

**Exam No. 1 on Topics from Chapters 2 through 9 (1.5 hours)**

A general version of the capital asset pricing model (CAPM) used in finance literature is the following.

$$(A) \quad SR_t = b_1 + b_2 MR_t + b_3 RFR_t + u_t$$

where  $SR$  is the rate of return of a company's stock,  $MR$  is the rate of return of a market average portfolio (such as the Standard and Poor stock average), and  $RFR$  is the return of a risk free asset (such as, for example, the three-month Treasury bill). You have data on  $SR$ ,  $MR$ , and  $RFR$  for a company for 52 periods.

1. (5 points)

A more commonly used version of CAPM is the following.

$$(B) \quad SR_t - RFR_t = a (MR_t - RFR_t) + v_t$$

Write down the null hypotheses on the  $b$  s (which should not involve  $a$  ) that will make (B) the restricted model (Model A would be the unrestricted model).

2. (5 points)

To use Wald test on your hypotheses, describe the variables to generate and the regressions to run.

3. (3 points) Describe how you would compute the test statistic.

4. (2 points) Write down its distribution and the numerical value of the d.f.

5. (5 points)

Describe how you would carry out the test (at the 5% level) . Give numerical values where known.

6. (8 points)

Suppose you have used appropriate tests on Model A and found that there is serial correlation of the first order in the residuals, that is,  $AR(1)$ . Describe, step by step, how you would go about using the mixed (that is, hybrid) Hildreth-Lu and Cochrane-Orcutt procedure to estimate the parameters.

7. (12 points)

Describe how you would test Model A for  $AR(4)$  and, if present, estimate it by the Generalized Cochran-Orcutt procedure.