2nd set GAUSS assignments Financial Econometrics

In this practical exercise we try to evaluate the GMM objective function via a two-dimensional grid search for the Consumption Based Model (for details on the CBM, see Cochrane(2001) ch.1 and ch.2).
The basic pricing equation for the return of any asset i is:

$$E_t[m_{t+1}R^i_{t+1}] = 1$$

with m_{t+1} being the stochastic discount factor. In the Consumption Based Model the stochastic discount factor is the marginal rate of substitution:

$$m_{t+1} = \beta \frac{u'(c_{t+1})}{u'(c_t)}$$

Using the power utility function this results in

$$m_{t+1} = \beta \left(\frac{c_{t+1}}{c_t} \right)^{-\gamma}$$

This result can be translated directly into moment conditions:

$$E_t[m_{t+1}R^i_{t+1} - 1] = E_t \left[\beta \left(\frac{c_{t+1}}{c_t} \right)^{-\gamma} R^i_{t+1} - 1 \right] = 0$$

1. Create an objective function to estimate the parameter β and γ

First, load the consumption growth data and the return data into a GAUSS matrix. Consumption growth data from 2nd quarter 1947 to 4th quarter 1993 are provided in the file `consgr_1947Q2_1993Q4.fmt`. Return data for ten portfolios (1st size decile to 10th size decile) from 2nd quarter 1947 to 4th quarter 1993 are provided in the file `ret_dec10_1947Q2_1993Q4.fmt`. You can load those files with the `load` command (look it up in the GAUSS Help).

GAUSS procedure:

Write a procedure which returns the objective function

$$Q(\beta, \gamma) \equiv g'Wg$$

where W is the identity matrix and

$$g = \begin{bmatrix} \sum_{t=1}^{T} \left[\beta \left(\frac{c_{t+1}}{c_t} \right)^{-\gamma} R_{t+1}^{1} - 1 \right] \\ \vdots \\ \sum_{t=1}^{T} \left[\beta \left(\frac{c_{t+1}}{c_t} \right)^{-\gamma} R_{t+1}^{10} - 1 \right] \end{bmatrix}$$

Input arguments are the values for β and γ.

2. Evaluating the objective function

GAUSS procedure:

Evaluate the objective function for different values of β and γ in a grid search. For instance, this can be done by using two `for` loops and calling on the procedure created above. Save the values of β and γ together with the corresponding value of the objective function. Input arguments are the `start\end\step` values of the `for` loops. The output argument is a matrix that contains the value of β, γ and of the associated objective function. Read out the minimum and print it into the output window together with the corresponding parameter values.

Plot the objective function and the corresponding values for β and γ first into a simple three dimensional `XYZ` plot. And second into a surface plot. The Gauss command is `surface.`You have to reshape your output matrix containing the values of the objective function. Look the command `surface` up in the help reference for details on the syntax (pay close attentions to the dimensions of the input variables for this command!). Label the axis and define a title for your graphs.
Hint: In order to get a nice plot you can loop over the values 0.98 to 1 in steps of 0.0005 for β and from 235 to 242 in steps of 0.1 for γ.

This assignment can be handed in for grading until 18th Nov. 2008.
If you want to hand in this assignment for grading, include a pdf file (beside your program code) that shortly describes the procedures. Include the graphs generated by Gauss and explain and interpret them. Moreover, outline the features of the Consumption-Based Model. What is the interpretation of the parameters β and γ within this framework?
Send your program code and the pdf file to franziska-julia.peter@uni-tuebingen.de