

properties of a set of asset returns, eventually to construct a set of two asset portfolios and evaluate their returns:

- Submission 1 will require you to obtain the returns data of 5 assets of your choice, construct the log daily returns for these assets, do exploratory data analyses and study the univariate time series properties of each of the assets individually, using the methods from Modules 1, 2 and 3.
- Submission 2 will require you to study and compare the univariate volatility properties of the asset returns, as well as their multivariate time series properties using the methods of Modules 4 and 5.
- Submission 3 will require you to study the nature of extreme events in each returns series, construct and compare bivariate copulas to study pairwise correlations of extreme events in the returns, and to construct and evaluate the performance optimal pairwise portfolios.

Instructions

Your group is required to submit three versions of the group work project during the Econometrics course. Within one week of the first and second submissions, your lecturer will provide detailed feedback, enabling you to improve the substance, clarity, cohesion and structure of your third and final submissions.

Your research should favor authoritative, scholarly sources, and you must cite all sources where relevant. The task is not to reproduce the research of others, but instead to develop your own systematic narrative that addresses the research topic and is informed by the research of others. Not only are you required to cite accurate and relevant facts, but you should also present your own clear logic when linking and contextualizing these facts.

For each submission date, **your group is only required to answer the relevant specified question; however, it is important to approach all three with the overarching topic in mind.**

Submission 1: Univariate Analysis of Asset Returns

3.1.1. Obtaining and transforming Data

You can obtain historical price data from this website for most commonly traded assets on the New York Stock Exchange, for example. You should download a dataset with the daily closing prices of five assets of your choice.

From this price data, you should construct the log daily returns r_{it} for each asset i :

$$r_{it} = \ln P_{it} - \ln P_{it-1}$$

3.1.2. Exploratory Data Analysis

Following the procedures in Module 1, do the following analyses and provide a brief summary discussion of what you learn:

1. Generate a time plot of all five price (not return) series on the same graph and give a brief discussion of the similarities and differences you observe.
2. For each asset returns series individually, provide the following and discuss the differences and similarities across the five assets:
 - a. A time plot.
 - b. A kernel density plot comparing the return series to the closest normal distribution.
 - c. A normal quantile-quantile plot.
3. For all pairs of assets, provide a scatter plot of the returns of one asset against the other, and compute the correlation matrix of the five assets.

3.1.3. Univariate Time Series Analysis

Following the procedures in Module 3, provide the following analyses and discuss your results, comparing similarities and differences across the different assets:

1. Stationarity analysis of the price series, returns series as well as the square of the returns series.
2. Find a parsimonious and encompassing ARMA model of each of the returns series as well as the square of each returns series. Are there significant auto-correlated properties? Recall from Module 1 that returns series are often characterized by low autocorrelation, so you might find that the best model has AR/MA components.

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Submission status