Solutions

Time-Series Regression Exercise

1. [50 Points] On Collab, there is a spreadsheet (Q1Data.xls) with excess returns for 10 size-sorted portfolios as well as the market excess return. *Note that this data is "nice" in that you don't have to do any data transformations here...*

   (a) Run regressions of each excess return on the market excess return and a constant. Report your estimated parameters in a table.

   Solution 1

	$Const$	$se(Const)$	$\widehat{\beta}$	$se\left(\widehat{\beta}\right)$
Decile 1	0.0033	0.0044	0.8367	0.0985
Decile 2	−0.0022	0.0036	0.8707	0.0799
Decile 3	−0.0019	0.0030	0.9561	0.0682
Decile 4	−0.0038	0.0027	0.9451	0.0614
Decile 5	−0.0035	0.0025	0.9917	0.0565
Decile 6	−0.0041	0.0023	1.0153	0.0515
Decile 7	−0.0040	0.0019	1.0508	0.0430
Decile 8	−0.0028	0.0018	1.0641	0.0403
Decile 9	−0.0020	0.0014	1.0592	0.0318
Decile 10	0.0006	0.0003	0.9908	0.0076

   (b) Test how well the factor pricing model does for each portfolio, i.e., equation-by-equation, using t-tests.

   Solution 2 *Critical value is 1.9744. Hypothesis is that the $Const = 0$. Is rejected if $|calculated$*

statistic is| > critical value.

	calculated statistic	*Rejected?*
Decile 1	*0.76437*	
Decile 2	*-0.62522*	
Decile 3	*-0.63125*	
Decile 4	*-1.4121*	
Decile 5	*-1.3977*	
Decile 6	*-1.7876*	
Decile 7	*-2.0757*	*Rejected.*
Decile 8	*-1.5739*	
Decile 9	*-1.4058*	
Decile 10	*1.9222*	

(c) Test the model, i.e., all the pricing errors are jointly equal to zero, using:

   i. A χ^2 test given in (12.3) in Cochrane.

   Solution. Hypothesis that all pricing errors are zero is rejected at the 5 percent significance level. Critical value = 18.307; Calculated Statistic = 28.8275.

   ii. An F test given in (12.4) of Cochrane.

   Solution. Hypothesis that all pricing errors are zero is rejected at the 5 percent significance level. Critical value = 1.8915; Calculated Statistic = 2.694.

   iii. The χ^2 test derived from (12.7) in Cochrane. (This is the GMM estimator with robust standard errors.) Use 5 lags.

   Solution. Hypothesis that all pricing errors are zero is rejected at the 5 percent significance level. Critical value = 18.307; Calculated Statistic = 37.0502.

(d) Given your results from parts (*b*) and (*c*) what do you conclude about this asset-pricing model?

   Solution. Model is rejected overall, mostly as a result of one or two of the deciles. It appears to not do that bad of a job with most (all but one) of the deciles

Cross-Section Regression Exercise

2. [50 Points] Data for the project can be found here:
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html - We are using the file "Portfolios Formed on Size". Data files have also been uploaded to Collab. *Note that this data is not "nice" - you do need to do data transformations here and make sure you are working with the correct data...* When you report your results, provide a brief interpretation of the results - generally, this should be a short paragraph.

(a) Use the 10 size-sorted portfolios to test the CAPM for the time period 1963:7-2010:12 using a two-step cross-sectional regression. Use GLS in the second step and do not include a constant. What is your estimate for the compensation for beta risk?

Solution 3 *The GLS estimate of λ is* 0.486.

(b) Can you reject the hypothesis that this coefficient is zero?

Solution 4 *With a standard error of* 0.190 *and a t-statistic of* 2.558, *we cannot reject the hypothesis that the coefficient is zero.*

(c) Can you reject the hypothesis that the CAPM is an adequate description of the data?

Solution 5 *We cannot reject the hypothesis that the CAPM adequately describes the data - the test statistic, distributed as chi-square with* 9 *degrees of freedom, has a value of* 9.034.