FIN 36182 FINANCIAL ECONOMETRICS
group assignment

Autumn 2024

Exam component weight: 40%

To be answered in groups of 1-4 students.

Upload your solution paper to WISEflow. Check the date and time of the deadline in WISEflow. Your solution paper may have up to 10 pages plus an appendix, which has to be uploaded as a separate attachment and does not count towards the 10 pages.

For your solution paper, please use the standard BI template paper and stick to the default font style, font size, line spacing, margins, etc. To save your Word document as PDF file, go to "File," "Save As," click on "Word document (.docx)" to open the drop-down menu, select "PDF (*.PDF)," and hit "Save." Upload your PDF file as the solution paper in WISEflow.*

A separate attachment (as a PDF file) has to be uploaded in WISEflow. This appendix will contain your complete R code. You can either produce this by using RStudio or copy your code into Word and export it as a PDF file. You do not need to show the output of the code. Notice that the solution paper should be self-contained, and should not refer to the appendix for results or tables. Upload the resulting PDF file as an attachment to your solution paper in WISEflow.

Read each question carefully and give precise answers. Report numerical answers using four digits after the decimal place.

Please note that neither the instructor nor the TAs can assist you with the exam. The student code of conduct applies: the solution paper must be written and prepared by the corresponding group members only. Collaboration with classmates or other individuals outside the group is not permitted and is considered cheating. All papers are automatically subject to plagiarism control.

Good luck!

Introduction.

In an attachment to this assignment, you will find the CSV file *Industry_ Portolios.csv*, which has 6 columns (from the Kenneth French database). The first column provides the date in "YYYYMMDD" format. The next 5 columns contain monthly simple returns in different industries. Notice that returns are multiplied by 100, so 1 is a 1% return. Start by importing the data into R. After you have done that, answer all of the questions below in your solution sheet. ***Unless otherwise indicated, report returns, standard deviations and Sharpe ratios at an annual frequency and in decimals*** (that is, 0.01 for 1% return). Do not include your code in your solution sheet. For each numerical answer, use the *round( )* function to set the precision of your reported values. There are 20 questions distributed over 3 tasks. Each question is worth 5 points.

Task 1

1. Report the arithmetic mean of the returns for each of the five industries over the entire sample.
2. Repeat point (1), but for the standard deviation.
3. Report the Sharpe ratio of each industry. You may choose to present result for (1)-(3) jointly in a table.
4. Is there evidence that technology stocks have better risk-adjusted returns?
5. Provide a table (5×5) with the sample correlation between the returns of the five industries. Comment briefly.
6. Construct a time series of the simple, non-cumulative returns of a portfolio where capital is allocated equally across the first four industries (excluding *Other*). Report the arithmetic mean, standard deviation and Sharpe. Comment briefly on the gains achieved by this diversified portfolio.

Task 2

In this task you will treat the portfolio you computed in Task 1, point (6), as the market portfolio, denote its returns as R_m, and will estimate and interpret *beta* and *alpha* coefficients in the context of the CAPM.

1. Compute the kurtosis and skeweness of R_m.
2. How do the values in (1) compare with the normal distribution?
3. Repeat point (1), but eliminating the first 70 years of data (i.e. from 199706).

4. Compute and report the covariance of the first four industries with R_m.

5. Use the results obtained so far to compute the *beta* values for the first four industries for the full sample.

6. Compute the *beta* values for the first four industries for the sample starting from 199706. Briefly comment on how results compare with those in point (5).

7. Assuming a risk-free rate of 5%, compute Jensen's alpha for each of the first four industries (on the full sample). Report the alpha in percentage terms. Briefly discuss your results.

Task 3

Use the *lm( )* function to run a few regressions:

1. Regress $R_m(t)$ on an intercept and on $R_m(t-1)$. Report estimates and t-statistics. Briefly interpret the results.

2. Regress $R_m(t)$ on an intercept and on $(P_m(t-1)/P_m(t-13)-1)$. Report estimates and t-statistics. Briefly interpret the results.

3. Are the t-statistics reported by *lm( )* in (2) reliable? Explain.

4. Regress $R_m(t)$ on an intercept and on $abs(R_m(t))$. Report estimates and t-statistics. Briefly interpret the results.

5. Repeat (1) on data from 199706. (Delete all data prior to 199706, then compute lagged returns). Comment briefly.

6. Repeat (2) on data from 199706. (Delete all data prior to 199706, then compute lagged returns). Comment briefly.

7. Repeat (4) on data from 199706. Comment briefly.