STAT0011
Decision and Risk

In-Course Assessment (ICA) 2025

Hand-in Date: Friday 28th March 2025
Hand-in Time: 4pm

General submission rules and information

- This ICA consists of group work. **Students alone are responsible for forming groups of size 3.**
- Your report can be composed in any way that you find convenient (R markdown, LaTeX, Word). However, please save the final version of your main report as a PDF file with filename group_N_report.pdf, where N is your group number.
- Each group will submit **3 files**: (1) one PDF file that includes the main report, (2) the original data set of selected stock prices (excel or csv), and (3) one R script. You will still need to include all the relevant R code in the main report for marking and feedback purposes (data and R script may be used to verify results). An example of the structure of the report expected from groups will be provided in due course.
- All 3 files must be submitted via the "ICA 2025 Information" section of the Moodle page. Each group member must click their respective submit buttons in order for the group's submission to be successful and final. By ticking the submission declaration box in Moodle you are agreeing to the following declaration:

  ***Declaration**: I am aware of the UCL Statistical Science Department's regulations on plagiarism for assessed coursework. I have read the guidelines in the student handbook and understand what constitutes plagiarism. I hereby affirm that the work my group is submitting is our own and entirely produced by the indicated group members.*

Turn Over

- Any plagiarism will normally result in zero marks for all students involved, and may also mean that your overall examination mark is recorded as non-complete. Guidelines as to what constitutes plagiarism may be found in the Departmental Student Handbooks. The relevant excerpt is also posted in the "ICA 2025 Information" section of the Moodle page.
- Working together and discussing solutions **within your own group is fine** and the usual plagiarism regulations do not apply to this. However, they do apply to plagiarism of work of other groups or other sources. Do not discuss your work with students that are not members of your group. Do not show your work to students that are not members of your group.
- The **Turn-It-In®** plagiarism detection system may be used to scan your submission for evidence of plagiarism and collusion.
- To allow anonymous marking, provide only group number "**Group N**" on the front page of the report. Please do NOT write your names on the report, or any other identifying information.
- The main report must be typed and must NOT contain more than **30 A4 pages**, including graphs, tables, pictures, and R code. The report should have reasonable margins and a font size no less than 10pt. Submissions exceeding the maximum length limit will be normally ignored in terms of marking. **This is a generous limit, which you shouldn't aim to reach: taking up more space will not gain more marks.**
- Late submission will incur a penalty unless there are extenuating circumstances supported by appropriate documentation. Penalties are set out in the student handbook of the Department of Statistical Science.
- Non-submission of in-course assessment may mean that your overall examination mark is recorded as "non-complete", i.e. you might not obtain a pass for the course.
- The group work will be assessed through the use of the UCL IPAC tool, Individual Peer Assessed Contribution (IPAC). More information will be provided in due course.
- A feedback sheet will be returned to you. You will receive a provisional letter grade – grades are provisional until confirmed by the Statistics Examiners' Meeting in June 2025.

Continued

Task

You have been receiving numerous advertisements from a social trading platform eDoro. The platform promises to provide a free account with no management fees and 0% commissions on stock investments. You become interested in opening an account with eDoro, and investing in a portfolio consisting of two stocks. However, you are also aware that this investment carries a certain level of risk. Conveniently, you have recently enrolled on a course called "Decision and Risk", and you have learned copula-based models for measuring the market risk of a portfolio of financial assets. Your initial search for potential financial stocks resulted in the following six candidates for investment:

1. FTSE100 is a share index of the 100 companies listed on the London Stock Exchange with the highest market capitalisation.

2. S&P500 is an American stock market index based on the market capitalizations of 500 large companies.

3. The Shanghai Stock Exchange (SSE) Composite Index is a stock market index made up of all the A-shares and B-shares that are traded at the Shanghai Stock Exchange.

4. DAX is a blue chip stock market index consisting of the 30 major German companies trading on the Frankfurt Stock Exchange.

5. Nikkei 225 is a price-weighted stock market index that includes the top 225 blue-chip companies listed on the Tokyo Stock Exchange.

6. CAC 40 is a stock market index that represents a capitalization weighted measure of the the performance of the 40 largest and most actively traded shares listed on Euronext Paris.

   Select two stock indices of your choice and obtain data for weekly prices for the period 2000 - 2023 (you are free to choose any starting and ending weeks within the start and end year). [**Hint**: Data can be downloaded from `finance.yahoo.com`]. Using log-returns for these two stock indices, construct an equally-weighted portfolio. Estimate the 99% and 95% 1-Week Value-at-Risk of the portfolio using the Monte Carlo simulation approach based on copula theory. [60]

End of Paper