Assignment 1: Mean–Variance analysis (part 1)

Purpose of the assignment:

- Install GAMS and get familiar with running GAMS.
- Complete a Mean Variance model in GAMS and verify the results.

The steps:

1. Download GAMS:

   (a) Save the gams license file (windows or mac) on your computer.

   (b) Download the newest version of GAMS from http://www.gams.com/download/

   (c) Select the license file when you are asked to copy an existing license file under installation.

   Note that the license file is a time limited full size GAMS/CPLEX and GAMS/CONOPT license and will automatically expire after some months.

2. Start the GAMS/IDE and choose File/Project/New Project and create a project file. Call the project for example ex01.gpr.

3. Save the file meanvar1.gms in this project. Open the file meanvar1.gms in the project.

4. Study the file to get familiar with the structure of a gams file.

5. Use the $exit command to help you debug your GAMS code. Once you write $exit at a given point in your GAMS file all the statements following the $exit command will not be executed. You are effectively commenting out the rest of the code from the $exit point. Use the display statement followed the $exit command to see the contents of the set, parameter or variable you are displaying. For example write $exit after the following display statement in file:

   ```
   display i, ExpectedReturns, VarCov;
   $exit
   ```

6. Press F9 to run GAMS or click on the red arrow on the tool bar.

7. A file called meanvar.lst is now generated and opened in GAMS. Choose the .lst file and browse through its contents. In particular note what is there under the Display statements.

8. Now remove the $exit again. Two lines in the equation definitions are missing. You should fill in those two lines.

9. Run the model several times with different values for lambda (between 0 and 1) and observe how the optimal strategy changes, i.e. what combination of assets is chosen and what is the corresponding mean and variance for that given combination.

   hint 1: In order to be able to use the // sign for making comments write the GAMS command ($eolcom //) in the beginning of your GAMS program.

   hint 2: You can use the GAMS option (OPTION decimals = 6;) in order to get an output with a decimal precision of 6.