Advanced Risk Management: Assignment 4
Nanyang 2024 Professor John R. O'Brien

Name: _____

Advanced Risk Management Assignment 4 (100-points total)

Questions

Question 1 (3-parts, 100-points) _____

Instructions

This assignment is to be completed individually and papers will be checked for any collusion. Answers should be concise and focus on the question asked. Submission is individual in the Assignments section of the course canvas.

Note: Answers to Question 1 should only be submitted as either a word or pdf file. Support Python code can be uploaded in either .txt or .IPYNB file. That is answers cannot be combined into a single .IPYNB file. Your uploaded files should contain your Andrew ID as part of the filename.

Due Date: Prior to 11.59pm June 3 uploaded via the Course Canvas Assignments section – Assignment 4. Missed deadline automatically attracts a penalty.

Assignment 4 is an individual not a team assignment.

The datafile referred to in Question 1 is available from the Course Canvas Modules section (Module Title: Individual Assignment 4 Data)

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Question 1: 100-points (30, 30, 40 respectively). This question requires using the dataset "ConstantMaturities.csv" provided in the Modules section (Assignment 4) of the Course Canvass.

The banking business model is inherently risky because a bank raises its funds short term but lends at longer terms than what is raised the funds at. As a result, managing interest rate risk is a critical part of a bank's operations and today's risk manager has a variety of tools at their disposal.

The datafile, "ConstantMaturities.csv" provides over 20 years of selected constant maturity interest rates ranging from three months (CM03) to 30-years (CY30). Download this file from the modules section of the course canvas and then answer the following.

Required:

1. Provide a formal analysis of interest rate behavior over time by applying the econometric concept of cointegration. Summarize and interpret the results of your analysis from an statistical/econometric perspective.
2. Provide an interpretation of your results from part 1, in terms of what general insights they provide for predicting and managing the interest rate risk associated with the banking business model.
3. Using the data provided design and test (including back-testing) a pairs trading strategy for the 3-month and 5-year pair of constant maturity rates. For this part you can assume that the constant maturity rates are the closing prices for each day. Provide supporting reasons for any assumptions and choices you make.

As part of your answer Include your Python computer code supporting parts 1 and part 3 analysis in a separate .txt or .IPYNB file. You are permitted to enlist AI support for your Python programming code as needed.