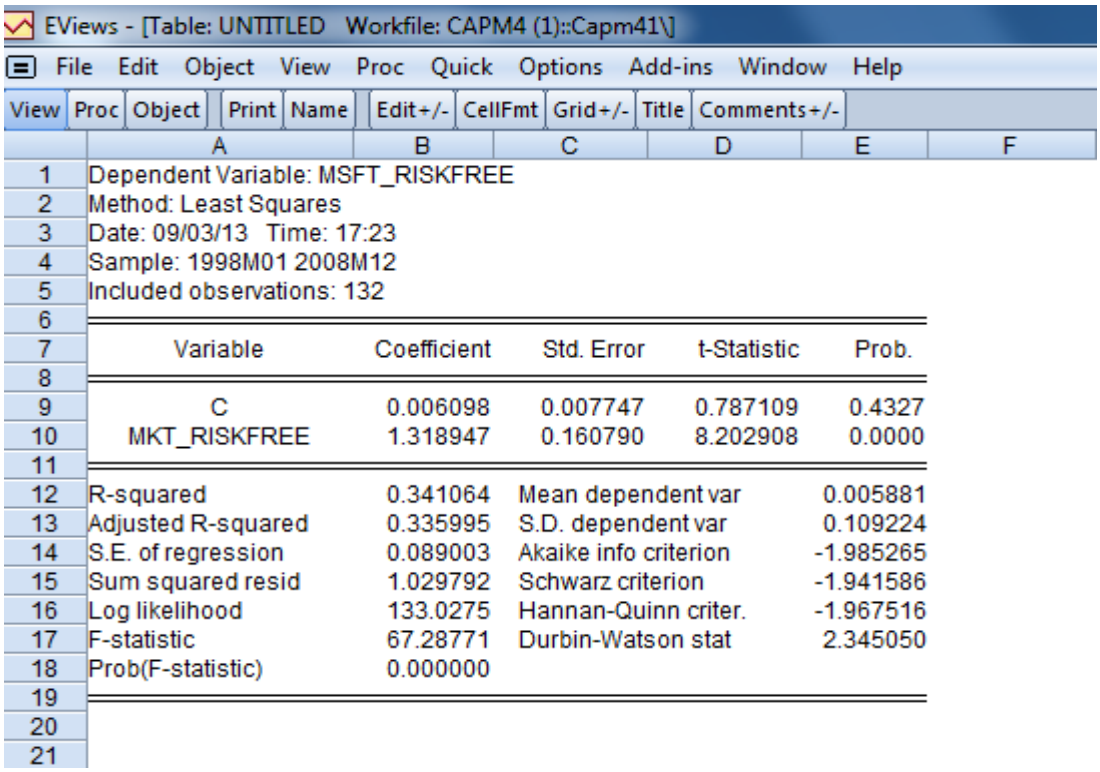
From the data file capm4.dat of textbook webpage, we have information about the monthly returns of six firms Microsoft (msft), GE (ge), GM (gm), IBM (ibm), Disney (dis), and Mobil-Exxon (xom), the rate of return on the market portfolio (mkt), and the rate of return on the risk free asset (riskfree) between January 1998 to December 2008 (132 observations cover). After running Eviews, there are 6 linear regression models such as Microsoft (msft), GE (ge), GM (gm), IBM (ibm), Disney (dis), and Mobil-Exxon (xom).

**MICROSOFT (msft)**



EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

File Edit Object View Proc Quick Options Add-ins Window Help

View | Proc | Object | Print | Name | Edit+/- | CellFmt | Grid+/- | Title | Comments+/-

Dependent Variable: MSFT_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:23
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.006098 | 0.007747 | 0.787109 | 0.4327 |
| MKT_RISKFREE | 1.318947 | 0.160790 | 8.202908 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.341064 | Mean dependent var | 0.005881 |
| Adjusted R-squared | 0.335995 | S.D. dependent var | 0.109224 |
| S.E. of regression | 0.089003 | Akaike info criterion | -1.985265 |
| Sum squared resid | 1.029792 | Schwarz criterion | -1.941586 |
| Log likelihood | 133.0275 | Hannan-Quinn criter. | -1.967516 |
| F-statistic | 67.28771 | Durbin-Watson stat | 2.345050 |
| Prob(F-statistic) | 0.000000 | | |

**GE (ge )**

EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

File Edit Object View Proc Quick Options Add-ins Window Help

View | Proc | Object | Print | Name | Edit+/- | CellFmt | Grid+/- | Title | Comments+/-

Dependent Variable: GE_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:13
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.001167 | 0.004759 | -0.245194 | 0.8067 |
| MKT_RISKFREE | 0.899260 | 0.098782 | 9.103512 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.389310 | Mean dependent var | -0.001314 |
| Adjusted R-squared | 0.384612 | S.D. dependent var | 0.069702 |
| S.E. of regression | 0.054679 | Akaike info criterion | -2.959642 |
| Sum squared resid | 0.388672 | Schwarz criterion | -2.915963 |
| Log likelihood | 197.3363 | Hannan-Quinn criter. | -2.941893 |
| F-statistic | 82.87393 | Durbin-Watson stat | 2.239423 |
| Prob(F-statistic) | 0.000000 | | |

**GM (gm)**

EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

File Edit Object View Proc Quick Options Add-ins Window Help

View | Proc | Object | Print | Name | Edit+/- | CellFmt | Grid+/- | Title | Comments+/-

Dependent Variable: GM_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:20
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.011550 | 0.009743 | -1.185474 | 0.2380 |
| MKT_RISKFREE | 1.261411 | 0.202223 | 6.237709 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.230355 | Mean dependent var | -0.011757 |
| Adjusted R-squared | 0.224435 | S.D. dependent var | 0.127106 |
| S.E. of regression | 0.111937 | Akaike info criterion | -1.526719 |
| Sum squared resid | 1.628896 | Schwarz criterion | -1.483041 |
| Log likelihood | 102.7635 | Hannan-Quinn criter. | -1.508970 |
| F-statistic | 38.90901 | Durbin-Watson stat | 2.062907 |
| Prob(F-statistic) | 0.000000 | | |

**IBM (ibm)**

EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

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Dependent Variable: IBM_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:21
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.005851 | 0.006091 | 0.960574 | 0.3385 |
| MKT_RISKFREE | 1.188208 | 0.126433 | 9.397948 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.404548 | Mean dependent var | 0.005656 |
| Adjusted R-squared | 0.399967 | S.D. dependent var | 0.090347 |
| S.E. of regression | 0.069985 | Akaike info criterion | -2.466044 |
| Sum squared resid | 0.636722 | Schwarz criterion | -2.422366 |
| Log likelihood | 164.7589 | Hannan-Quinn criter. | -2.448295 |
| F-statistic | 88.32143 | Durbin-Watson stat | 2.171986 |
| Prob(F-statistic) | 0.000000 | | |

**Disney (dis)**

EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

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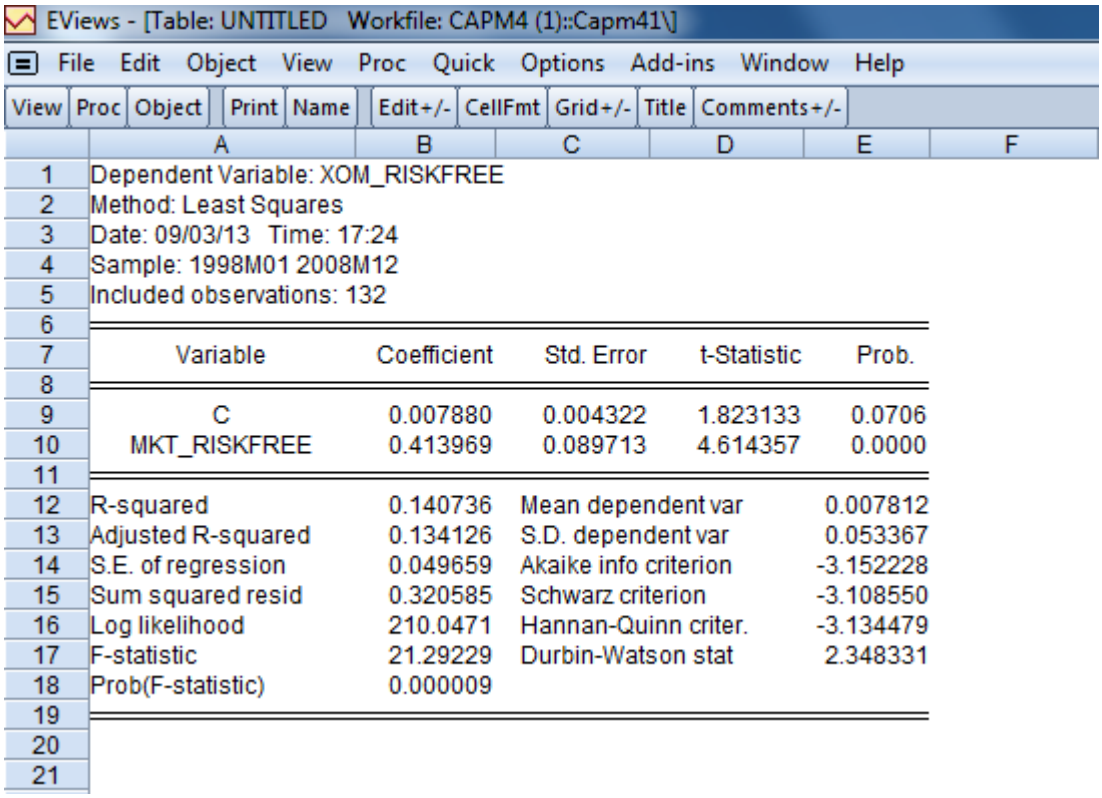
Dependent Variable: DIS_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:18
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.001149 | 0.005956 | -0.192976 | 0.8473 |
| MKT_RISKFREE | 0.897838 | 0.123627 | 7.262477 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.288621 | Mean dependent var | -0.001297 |
| Adjusted R-squared | 0.283149 | S.D. dependent var | 0.080824 |
| S.E. of regression | 0.068432 | Akaike info criterion | -2.510928 |
| Sum squared resid | 0.608775 | Schwarz criterion | -2.467249 |
| Log likelihood | 167.7212 | Hannan-Quinn criter. | -2.493179 |
| F-statistic | 52.74358 | Durbin-Watson stat | 2.426356 |
| Prob(F-statistic) | 0.000000 | | |

**Mobil-Exxon (xom)**


EViews - [Table: UNTITLED Workfile: CAPM4 (1)::Capm41\]

File Edit Object View Proc Quick Options Add-ins Window Help

View Proc Object Print Name Edit+/- CellFmt Grid+/- Title Comments+/-

Dependent Variable: XOM_RISKFREE
Method: Least Squares
Date: 09/03/13 Time: 17:24
Sample: 1998M01 2008M12
Included observations: 132

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.007880 | 0.004322 | 1.823133 | 0.0706 |
| MKT_RISKFREE | 0.413969 | 0.089713 | 4.614357 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.140736 | Mean dependent var | 0.007812 |
| Adjusted R-squared | 0.134126 | S.D. dependent var | 0.053367 |
| S.E. of regression | 0.049659 | Akaike info criterion | -3.152228 |
| Sum squared resid | 0.320585 | Schwarz criterion | -3.108550 |
| Log likelihood | 210.0471 | Hannan-Quinn criter. | -3.134479 |
| F-statistic | 21.29229 | Durbin-Watson stat | 2.348331 |
| Prob(F-statistic) | 0.000009 | | |

A linear regression models for Microsoft, GE, GM, IBM, DISNEY and Mobil-Exxon respectively, as follows

**MSFT- RISKFREE = 0.006098 + 1.318947 (MKT-RISKFREE)**

**GE-RISKFREE = -0.001167 + 0.89926 (MKT-RISKFREE)**

**GM-RISKFREE = -0.01155 + 1.261411 (MKT-RISKFREE)**

**IBM-RISKFREE = 0.005851 + 1.188208 (MKT-RISKFREE)**

**DIS-RISKFREE = -0.001149 + 0.897838 (MKT-RISKFREE)**

**XOM-RISKFREE = 0.00788 + 0.413969 (MKT-RISKFREE)**

## Question 1:

The linear regression model of Microsoft:

| |
|---|
| MSFT- RISKFREE = 0.00601 + 1.31895(MKT-RISKFREE)<br>*Se (0.089003)* *(0.007747)* *(0.16079)* |

We have a null hypothesis test for $\alpha_{msft}$ :

***Ho:*** $\alpha_{msft} = 0$

$H_a$: $\alpha_{msft} \neq 0$

⇨ We use the t – test**:**

- Test statistics:
  $t_{statistic} = (\hat{\alpha}_{msft} - \alpha_{msft}) / se(\alpha_{msft}) = (0.006098 - 0) / 0.007747 = 0.787109$
- Select $\alpha = 0.05$

– The critical value for the two-tail rejection region is the 2.5th percentile of the *t*-distribution with $N - 2 = 132 - 2 = 130$ degrees of freedom:

$t_{(0.025,130)} =$ -1.980 and the 97.5th percentile $t_{(0.975,38)} =$ 1.980

– Thus we will reject the null hypothesis if the calculated value of $t \geq 1.980$ **or** if $t \leq -2.024$

Because the level significance is not given, so we calculate the rejection points with a $\alpha$=5% and df = n-2 =132-2=130. We have critical value: $\mathbf{t_{\alpha/2,\ n-2} = t_{0.025,120}} = 1.980$

Thus, the rejection points are if t < -1.980 and if t > 1.980

Final decision: Since, -1.980 < $t_{statistic} = 0.787109$ < 1.980, so we cannot reject the null hypothesis, *Ho:* $\alpha_{msft} = 0$.

## Question 2:

If Microsoft (a Tech stock) is an ***aggressive*** stock, we will test a following one-tailed null hypothesis for their $\beta$ values:

$\mathbf{H_o: \ \beta_{msft} > 1}$

$\mathbf{H_a: \ \beta_{msft} < 1}$

We use the following t test:

$$t_{statistic} = (\beta_{msft} - \beta_{msft}) / se(\beta_{msft}) = (1.31895-1)/0.16079 = 1.98364$$

we will calculate the rejection points with a level of significance of 5 per cent for one tailed test, df = n-2 = 130, Thus, $\mathbf{t_{\alpha, n-2} = t_{0.05, 130} = 1.658}$

**Final decision: Since, -1.658 < $t_{statistic}$ = *1.98364*, so we cannot reject the null hypothesis, which means there is no significantly sufficient evidence to support that Microsoft is a defensive stock.**